

POECILOSTOMATOIDA COPEPODS OF THE FAMILY CORYCAEIDAE DANA, 1852 IN INDONESIAN WATERS

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Abstract

Taxonomic study was made on the species of the family Corycaidae recently collected from 8 sites in Indonesian waters. Twelve species, including 2 subgenus Corycaeus (C. speciosus Dana, 1849, C. crassiusculus Dana, 1849), 4 subgenus Ditrichocorycaeus (C. andrewsi Farran, 1911, C. asiaticus Dahl, 1894, C. erythraeus Cleve, 1901, C. lubbocki Giesbrecht, 1892), 1 subgenus Monocorycaeus (C. robustus Giesbrecht, 1891), 2 subgenus Onychocorycaeus (C. catus Dahl, 1894, C. pacificus Dahl, 1894), 1 subgenus Urocorycaeus (C. longistylis Dana, 1849), and 2 species of genus Farranula (F. concinna Dana, 1849, F. gibbula Giesbrecht, 1892) were recorded.

Descriptions, measurements, and figures are given for all species, along with a review of their distribution over the world's oceans, with taxonomical remarks, and restricted synonymies.

Key words: Poecilostomatoida Copepods, Corycaidae, *Corycaeus*, *Farranula*, description key, Indonesian water.

Introductions

The species of the genera *Corycaeus* and *Farranula* (= *Corycella*) occur in tropical and subtropical seas. These groups of copepods are easily recognized by the peculiar structure of their bodies and by their large paired eyes, and they are very useful indicator forms of warm ocean currents.

In Indonesian waters, hitherto, 17 species of this family have been reported by Carl (1907), A. Scott (1909), and Früchtl (1924). Unfortunately, they did not provide figures or adequate descriptions of most of the species collected. There are also some doubtful records species, which need to be studied more accurately.

The family Corycaidae is divided into two genera, *Corycaeus* Dana, 1852 and *Farranula* Wilson, 1932. Dahl (1912) divided the genus *Corycaeus* into six subgenera, *Agetus*, *Corycaeus*, *Ditrichocorycaeus*, *Monocorycaeus*, *Onychocorycaeus*, and *Urocorycaeus*.

This paper concentrates on the family Corycaidae collected during 10 years in 8 sites along Indonesian coastal waters.

Material and Methods

Samplings were done by were surface towing and vertical hauls from 10-25 m depth to the surface of conical plankton nets (0.1 mm and 0.33 mm mesh size; 0.35 m and 0.45 m diameter mouth aperture). The samples were collected from 8 sites in Indonesian waters (Figure 1). The samples were fixed and preserved in 5% formaldehyde/sea water solution.

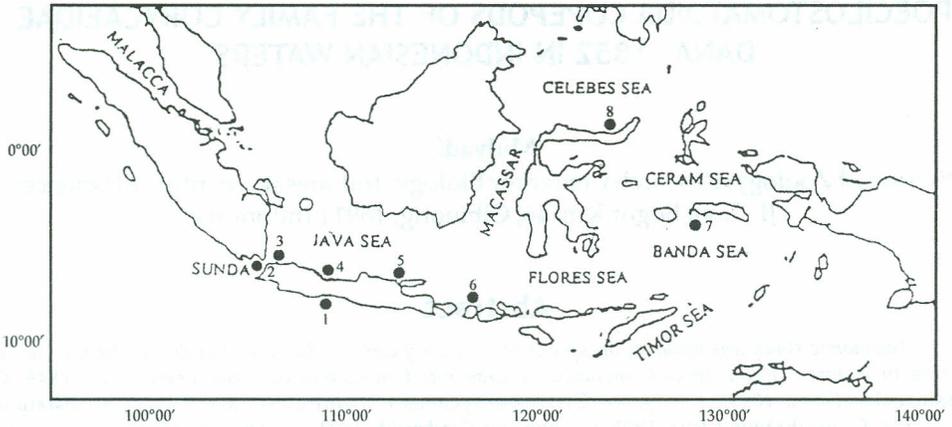


Fig. 1. Indonesian waters showing study sites 1-8.

1. Cilacap Bay, Central Java ($07^{\circ}40'2''S$ $109^{\circ}00'2''E$)
2. Off Labuan, West Java ($06^{\circ}10'2''S$ $106^{\circ}00'2''E$)
3. Jakarta Bay-Seribu Islands ($06^{\circ}00'2''S$ $106^{\circ}45'2''E$)
4. Off Tegal, Central Java ($06^{\circ}00'2''S$ $109^{\circ}10'2''E$)
5. Off Surabaya, East Java ($07^{\circ}10'2''S$ $109^{\circ}10'2''E$)
6. Sumbawa Sea ($08^{\circ}40'2''S$ $112^{\circ}45'2''E$)
7. Ambon Bay ($03^{\circ}40'2''S$ $128^{\circ}10'2''E$)
8. Off North Celebes ($01^{\circ}30'2''N$ $124^{\circ}00'2''E$)

Abbreviations used as follows: A1, antennule; A2, antenna; Ms1-Ms5, metasomal somites 1-5; Ur1-Ur5, urosomal somites 1-5; B1-B2, coxa, basis; Re1-Re3, exopodal segments 1-3; Ri1-Ri3, endopodal segments 1-3; Se, outer spine; Si, inner spine; St, terminal spine. Length of prosome and urosome were taken dorsally from the anterior of head to the posterior end of the last metasomal somite; and from anterior margin of genital somite to posterior end of CR excluding setae.

Discussion

Twelve species of family Corycaeidae, including 10 species of *Corycaeus* and two species of *Farranula* were recorded (Table 1). Of the 10 species of *Corycaeus* described here 2 belong to subgenus *Corycaeus* (*C. speciosus* Dana, *C. crassiusculus* Dana), 4 to subgenus *Ditrichocorycaeus* (*C. andrewsi* Farran, *C. asiaticus* Dahl, *C. erythraeus* Cleve, and *C. lubbocki* Giesbrecht), 2 to subgenus *Onychocorycaeus* (*C. catus* Dahl and *C. pacificus* Dahl), 1 to subgenus *Monocorycaeus* (*C. robustus* Giesbrecht), and 1 to subgenus *Urocorycaeus* (*C. longistylis* Dana).

Most of these species occur in eastern Indonesian waters, and only 3 species (*C. asiaticus*, *C. lubbocki*, and *F. gibbula*) were found from Java Sea. *C. asiaticus* and *F. gibbula* have been found to be most widely distributed species in the examined collections. *C. crassiusculus*, *C. longistylis*, *C. robustus*, and *C. speciosus* were found only from the

high saline regions of eastern Indonesian waters (Sites 6, 7 and 8). The less abundant species, *C. catus* and *C. speciosus* are common in the warm waters of all oceans. Both species were found only from sites 7 and 7 and 8 respectively. The remaining rarely occurring species, *C. pacificus* and *C. robustus* were found at only a few sites (Sites 7 and 7 and 8).

More than 75% (9 species) of Indonesian corycaeid species belonging to Indo-Pacific species, 2 species (*C. crassiusculus* and *C. speciosus*) are cosmopolitan species. The species are only recorded from the Pacific Ocean occupy 8.33% (1 species, *C. longystylis*).

Table 1. Species list of the genera *Corycaeus* and *Farranula* recorded in the present study, their sampling sites and their previous records in Indonesian waters, neighbouring areas and the major oceans. o = present records, • = previous records, A = Indonesian waters, B = Australian waters, C = China Seas, D = Japanese waters, E = Philippine waters, I, P, At = Indian, Pacific, and Atlantic Oceans.

No.	Species	Sites								Neighb. areas				Remarks	
		1	2	3	4	5	6	7	8	A	B	C	D		
1.	<i>C. andrewsi</i>	o					o	o	o	•	•		•	IP	O
2.	<i>C. asiaticus</i>	o		o	o	o	o		o	•	•		•	IP	O
3.	<i>C. catus</i>	o					o			•	•	•	•	IP	O
4.	<i>C. crassiusculus</i>						o	o	o	•	•		•	IPA	O
5.	<i>C. erythraeus</i>	o					o	o	o	Nr	•			IP	O
6.	<i>C. longystylis</i>							o	o	•	•	•	•	P	O
7.	<i>C. lubbocki</i>	o			o		o	o	o	•	•			IP	O
8.	<i>C. robustus</i>							o	o	•	•			IP	O
9.	<i>C. pacificus</i>	o							o	•	•	•		IP	O
10.	<i>C. speciosus</i>							o	o	•	•	•	•	IPA	O
11.	<i>F. concinna</i>							o	o	•	•	•	•	IP	O
12.	<i>F. gibbula</i>	o		o			o	o	o	•	•		•	IP	O

Family Corycaeidae Dana, 1852

Diagnosis.- Prosome cylindrical or conical, 2-4 segments. Cephalon with pair of prominent ocular lenses located close together, sometimes contiguous. Posterolateral ends of Ms3 and usually Ms4 pointed, Ms5 very short. Urosome composed of 2-3-somites, CR usually long and narrow, with 3 terminal and 1 lateral setae. A1 6-segmented, with non plumose setae and without aesthetascs, not geniculate in male. A2 prehensile, with long spines on B1 and B2, terminal spine longer in male than in female. Maxilla 2-segmented, ending in strong hook; maxilliped 3-segmented. P1-P4, Re 3-segmented; Ri 3-segmented in P1-P3, 1-segmented or absent in P4; P5 represented by 2 unequal setae.

