SOME COMMON SPECIES OF PLANKTONIC HARPACTICOIDA (CRUSTACEA, COPEPODA) FROM INDONESIAN WATERS

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ABSTRACT

Taxonomic study was made on the species of the order Harpacticoida recently collected from 9 sites in Indonesian waters. Six species from 5 genera and 5 families Clytemnestridae, Ectinosomatidae, Harpacticidae, Tachidiidae and Talestridae, including Clytemnestra scutellata Dana, 1847; Euterpina acutifrons (Dana, 1848), Eudactylopus latipes (T. Scott, 1894); Macrosetella gracilis (Dana, 1848); Microsetella norvegica (Boeck, 1864) and Microsetella rosea (Dana, 1852) were recorded. C. scutellata and M. norvegica are recorded for the first time from Indonesian waters. 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: *Clytemnestridae, Ectinosomatidae, Harpacticidae, Tachidiidae, Talestridae, Harpacticoida, Copepoda, Indonesian waters*

INTRODUCTION

The order Harpacticoida consists of 3,000 species belonging to 463 genera and 54 families. Most species are bottom-living in marine and brackish waters (Huys *et al*., 1996). Of these 945 species are living in freshwater. Planktonic harpacticoids in marine and brackish water are known 23 species belonging to 13 genera (Wells, 1970; Boxshall, 1979; Huys and Bottger-Schnack, 1994). Nine species of them are distributed in East and Southeast Asian waters are *Aegisthus aculeatus* Giesbrecht, 1891; *A. mucronatus* Giesbrecht, 1891; *Clytemnestra scutellata* Dana, 1847; *Distioculus minor* (Scott, 1894); *Euterpina acutifrons* (Dana, 1848); *Macrosetella gracilis* (Dana, 1848); and *Miracia efferata* Dana, 1852 (Scott, 1909; Tanaka and Hue, 1965). However, they did not provide figures or adequate decriptions of most of the species recorded. They also some doubtful records species, which need to be studied more accurately.

Useful identification and reference works are as follows: the key of Huys *et al*. (1996), the numerical key of Wells (1976) and its supplements (Wells, 1981, 1983, 1985), monographs of Lang (1948, 1965) and the calatologue of marine species by Bodin (1988).

MATERIAL AND METHODS

The present plankton samples were collected at 9 sites in Indonesian coastal waters during 1995–2010 (Figure 1). For convenience of description, these sites are divided into three study areas with the consideration of their topography and hydrological conditions. They were the coastal waters of Indian Sea side of southern Java (Area A including Sites 1–3), the Java Sea (Area B including Sites 4–6), and the eatsern region (Area C including Sites 7–9).

Sampling was done by surface towing and vertical hauls (from 10 m or 20 m depth to the surface) with plankton nets (0.1 mm and 0.33 mm mesh size; 0.35 m and 0.45 m diameter aperture) at day-and nighttime. The specimens were fixed and preserved in 5% formalin/sea water solution. The specimens were identified after dissection and examined with a compound microscope. Drawings were made with the aid of a camera lucida. 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.

Abbreviations used in the text to describe morphological features are: A1, antennule; A2, antenna; Ms1-Ms6, metasomal somites 1–6; P1-P6, swimming legs 1–6; Ur1–Ur6, urosomal somites 1–6; CR, caudal rami; Re, exopod; Ri, endopod; Se, outer spine; Si, inner spine; St, terminal spine.

All the type specimens are deposited at the Museum Zoologicum Bogoriense, Reserach Center for Biology, Indonesian Institute of Sciences (LIPI), Cibinong, Indonesia.

RESULT AND DISCUSSION

Total six species representing 5 genera and 5 families Clytemnestridae, Ectinosomatidae, Harpacticidae, Tachidiidae and Talestridae, including *Clytemnestra*

Table 1. Species list of the planktonic harpacticoid recorded in the present study, their sampling sites and their previous records in Indonesian waters, neighbouring areas and major oceans. o = present records, ● = previous records, A = Indonesian waters, B=Australian waters, C=China Seas, D = Japanese waters, I, P and At = India, Pacific and Atlantic Oceans, O = oceanic, N-O = neritic-oceanic, Nr = new records.