Genus *Corycaeus* Dana, 1852

Diagnosis.- A2, B1 and B2 with non plumose setae in female; B2 with fine plumose seta in male. Urosome composed of 3 somites (2 somites in subgenus *Agetus*), ventral process rounded. P1-P3, Re with 1, 1, 3 outer spines respectively; P4 with rudimentary Ri consisting of small knob bearing 1 or 2 setae; Re with 0, 1, 1 outer spines.

Dahl (1912) divided this genus into six subgenera, *Agetus*, *Corycaeus*, *Ditrichocorycaeus*, *Monocorycaeus*, *Onychocorycaeus*, and *Urocorycaeus*.

Genus *Corycaeus* Dana, 1852

1. Female CR at least as long as urosome, and not divergent; male CR always longer than urosome *Urocorycaeus*
Female CR seldom longer and then strongly divergent; male CR always shorter than urosome 2
2. Peg-like projection (Ri) on P4 has 2 bristles, and behind this peg, there is a small bulge; size usually less than 1 mm; male Ur1 generally with a ventral hook or point *Ditrichocorycaeus*
Ri of P4 with 1 bristle only and no bulge; Ur1 of male without ventral hook (except in *Onychocorycaeus*) 3
3. Size seldom if ever exceeds 1.2 mm, the females have a very broad cephalosome and Ms1 is usually two-thirds as broad as long; the end hook of the male A2 overhangs both basal segments *Onychocorycaeus*
Size greater than 1.2 mm, the female cephalosome more elongate, and Ms1 is less than two-thirds as broad as long; the end hook of the male A2 does not overhang the base of the 1st segment 4
4. The large end hook of the male A2 is about twice the length of the small one, or even longer, the female Ur1 sometimes projects; above the base of anal somites; the female urosome is 2-segmented, and the CR strongly divergent; in female A2 one basal bristle at least twice as long as the other; male A2 with pointed tooth on distal inner margin *Corycaeus*

Descriptions

Corycaeus (Corycaeus) speciosus Dana, 1849

(Figure 2)

Corycaeus speciosus, Brady, 1883: 115, pl. 45, figs. 5-6; Giesbrecht, 1892: 673, pl. 51, figs. 29, 39-40; Thompson & Scott, 1903: 285; Wolfenden, 1906:1026; Breemen, 1908: 199, figs. 212a-b; Scott, 1909: 251; Farran, 1911: 289; 1929 : 291; 1936:134; Mori, 1929: 203, pl. 8, figs. 13-18;

Corycaeus (Corycaeus) speciosus, M. Dahl, 1912: 13, figs. 1-2; Rose, 1933: 326, fig. 422; Dakin & Colefax, 1940: 111, fig. 195a-e; Sewell, 1947: 276; Krishnaswamy, 1953: 70, figs. 12-13; Tanaka, 1957: 79, figs. 1-6; Motoda, 1963: 213, fig. 3; Chen & Zhang, 1974: 53, pl. 14, figs. 9-13.

Corycaeus various (part) Dana, 1848: 36; 1852: 1211, pl. 85, figs. 1, 2d.

Corycaeus remiger Dana, 1848: 38; Tanaka, 1986: 1, 97.

Corycaeus longicaudatus Dana, 1848: 39.

Corycaeus longicaudis Dana, 1852-1855: 1226, pl. 86, figs. 9a-c.

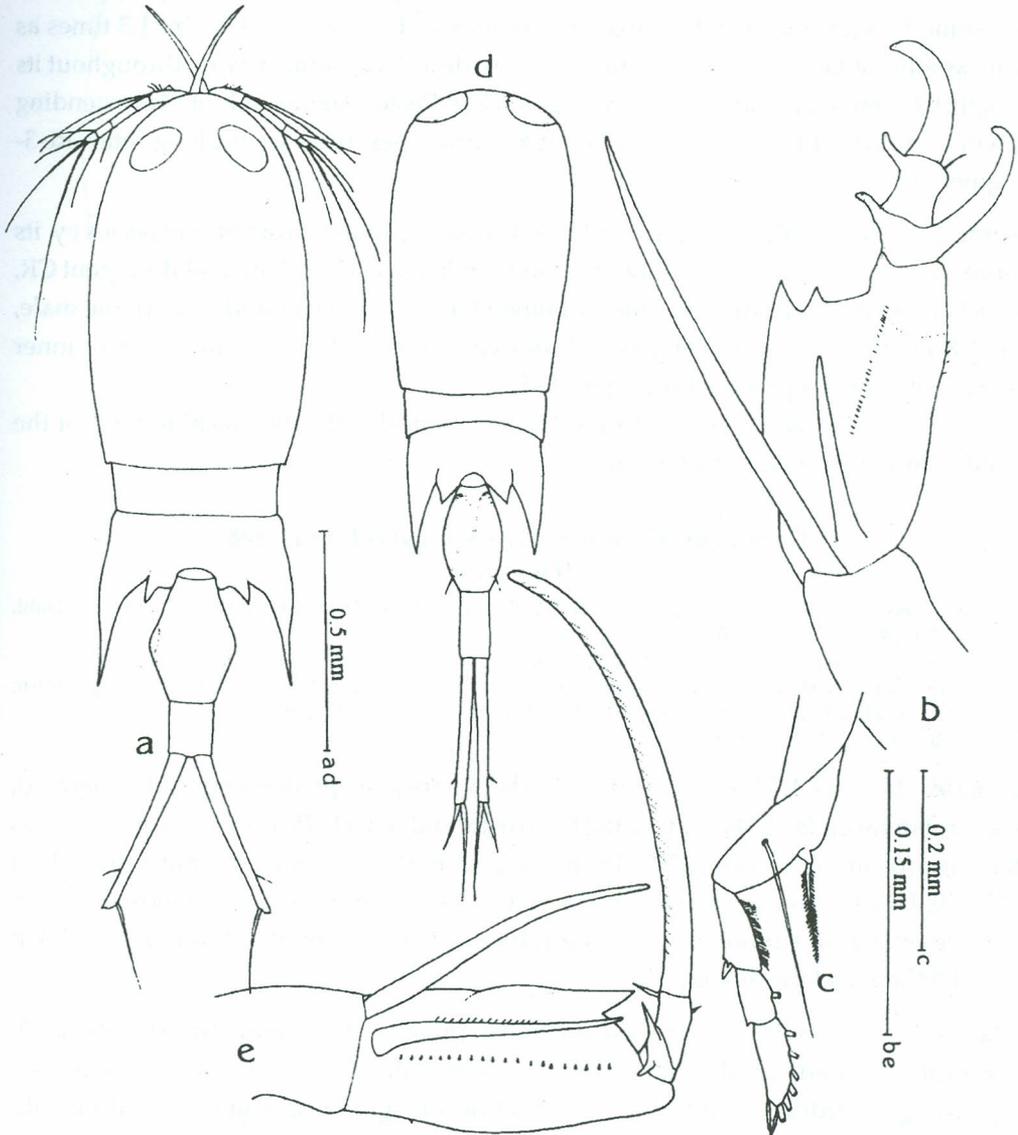


Fig. 2. *Corycaeus (Corycaeus) speciosus* Dana, 1849. Female, a, whole animal, dorsal view; b, 2nd antenna; c, 4th leg; male, d, whole animal, dorsal view; e, 2nd antenna.

Female.- TL. 1.85-1.98 mm (based on 10 specimens).- Prosome about 1.7 times as long as urosome (excluding CR). Cephalon and Ms1 partially fused. Posterolateral ends of Ms3 reaching about 4/5 distal end of genital somite. Urosome composed of 2 somites.

Proportional lengths of urosomal somites and CR 36 : 15 : 49. Ur1 1.3 times as long as wide; CR long and divergent.

Male.- TL. 1.48-1.62 mm (based on 5 specimens).- Proportional lengths of prosome and urosome 7 : 3 (excluding CR), urosomal somites and CR 35 : 20 : 45. Ur1 1.3 times as long as wide; anal somite more than twice as wide as long, same in wide throughout its length; CR slender, about 12 times as long as wide. Posterolateral ends of Ms3 extending beyond middle of Ur1. P5, coxa without any processes, basis with 2 long setae, Re 3-segmented.

Remarks.- The female of *C. speciosus* is easily distinguishable from other species by its large size, the somewhat tapering, rounded forehead, and the long and divergent CR, which are slightly shorter than the combined length of the Ur1 and Ur2. In the male, the CR about 0.8 times as long as Ur1 and Ur2 combined, the distal corner of inner margin of the 2nd segment of A2 is pointed.

C. speciosus is widely distributed in the tropical and subtropical regions of the Pacific, Indian and Atlantic Oceans.

Corycaeus (Corycaeus) crassiusculus Dana, 1848

(Figure 3)

Corycaeus crassiusculus Dana, 1849; Farran, 1929: 291, figs. 36a-b; 1936: 134; Wilson, 1950: 193; Dahl, 1894: 73; Mori, 1937: 133, pl. 45, figs. 1-5.

Corycaeus danae Giesbrecht, 1891: 480; 1892: 660, pl. 51, figs. 59-60.

Corycaeus (Corycaeus) crassiusculus, Dahl, 1912: 21, pl. 3, figs. 1-7; Sewell, 1947: 272, fig. 69, l-h; Tanaka, 1957: 80, pl. 3, figs. 12-15; Motoda, 1963: 218-219, figs. 5a-j.

Corycaeus venustus Dana, 1848: 38.

Female.- TL. 1.44-1.57 mm (based on 10 specimens).- Cephalon and Ms1 separated, posterolateral ends of Ms3 extending to $\frac{3}{4}$ distal end of Ur1. Prosome nearly 3 times as long as urosome (excluding CR). Proportional lengths of urosomal somites and CR 44 : 17 : 39, Ur1 1.8 times as long as widest part, distal margin of Ur1 extends on dorsal surface over anal somite; anal somite rather wider on proximal than on distal; CR about 9 times as long as wide.

Male.- TL. 1.27-1.36 mm (based on 5 specimens).- Cephalon fused with Ms1, posterolateral ends of Ms3 not so slender as in male of *C. (Corycaeus) speciosus*, not extending to middle of Ur1. Prosome 2.5 times length of urosome (excluding CR). Proportional lengths of urosomal somites and CR 35 : 22 : 43; Ur1 1.6 times as long as wide; anal somite 1.8 times as long as wide; CR 10 times as long as wide.

Remarks.- The CR are divergent as in female of *C. speciosus*, but are shorter, about 0.4 times length of Ur1 and Ur2 combined. Dahl (1912) mentioned that the length of the CR, the anal somite is about 1.8 as long as wide.

C. crassiusculus is widely distributed in the Indo-Pacific Ocean and the Mediterranean Sea.

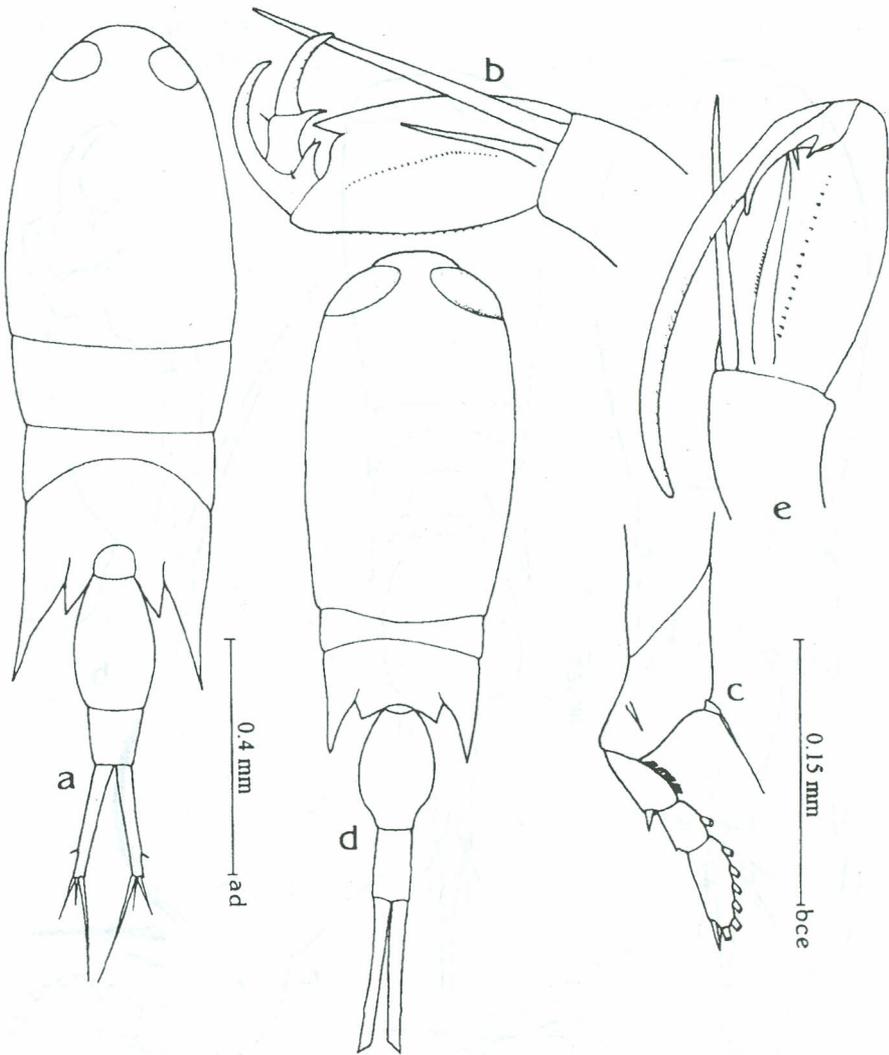


Fig. 3. *Corycaeus (Corycaeus) crassiusculus* Dana, 1848. Female, a, whole animal, dorsal view; b, 2nd antenna; c, 4th leg; male, d, whole animal, dorsal view; e, 2nd antenna.

Subgenus *Ditrichocorycaeus* Dahl, 1912

Small species characteristics of coastal plankton. Seta of B1 of A2 3 times longer than seta on B2 in female, only slightly longer in male.

Corycaeus (Ditrichocorycaeus) andrewsi Farran, 1911

(Figure 4)

Corycaeus andrewsi Farran, 1911: 294, pls. 13-14.

Corycaeus (Ditrichocorycaeus) andrewsi, Dahl, 1912: 78, pl. 9, figs. 10-18; Tanaka, 1957: 86, pl. 6, figs. 7-12; 1960: 78-79, pl. 34, figs. 1-2.

Corycaeus trukicus Mori, 1937: 137, pl. 75, figs. 9-16.

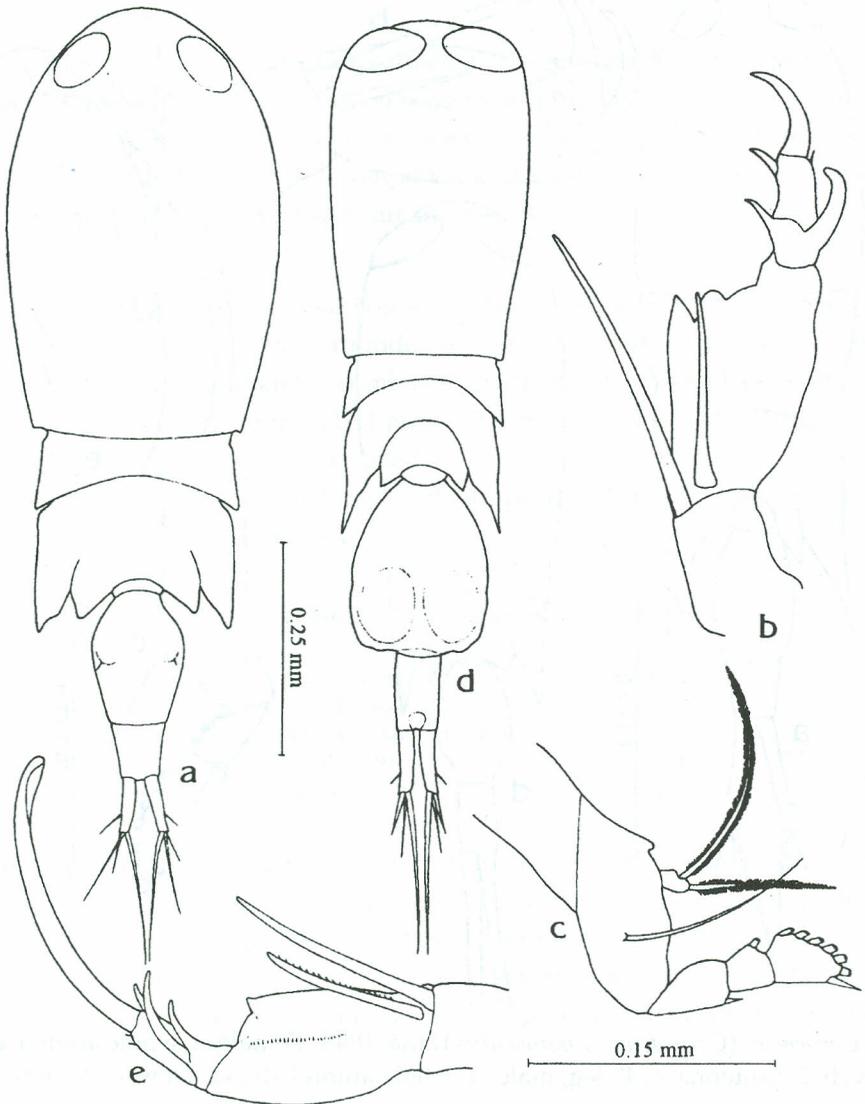


Fig. 4. *Corycaeus (Ditrichocorycaeus) andrewsi* Farran, 1911. Female, a, whole animal, dorsal view; b, 2nd antenna; c, 4th leg; male, d, whole animal, dorsal view; e, 2nd antenna.