Species	Sites									Neigb. areas				Notes	
	1	2	3	4	5	6	7	8	9	A	B	C	D	Osean	Type
Clytemnestra scutellata			o			o		o	o	Nr	●	●	●	IPAt	O
Euterpina acutifrons		o	o	o	o		o	o		●	●	●	●	IPAt	N-O
Eudactylopus latipes	o		o	o		o	o	o		●		●	●	IPAt	O
Macrosetella gracilis			o	o		o		o	o	●	●	●	●	IPAt	N-O
Micorsetella norvegica			o					o		Nr		●	●	IPAt	O
M. rosea			o			o	o	o		●	●	●	●	IPAt	O

scutellata Dana, 1847; *Euterpina acutifrons* (Dana, 1848), *Eudactylopus latipes* (Scott, 1894); *Macrosetella gracilis* (Dana, 1848); *Microsetella norvegica* (Boeck, 1864) and *Microsetella rosea* (Dana, 1852) were recorded (Table 1).

For the convenience of discussion, these sites are divided into 3 study areas as mentioned in Material and Methods. I named the area including Sempu Island, Segara Anakan Cilacap and Ujung Kulon (Sites 1, 2, and 3) as Area A, the Java Sea (Sites 4, 5, and 6) as Area B, and the eastern waters (Sites 7, 8, and 9) as Area C.

The number of observed species was highest at the sites which has connection with the Indian or Pacific Oceans (Sites 3 and 8), and only 3 species (*Euterpina acutifrons, Eudactylopus latipes*, and *Macrosetella gracilis*) were found from Java Sea (Sites 4 and 5). The number of species increased towards the eastern part, 4 species at Bali Strait (Site 6), and 6 species at Ambon Bay (Site 8). *E acutifrons* and *M. gracilis* were found widely in Indonesian waters, while *C. scutellata* was found only from high salinity regions (Sites 3, 6, 8 and 9). The less abundant species, *M. norvegica* was found only from Sites 3 and 8.

All the species mentioned above were analyzed for the purpose of clarifying the geographical distribution patterns. Their distributional patterns and habitats are listed in Table 1. As a result, all of harpacticoid species recorded in the present study are cosmopolitan species. However, only 3 species (*E. acutifrons*, *M. gracilis* and *M. rosea*) are recorded in the Southeast Asian waters including Australia and Japanese waters (see Table 1). Two species (*C. scutellata* and *M. norvegica*) are recorded for the first time from Indonesian waters.

Based on horizontal distribution of their habitats, marine copepods are divided into 5 species groups: oceanic, neritic-oceanic, neritic, estuarine-neritic, and estuarine (Park, 1970; Kim, 1985). More than half, 6,7% (4 species) of Indonesian harpacticoid are listed as oceanic species. The remain two species (3,3%) *E. acutifrons* and *M. gracilis* are listed as neritic-oceanic with preference to the low salinity waters.

Surface temperature and salinity distributions were based on observations taken during the present study. The mean temperature was 29° C, range from 31° C in western region to 27° C in the eastern region. Salinity range from 30‰ at Java Sea sites to 34‰ at eastern sites. Differences among the distributions of harpacticoid species and surface salinity or temperature affected by the environmental changes. However, the specific factor or group of factors limiting distribution has been determined. Of the two variables measured, salinity was more important in limiting distribution of the oceanic species, such as *C. scutellata*, *M. rosea*, and *M. norvegica* were found only from the sites which are influenced by the Indian or Pacific Oceans water masses which have high salinities.

DESCRIPTIONS

Family **Clytemnestridae** A. Scott, 1909
Genus ***Clytemnestra*** Dana, 1852
Clytemnestra scutellata Dana, 1847
(fig. 2)

Clytemnestra scutellata Dana, 1847, 1852: 1194, pl. 83, fig. 12a-f; Giesbrecht, 1892: 566, pl. 1, fig. 9; Mori, 1929: 201, pl. 8, figs. 1–5.