Female.- TL. 1.0-1.07 mm (based on 5 specimens).- Prosome and urosome in proportional length 19 : 8 (including CR). Cephalon and Ms1 separated. Posterolateral ends of Ms3 produced into small wing-like process, posterolateral ends of Ms4 very short, not extending to quarter length of Ur1. Proportional lengths of urosomal somites and CR 55 : 22.5 : 22.5. Urosome, Ur1 oval, 1.1 times as long as wide, tapers gradually to

proximal part, with 2 groups of ventral fine hairs, ventral hook small, directed downwards; anal somite 1.3 times as long as its width, posterior border slightly narrower than that of anterior. A2, inner spine of B2 0.8 times as long as 1st segment.

Male.- TL. 0.82-0.88 mm (based on 5 specimens).- Proportional lengths of prosome and urosome (including CR) 7.6 : 5. Posterolateral ends of Ms2 with slight median swelling, Ms3 with wing-shape process extending beyond proximal $\frac{1}{3}$ length of Ur1. Urosome, proportional lengths of urosomal somites and CR 57 : 23 : 20; Ur1 1.7 times as long as wide, broader oval in shape, with small ventral hook; anal somite 1.7 times as long as wide; CR 5 times as long as wide. A2, spinules on B2 with longitudinal median row.

Remarks.- The female of *C. trukicus* Mori, 1937 has coarsely plumosed spines on B1 and B2 of A2, this is a characteristic feature of the immature specimens of *Corycaeus*, except the genus *Farranula* Wilson. *C. trukicus* is synonyms of *C. andrewsi* in the short CR in both sexes, which is about as long as anal somite, and the short wing-like process on posterior ends of Ms3 in the male. *C. trukicus* is closely allied to *C. andrewsi*, *C. asiaticus*, and *C. subtilis* in having short CR, which are about as long as anal somite, and in having short wing-like expansions on the Ms3.

This species has been recorded from Indo-Pacific Ocean, from the west coast of Ceylon, the west coast of Sumatra, the Bismark Archipelago, the north of Guinea, the Great Barrier Reef, and Japanese waters.

***Corycaeus (Ditrichocorycaeus) asiaticus* Dahl, 1894**
(Figure 5)

Corycaeus asiaticus Dahl, 1894: 71; Gurney, 1926: 163, fig. 24a-c; Farran, 1936: 137; Mori, 1937: 136, pl.75, figs. 6-8.

Corycaeus murrayi Farran, 1911: 294, pl. 13, figs. 1-6.

Corycaeus (Ditrichocorycaeus) asiaticus, Dahl, 1912:74, pl. 11, figs. 1-9; Gurney, 1927: 113, figs.24a-c; Tanaka, 1957: 87, pl. 46, figs. 13-19; Dakin & Colefax, 1940: 115, figs. 183a-b; Sewell, 1947: 281, fig. 70d; Motoda, 1963: 237, fig. 13.

Female.- TL. 1.19 (based on 2 specimens).- Prosome 1.8 times as long as urosome. Urosome, proportional lengths of urosomal somites and CR 40:30:30. Ur1 1.3 times as long as wide, without ventral hook, proximal ventral corner rectangular; anal somite 1.5 times as long as wide; CR 7.5 times as long as wide. A2, distal margin of B2 with 1 small and 1 large teeth near distal end. P2, Re with curved apical spine and without peculiar serration. P4, Ri with 2 setae.

Male.- TL. 1.12 mm (based on 3 specimens).- Prosome 1.2 times as long as urosome. Ms3 with wing-like process extending beyond middle of Ur1. Urosome, proportional lengths of urosomal somites and CR 49:24:27, Ur1 1.3 times as long as wide; anal somite about twice as long as wide, same in width throughout its length; CR about 6 times as long as greatest width of ramus.

Remarks.- This species includes small sized *Corycaeus* which have 2 setae on the Ri of the 4th legs. The male has a stout curved median hook at the ventral corner of the anterior end of the urosome. Farran's (1911) *murrayi* (female) was synonymized with *C. asiaticus* by Dahl (1894), Dahl (1912), Wheller (1901), and by Farran himself (1936).

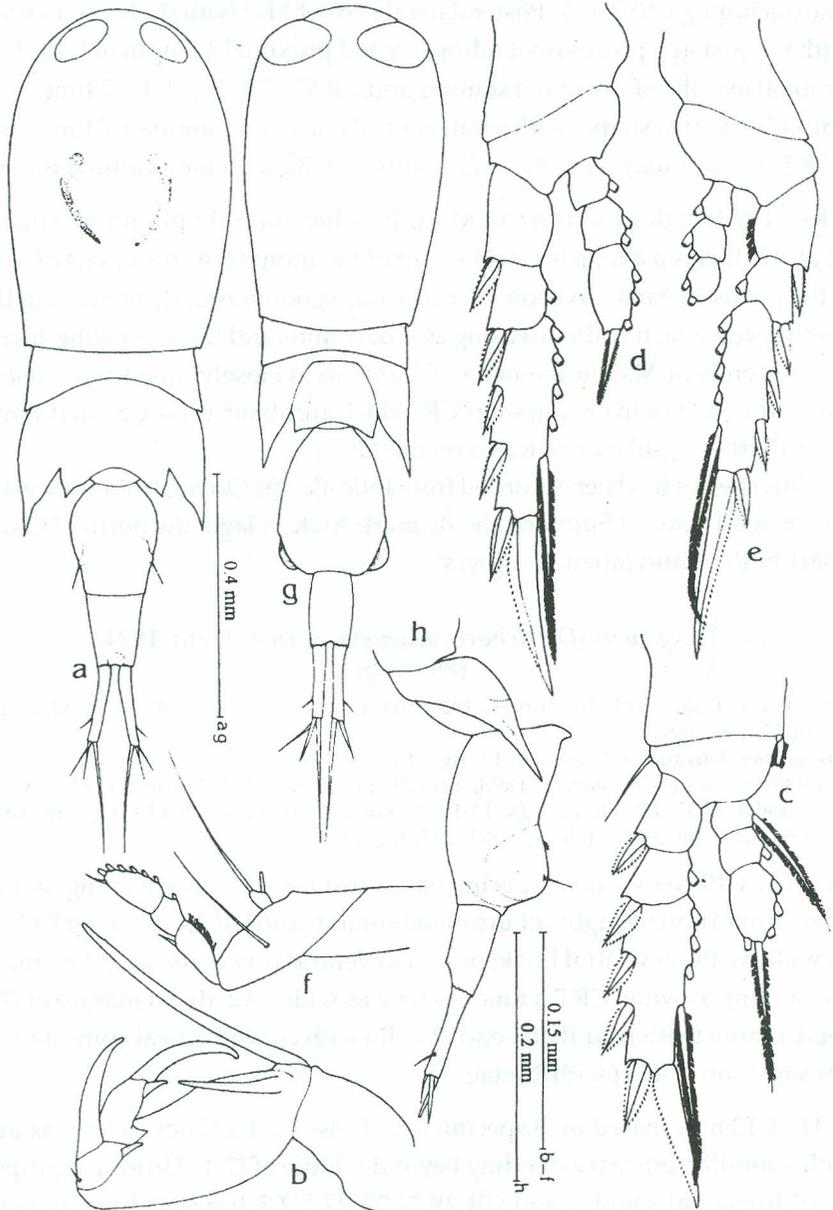


Fig. 5. *Corycaeus* (*Ditrichocorycaeus*) *asiaticus* Dahl, 1894. Female, a, whole animal, dorsal view; b, 2nd antenna; c-f, 1st-4th legs; male, g, whole animal, dorsal view; h, Ms3 and urosome, lateral view.

The species is rather rare in Indonesian waters, and also from the coast of Japan Sea (Tanaka, 1957).

Corycaeus (Ditrichocorycaeus) lubbocki Giesbrecht, 1891
(Figure 6)

Corycaeus lubbocki Giesbrecht, 1891: 481; 1892: 660, pl. 51; A. Scott, 1902: 421; Thompson & Scott, 1903: 285; Cleve, 1903: 361.

Corycaeus (Ditrichocorycaeus) lubbocki, Dahl, 1912.