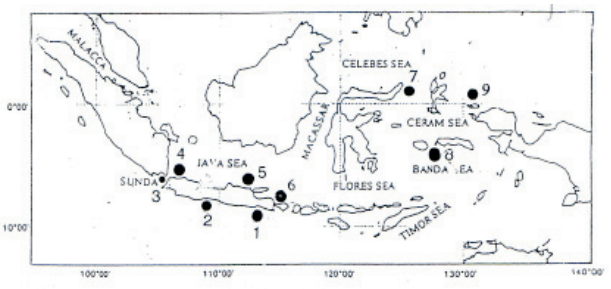

Figure 1. Indonesian waters showing study sites 1-9

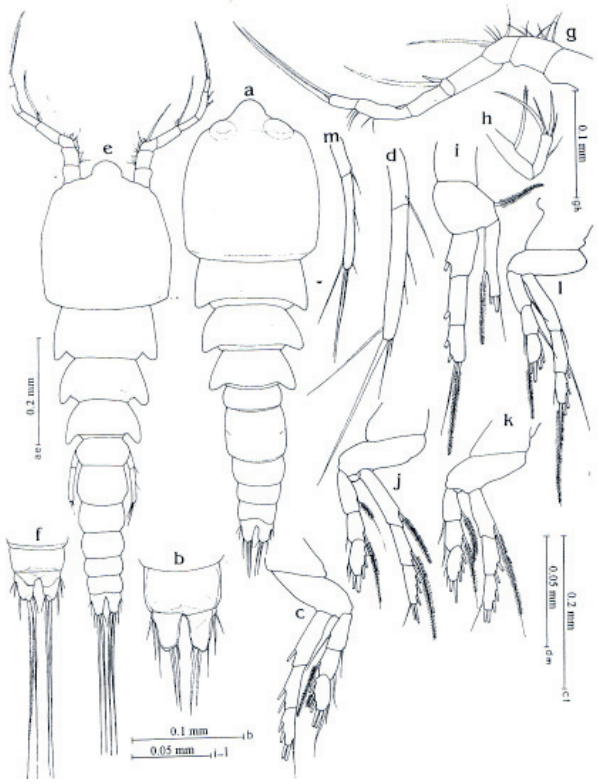

Figure 2. ***Clytemnestra scutellata***. Female. a, whole animal, dorsal view; b, anal somite and CR, dorsal view; c–d, P4–P5. Male. e, whole animal, dorsal view; f, anal somite and CR, dorsal view; g, antennule; h, antenna; i-m, P1-P5.

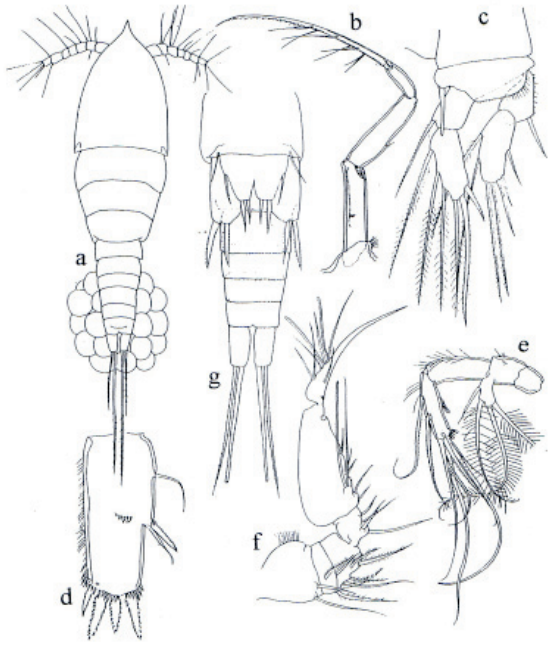

Figure 3. ***Euterpina acutifrons***. Female. a, whole animal, dorsal view; b, maxilliped; c, P1; d, P5; e, antennule;. Male. f, antennule; g, urosome, ventral view.