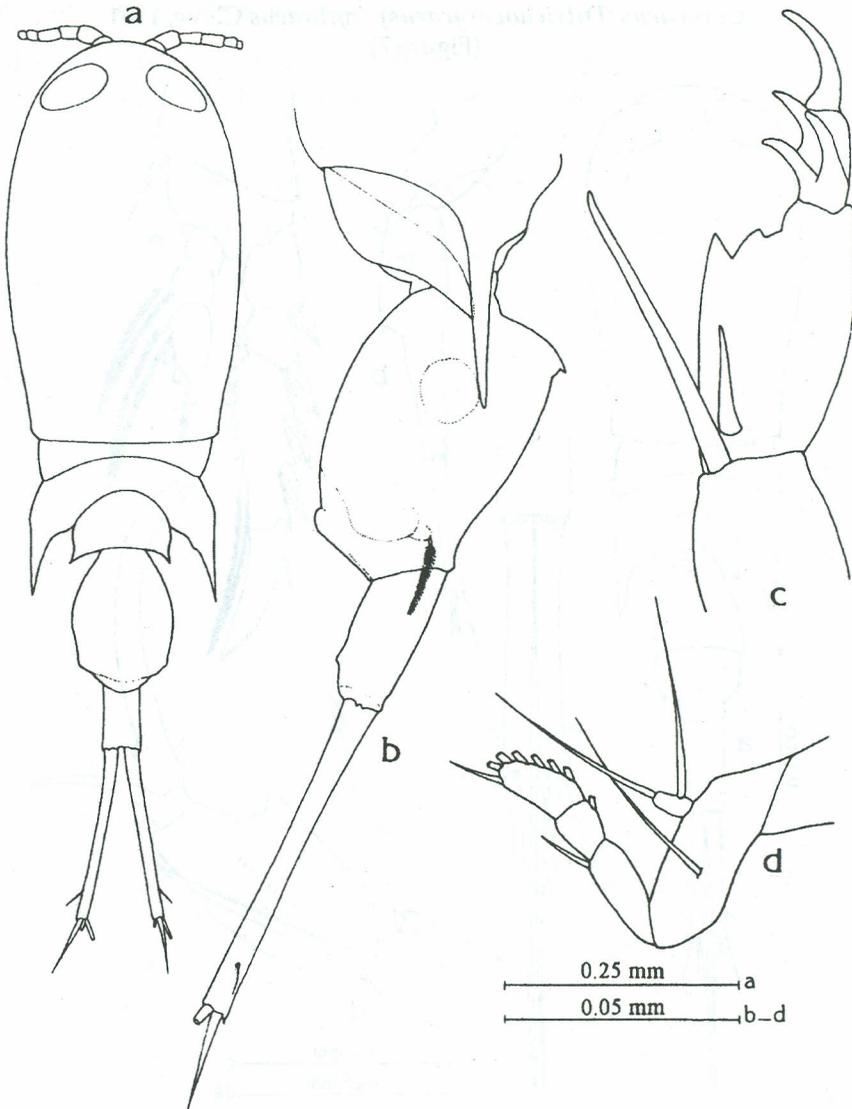


Fig. 6. *Corycaeus (Ditrichocorycaeus) lubbocki* Giesbrecht, 1891. Female, a, whole animal, dorsal view; b, Ms3 and urosome, lateral view; c, 2nd antenna; d, 4th leg.

Female.- TL. 0.80-0.87 mm (based on 10 specimens).- Proportional lengths of prosome and urosome 7.8 : 3.1 (excluding CR). Urosome, proportional lengths of urosomal somites and CR 39 : 14 : 47. Ur1 elongate ovate; anal somite short, narrow and cylindrical; CR rather long and slender, slightly divergent, 3 times as long as anal somite.

No male was found in the present study.

Remarks.- This is a moderately slender form, rather scarce in the present study.

Corycaeus (Ditrichocorycaeus) erythraeus Cleve, 1901
(Figure 7)

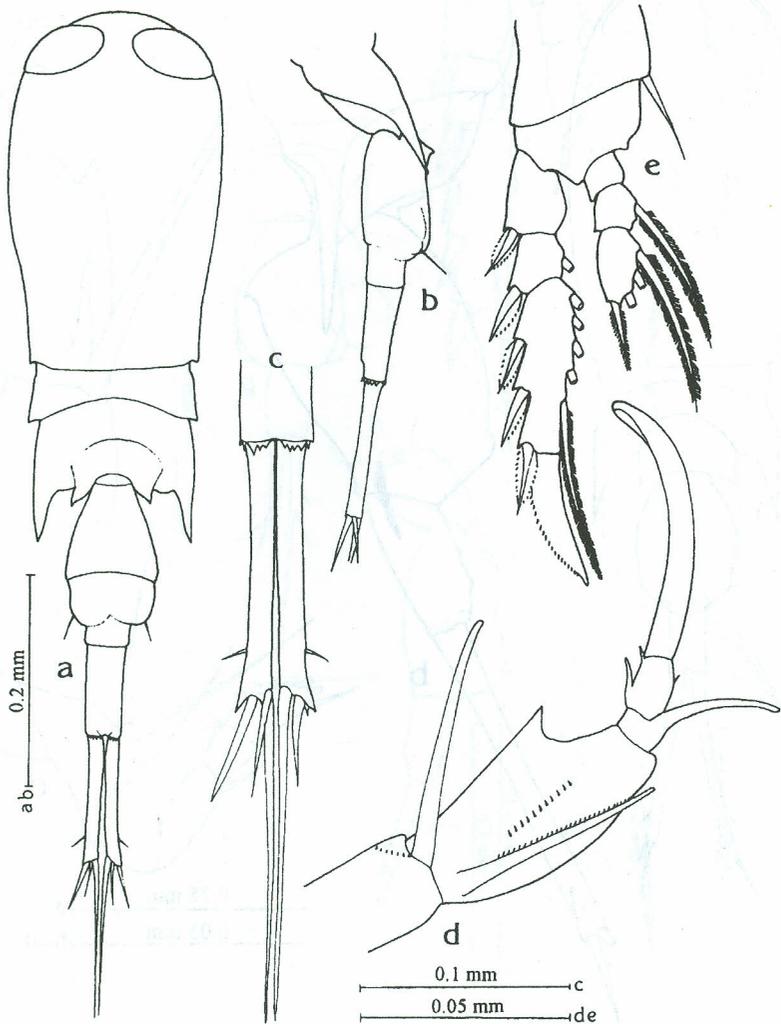


Fig. 7. *Corycaeus (Ditrichocorycaeus) erythraeus* Cleve, 1901. Female, a, whole animal, dorsal view; b, Ms3 and urosome, lateral view; c, anal somite and caudal rami, dorsal view; d, 2nd antenna; e, 2nd leg.

Corycaeus dubius Farran, 1911: 292, pls. 12, 14.

Corycaeus (Ditrichocorycaeus) dubius, Dahl, 1912: 71, pls.1, 10, figs. 11-19; Tanaka, 1957: 88, pl. 7, figs. 5-13.

Corycaeus erythraeus, Gurney, 1927: 191, fig. 23a-d; Farran, 1926: 137.

Corycaeus (Ditrichocorycaeus) erythraeus, Tanaka, 1960: 81, pl. 35, figs. 1-8.

Female.- TL. 0.81 mm (based on 2 specimens).- Proportional lengths of prosome and urosome 55 : 45. Posterolateral ends of Ms3 do not extend to middle of Ur1. Urosome, proportional lengths of urosomal somites and CR 43 : 12 : 45. Ventral hook of Ur1 slender and bent posteriorly.

No male was found in the present study.

Remarks.- This species is distributed in the Indo-Pacific and the Christmas Island, Madagascar, Suez Canal, Red Sea, and Japanese waters.

Subgenus *Monocorycaeus* Dahl, 1912

Corycaeus (Monocorycaeus) robustus Giesbrecht, 1891 (Figure 8)

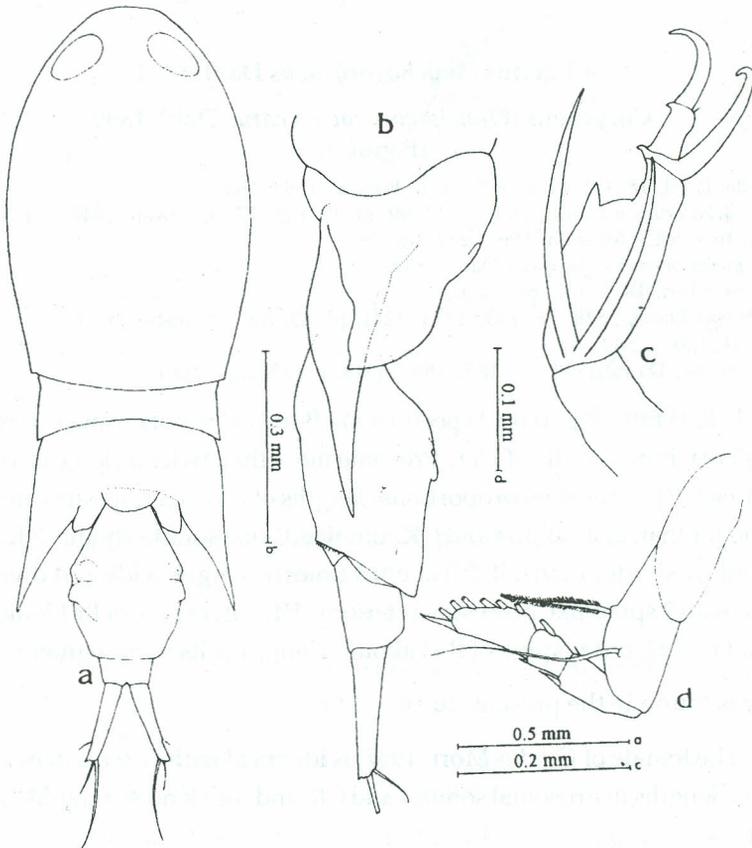


Fig. 8. *Corycaeus (Monocorycaeus) robustus* Dahl, 1912. Female, a, whole animal, dorsal view; b, Ms3 and urosome, lateral view; c, 2nd antenna; d, 4th leg.

Corycaeus robustus Giesbrecht, 1891: 480; 1892: 660, pl.51, figs. 38, 42; Dahl, 1894: 69; Thompson & Scott, 1903: 286;; A. Scott, 1909: 251; Farran, 1911: 289; 1936: 135; Wilson, 1942: 182; 1950:196.
Corycaeus (Monocorycaeus) robustus, Dahl, 1912: 27, pl. 4, figs. 1-8; Tanaka, 1957: 81, pl. 4, figs. 5-8; Motoda, 1963: 222, fig. 7; Chen & Zhang, 1974: 55, pl. 15, figs. 9-11.
Corycaeus venustus, Brady, 1883: 115, pl. 54, figs. 8-10.

Female.- TL. 2.1 mm (based on 2 specimens). - Body very stout. Proportional lengths of prosome and urosome (including CR) 95 : 48. Urosome, proportional lengths of urosomal somites and CR 65 : 12 : 23. Ur1 robust, 1.3 times as long as greatest width; anal somite very short, about 1/5 length of Ur1.

No male was found in the present study.

Remarks.- The subgenus *Monocorycaeus* includes only one species. *C. robustus* is easily distinguished from the other members of the genus by the robust prosome and genital complex. Since Brady's (1883) description of the female of *C. venustus* did not include any character of species value, this species has been placed in Giesbrecht's (1891, 1892) *robustus*. This species is very rare in Indonesian waters. Only two females were collected from Ambon Bay (Site 8). The species has been recorded from the tropical region of the Indo-Pacific.

Subgenus *Onychocorycaeus* Dahl, 1894

Corycaeus (Onychocorycaeus) catus Dahl, 1894

(Figure 9)

Corycaeus catus Dahl, 1894; Farran, 1936: 138; Wilson, 1950: 192.
Corycaeus (Onychocorycaeus) catus, Dahl, 1912: 99, pl. 13, figs. 17-24; Sewell, 1947: 284; Tanaka, 1957: 94, figs. 6-12; Motoda, 1963: 242, fig. 16.
Corycaeus (Onychocorycaeus) pacificus Dahl, 1894.
Corycaeus latus, Mori, 1937: 136, pl. 74, figs. 8-10.
Corycaeus obtusus Dana, 1848: 36; 1852-1855: 1241, pl. 85, fig. 6; Giesbrecht, 1891: 481; 1892: 673, pl.51, figs. 12-14.
Corycaeus orientalis, Dana, 1848: 37; 1852-1855: 1218, pl. 85, figs. 11a-c.

Female.- TL. 0.93 mm (based on 2 specimens).- Body extremely robust. Posterolateral ends of Ms3 reaching middle of Ur1. Prosome more than twice as long as urosome (9.4 : 3.9 including CR). Urosome, proportional lengths of urosomal somites and CR 56 : 18 : 26. Ur1 longer than anal somite and CR combined; anal somite about 1.3 times as long as wide, slightly shorter than CR; CR about 4 times as long as wide and divergent. A2, 2nd segment with 2 spine-like processes anteriorly. P4, outer spine of Re1 long, extending to distal end of Re2, outer spine of Re3 about 3/4 length of its own segment.

No male was found in the present study.

Remarks.- The female of *C. latus* Mori (1937) is identical with *C. catus* in having similar proportional lengths in urosomal somites and CR, and the slender wing-like expansions of the Ms4.

C. catus has been recorded from the Indo-Pacific Ocean, Great Barrier Reef waters, Arabian Sea, and warm waters of Japan.

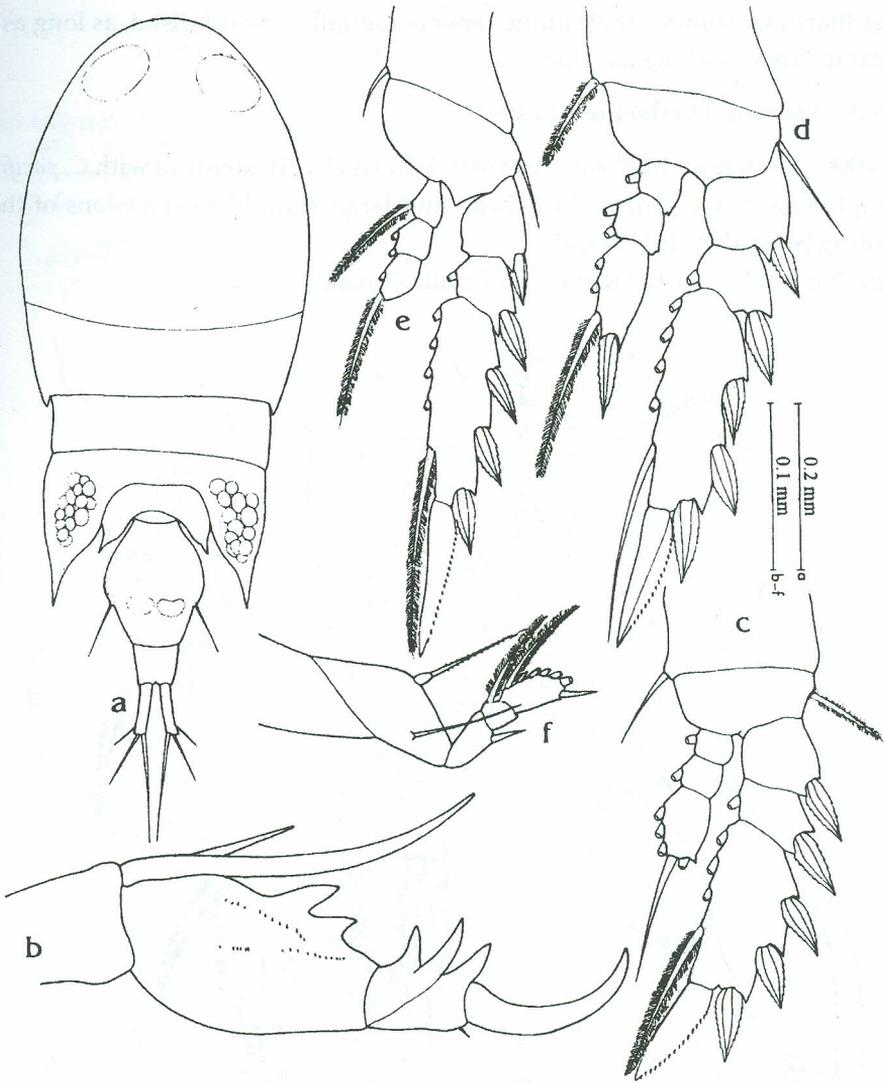


Fig. 9. *Corycaeus (Onychocorycaeus) catus* Dahl, 1894. Female, a, whole animal, dorsal view; b, 2nd antenna; c-f, 1st-4th legs.

***Corycaeus (Onychocorycaeus) pacificus* Dahl, 1894**
(Figure 10)

Corycaeus pacificus Dahl, 1894.

Corycaeus (Onychocorycaeus) pacificus, Dahl, 1912: 103, pl. 14, figs. 1-10; Sewell, 1947: 285; Tanaka, 1957: 95, pl. 9, figs. 13-29; 1960: 86, pl. 37, figs. 1-3.

Female.- TL. 0.87 mm (based on 3 specimens).- Proportional lengths of prosome and urosome 72 : 45. Posterolateral ends of Ms4 narrowly pointed, not reaching middle of Ur1. Urosome, proportional lengths of urosomal somites and CR 58 : 20 : 23. Ur1

longer than anal somite; anal somite tapers gradually toward distal, as long as wide; CR about 7 times as long as wide.

No male was found in the present study.

Remarks.- The female of *C. catus* in Mori (1937) is clearly identical with *C. pacificus*, in having the narrowly rounded forehead and large wing-like expansions of the Ms3 extending beyond middle of Ur1.