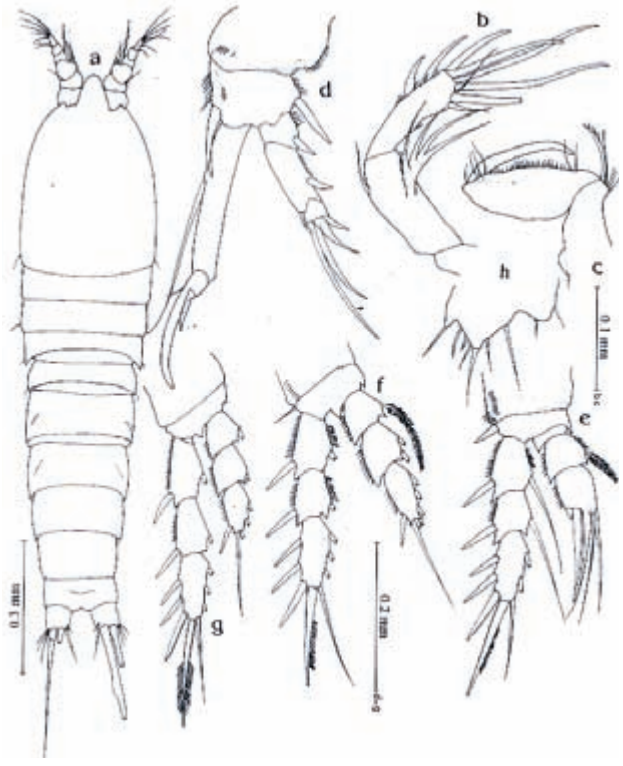

Figure 4. ***Eudactylopus latipes***. Female. a, whole animal, dorsal view; b, antenna; c, maxilliped; d–h, P1–P5.

Material examined. Five females (1.05 mm), 5 males (1.04 mm) collected from Ujung Kulon National Park, Banten by surface tow of 0.1 mm mesh plankton net at night on 13 June 2008.

Female. Prosome 4-segmented. Cephalon bell-shaped, with nauplius eye, rostrum large, anteriorly directed, fused to cephalic shield. Posterolateral ends of each somite laterally expanded. Urosome 5-segmented, consists of Ms5, genital double-somite and 3 free abdominal somites. CR short, twice as long as wide with 2 plumose setae. Genital double-somite subdivided by slight lateral constrictions.

A1 slender 7-segmented, aesthetasc-like setal elements present on segments 3, 4 and 7. Antennary Re represented by 2 setae; free Ri 2-segmented; proximal segment unarmed; distal segment bearing 1 subapical and 4 terminal elements. Mandible reduced, coxa with slender, stylet-like gnathobase, palp represented by single seta. Maxillule reduced to tapering lobate segment bearing 1 seta. Maxilla with 2 syncoxal endites, proximal endite represented by single seta, distal endite lobate with 3 setae, allobasis with articulating claw-like element plus 2 accessory setae. Maxilliped well developed, slender and elongated 3-segmented, and armed with short hooks on the end. P1-P4 with following armature (spines in Roman and setae in Arabic numerals):

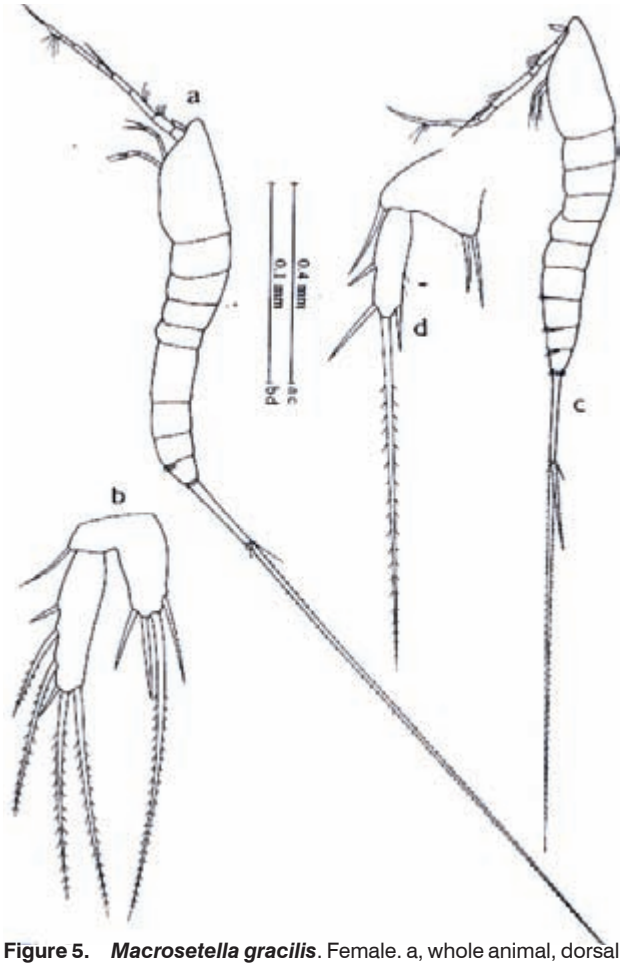

Figure 5. ***Macrosetella gracilis***. Female. a, whole animal, dorsal view; b, P5. Male. c, whole animal, lateral view; d, P5.

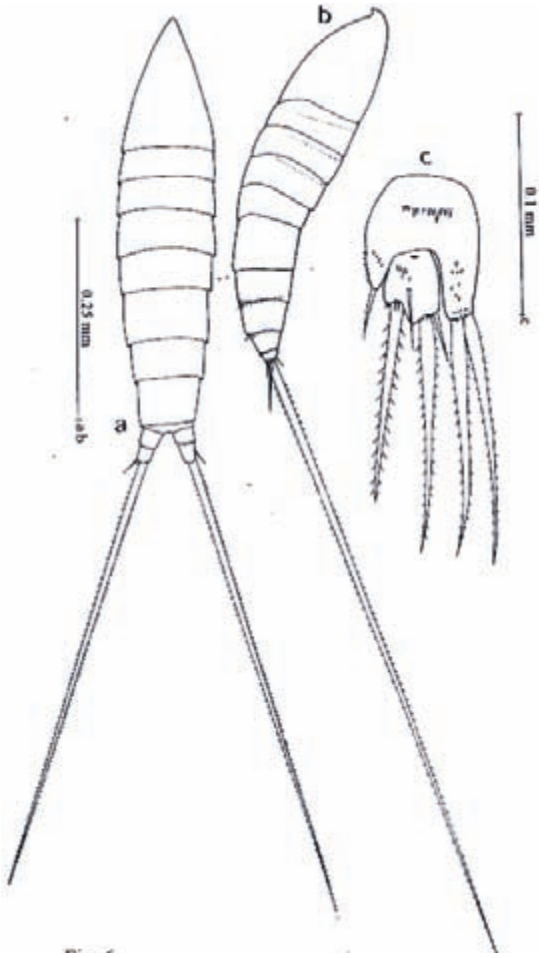

Figure 6. ***Microsetella rosea***. Female. a, whole animal, dorsal view. Male. b, whole animal, lateral view; c, P5

	coxa	basis	Re segments	Ri segments
P1	0-0	1-0	3-1	0,2,2
P2	0-0	1-0	0-1; I-1; II,2,3	0-1; 0-2; I,2,3
P3	0-0	1-0	I-1; I-1; II,2,3	0-1; 0-2, I,2,2
P4	0-0	1-0	0-1; I-1; I,2,2	0-1; 0-2; I,2,2

P5 uniramous, 2-segmented, baseoendopod small with outer seta only, compound exopodal segment elongate, typically with 5 setae.

Male. Prosome as in female. Urosome 6-segmented, consists of Ms5, genital somite and 4 free abdominal somites; CR short, with 7 setae, setae 4 and 5 fused at base, without fracture A1 7-segmented; haplocerate with geniculation between segments 6 and 7; aestehetascs-like setal elements present on segments 3, 5 and 7, segment 6 short with spine. Maxilliped well developed, elongate, Ri represented by curved distal claw and 5 accessory elements. P1–P5 as in female. P6 represented by elongate lobe bearing 3 setae.