C. catus has been recorded from Indo-Pacific Ocean.

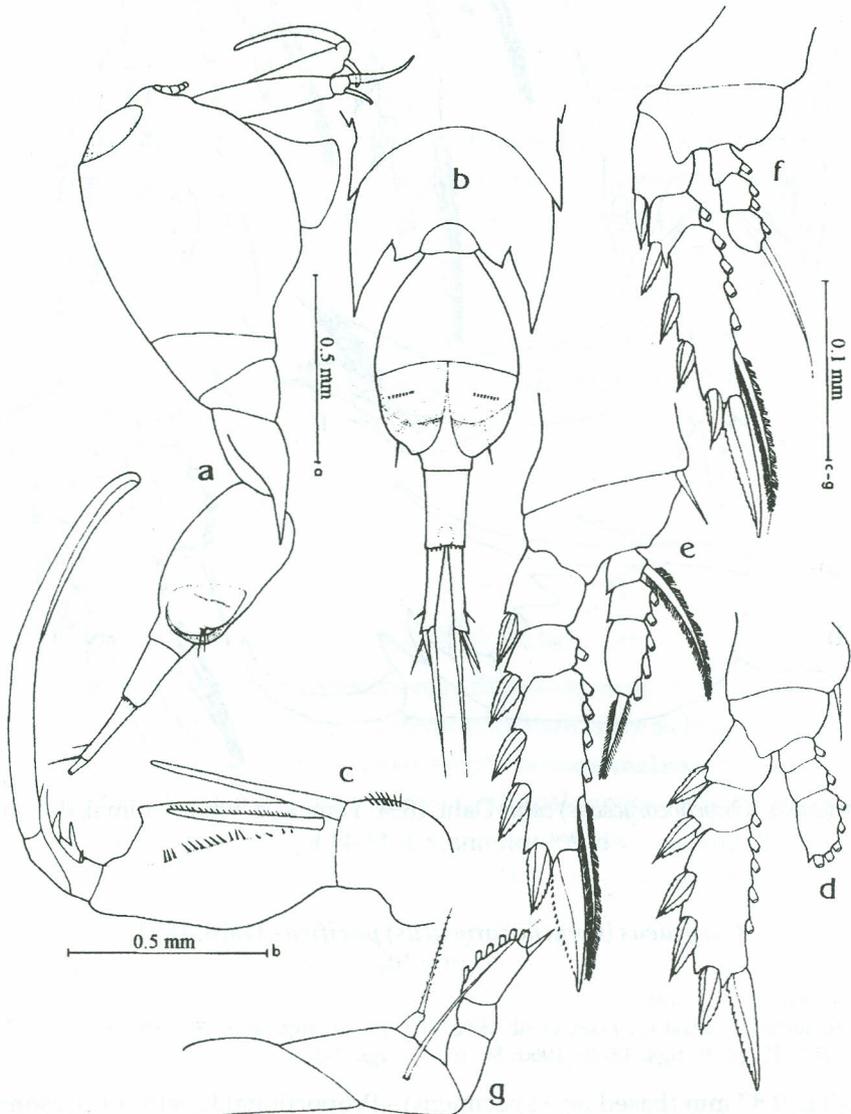


Fig. 10. *Corycaeus (Onychocorycaeus) pacificus* Dahl, 1894. Female, a, whole animal, lateral view; b, Ms3 and urosome, dorsal view; c, 2nd antenna; d-g, 1st-4th legs.

Subgenus *Urocorycaeus* Dahl, 1912

Corycaeus (Urocorycaeus) longistylis Dana, 1849

(Figure 11)

Corycaeus longistylis Dana, 1849; Giesbrecht, 1892: 674, pl. 51, fig. 37; A. Scott, 1909: 249; Farran, 1936: 136; Mori, 1937: 134, pl. 73, figs. 3-8; Wilson, 1950: 195.

Corycaeus (Urocorycaeus) longistylis, Dahl, 1912: 42, pls. 6-7; Sewell, 1947: 277; Tanaka, 1957: 84, pl. 5, figs. 8-12.

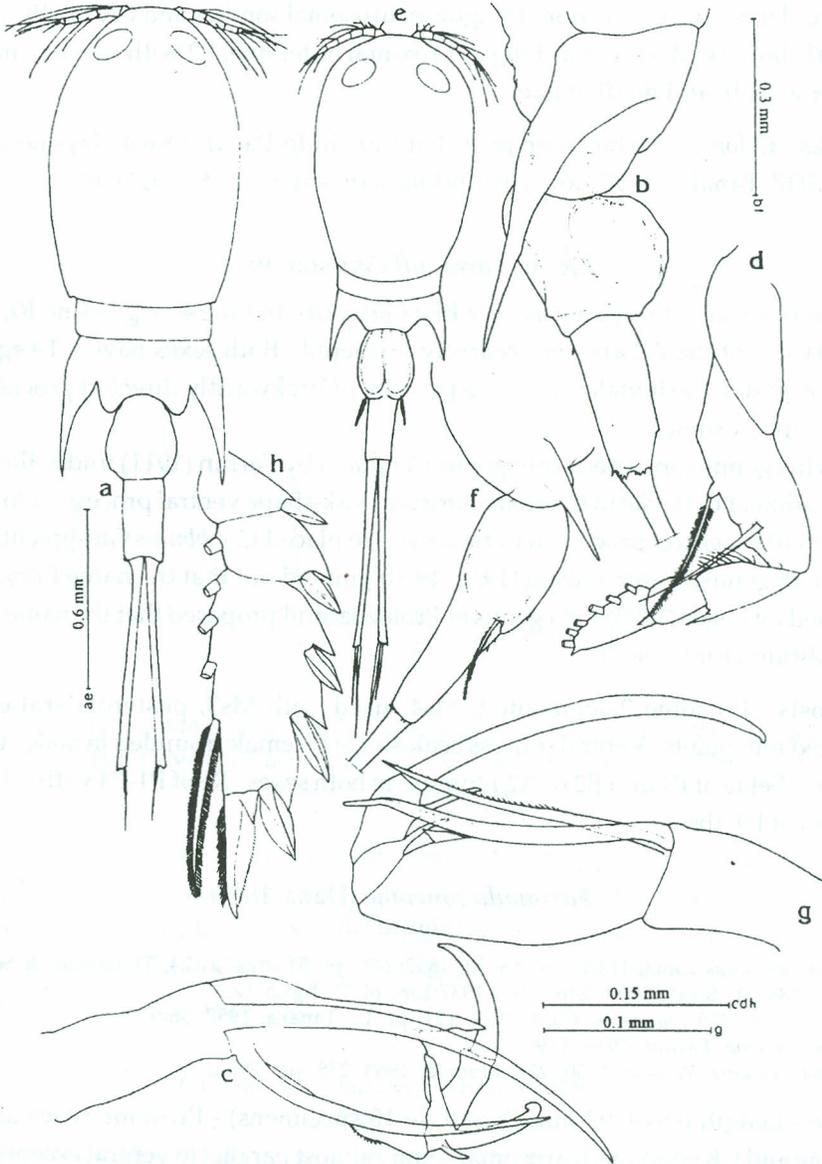


Fig. 11. *Corycaeus (Urocorycaeus) longistylis* Dana, 1849. Female, a, whole animal, dorsal view; b, Ms3 and urosome, lateral view; c, 2nd antenna; d, 4th leg; male, e, whole animal, dorsal view; f, Ms3 and urosome, lateral view; g, 2nd antenna; h, exopod of 2nd leg.

Female.- TL. 2.75-2.80 mm (based on 10 specimens).- Cephalon and Ms1 fused, Ms3 and Ms4 completely fused. Posterolateral ends of Ms3 extending beyond Ur1. Prosome 2.5 times length of urosome (excluding CR). Urosome, proportional lengths of urosomal somites and CR 22 : 22 : 56. Dorsal surface of Ur1 vaulted; CR very long and slender, about 20 times as long as wide.

Male. - TL. 2.13-2.19 mm (based on 10 specimens).- Prosome 2.3 times longer than urosome. Urosome, proportional lengths of urosomal somites and CR 13 : 18. A2, with terminal claw about 3 times as long as proximal outer one, B2 with row of small teeth on outer margin and median line.

Remarks.- *C. longistylis* has been recorded from Indo-Pacific Ocean, Japanese waters (Mori, 1937; Tanaka, 1957), and east Indonesian waters (A. Scott, 1909).

Genus *Farranulla* Wilson, 1932

Superficially this genus is very like *Corycaeus*, but the 4th leg has no Ri, and the basal bristles of the A2 are very coarsely feathered. Both sexes have a 1-segmented urosome, and in the females there is a prominent backwardly directed process on the ventral cephalosome.

This genus separated from genus *Corycaeus* by Farran (1911) under the generic classification of *Corycella* in the characteristics beak-shape ventral process on the female (semi circular ventral process in *Corycaeus*). He placed *C. gibbulus* Giesbrecht, 1892 as the type of genus. Later Wilson (1932, 1950) pointed out that the name *Corycella* had been used by Leger (1893) for a genus of Protozoa, and proposed that the name *Farranula* be substituted for *Corycella*.

Diagnosis.- Prosome 2-segmented, Ms4 fused with Ms3, posterolateral ends not produced into points. Ventral process beak-shape in female, rounded in male. Urosome 1-somite. Setae of B1 and B2 of A2 plumose in both sexes. Re of P1-P4 with 0, 0, 1 outer spine, Ri of P4 absent.

Farranula concinna (Dana, 1849)

(Figure 12)

Corycaeus concinnus Dana, 1849; Giesbrecht, 1892: 675, pl. 51, figs. 21-24; Thompson & Scott, 1903: 286; A. Scott, 1909: 246; Mori, 1937: 138, pl. 77, figs. 5-12.

Corycaeus (Corycella) concinnus, Dahl, 1912: 121, pl. 15; Tanaka, 1957: 96-97.

Corycella concinna, Farran, 1936: 139.

Farranulla concinna, Wilson, 1950: 228; Motoda, 1963: 258, fig. 29a-d.

Female.- Length 0.84-0.90 mm (based on 10 specimens).- Prosome twice as long as urosome and CR combined, urosomal somite almost parallel to ventral except for distal 1/5 length in lateral view. P4, Re3 with 5 setae.

No male was found in the present study.

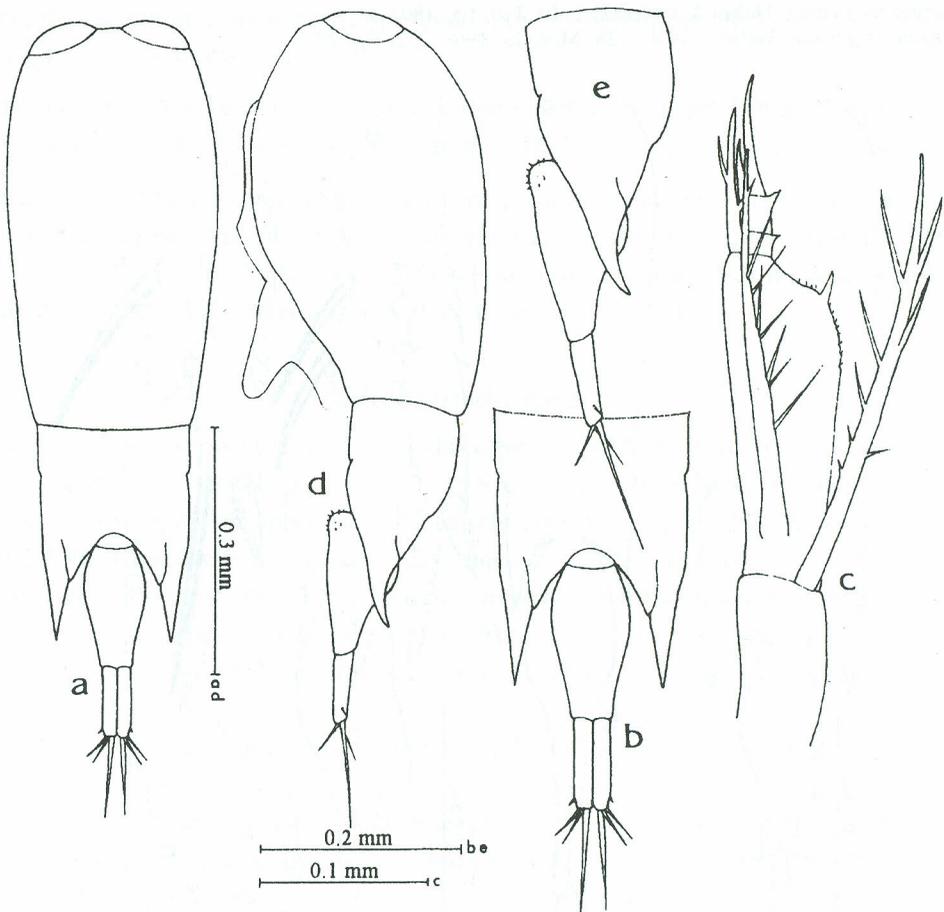


Fig. 12. *Farranula concinna* (Dana, 1849). Female, a, whole animal, dorsal view; b, Ms3 and urosome, dorsal view; c, 2nd antenna; male, d, whole animal, dorsal view; e, Ms3 and urosome, lateral view.

Remarks.- *F. concinna* is widely reported from Indian Ocean, Ceylon (Thompson & Scott, 1903), Christmas Island (Farran, 1911), Great Barrier Reef (Farran, 1936), off New South Wales (Dakin & Colefax, 1940), off Japan (Mori, 1937, Palau Island (Mori, 1942), and Hawaiian waters (Motoda, 1963). Indonesian waters records are given by A. Scott (1909) and Chiba & Tsuruta (1955).

Farranula gibbula (Giesbrecht, 1892)

(Figure 13)

Corycaeus gibbulus Giesbrecht, 1892: 675, pl. 51, figs. 22-23; Thompson & Scott, 1903: 248; Mori, 1937: 137, pl. 76, figs. 12-16, pl. 77, figs. 1-4.

Corycaeus gibbula, Wolfenden, 1906: 1028; Farran, 1936:139.

Corycaeus (Corycella) gibbulus, Dahl, 1912: 115, pl. 15, figs. 1-4, 9-10, 25, 35-36; Tanaka, 1957: 96, pl.10, figs. 6-11; 1960: 89, pl. 38, fig. 12.

Corycaeus gibbula, Dakin & Colefax, 1940: 110, fig. 180a-d.
Farranula gibbula, Wilson, 1950: 228; Motoda, 1963: 252, fig. 27.

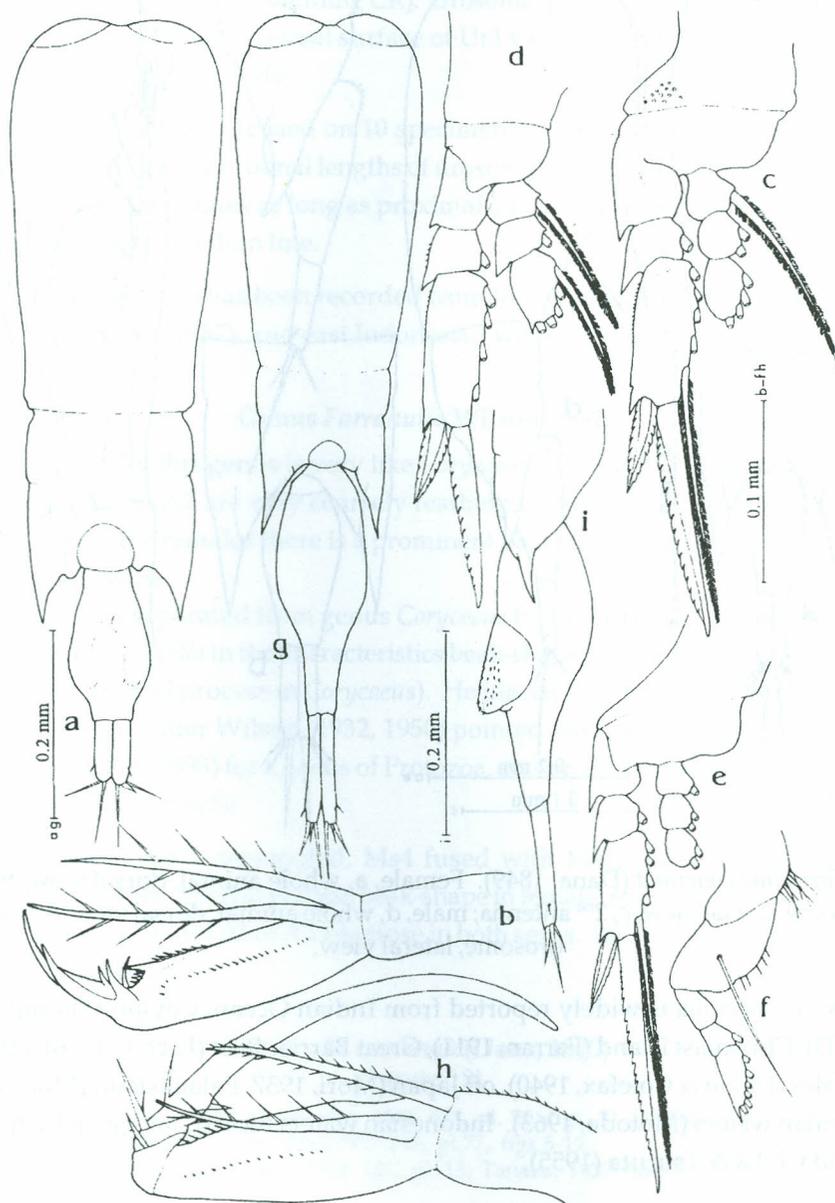


Fig. 13. *Farranula gibbula* (Giesbrecht, 1892). Female, a, whole animal, dorsal view; b, 2nd antenna; c-f, 1st-4th legs; male, g, whole animal, dorsal view; h, 2nd antenna.

Female.- Length 0.90-1.10 mm (based on 10 specimens).- Prosome about 2.3 times as long as urosome, robust in lateral view. Ms3 with dorsal hump. Proportional length of urosomal somite and CR 65 : 35, Ur1 irregular in dorsal outline, and deepest on posterior

$\frac{1}{3}$ length of segment, usually with 2 spermatophores, sometimes with 4 spermatophores; CR slightly curved upward.

Male.- Length 0.86-0.96 mm (based on 10 specimens).- Proportional lengths of prosome and urosome 57 : 43, urosomal somites and CR 70 : 30, Ur1 2.8 times as long as wide.

Remarks.- *F. gibbula* is easily identified by the peculiar form of Ur1 in the female. The male is distinguished from *F. concinna* only in size, *F. gibbula* slightly larger (0.8-0.87 mm), *F. concinna* (0.73-0.78). This species is widely distributed in the Indo-Pacific, Arabian Sea, Red Sea, and adjacent waters of Japan.

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