Remarks. The family Clytemnestridae A. Scott, 1909 divided into two genera, *Clytemnestridae* Dana, 1848 and *Goniopsyllus* Brady, 1883 consists of 5 and 3 species, respectively. Boxshall (1979) adopted the family name Clytemnestridae A. Scott, 1909 rather than the Pseudopeltididae Poppe, 1891 as used by Lang (1948). Huys & Conroy-Dalton (2000) revisited this action, noting that the valid senior synonym of this taxon. Goniopeltiidae Claus, 1891, had remained unused since 1899 and could be considered a *nomen oblitum*. The junior name, the Clytemnestridae, was treated by Huys & Conroy-Dalton (2000) as a protected name.

Distribution. Members of the Clytemnestridae are holoplanktonic, typically occurring in the epipelagic zone. After Huys & Conroy-Dalton (2000) 8 species are treated as valid. There is considerable uncertainty surrounding known distribution patterns because of the taxonomic

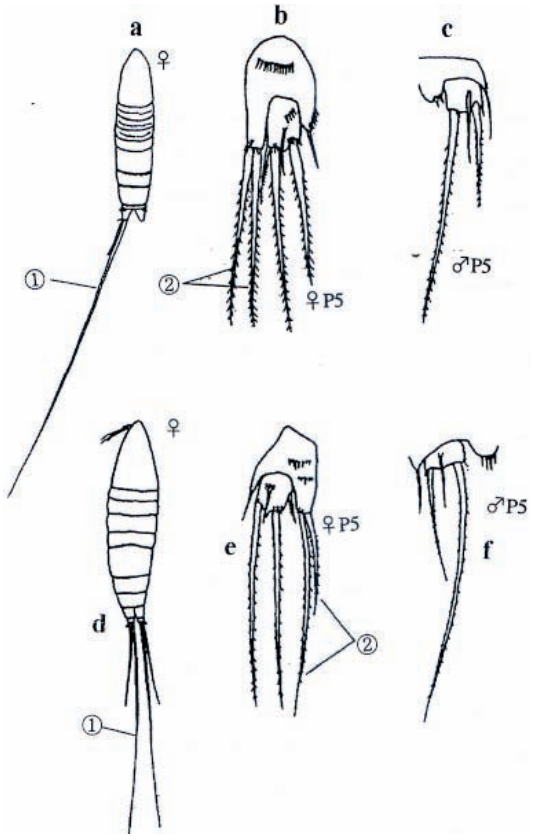

Figure 7. ***Microsetella rosea***. Female. a, whole animal, dorsal view; b, P5. Male. c, P5. ***Microsetella norvegica***. Female. d, whole animal, dorsal view; e, P5. Male. f, P5.

confusion over species identities. Confirmed distributions of *C. scutellata* Dana has been recorded from the tropical an subtropical zones of the Indo-Pacific Oceans. There is a posibility that three Indo-Pacific species, *Clytemnestra farrani*, *C. longipes* and *C. setosa* are distributed in the East and Southeast Asian waters. I have found *C. scutellata* from the sites 3, 6, 8 and 9.

Family **Euterpinidae** Brian, 1921
Genus ***Euterpina*** Norman, 1903
Euterpina acutifrons (Dana (1847)
(fig. 3)

Harpacticus acutifrons Dana, 1847: 153.
Euterpe acutifrons, Dahl, 1894: 13; Mori, 1937: 117, pl. 64, figs. 1–3; Lang, 1948: 285–287, fig. 142; Gonzales & Bowman, 1965: 264, fig. 14d-i.
Euterpina acutifrons, A. Scott, 1909: 229.

Material examined. Ten females (0.62–0.69 mm), 10 males (0.53–0.56 mm) collected from Gilimanuk, Bali Strait by surface tow of 0.31 mm mesh plankton net at daytime on 14 July 2009.

Female. Body slender, cyclopiform, with distinct boundary between prosome and urosome at podoplean position. Prosome 5-segmented, consists of cephalon, Ms1 and 3 free metasomal somites. Cephalon produced into triangular process anteriorly. Rostrum prominent, tapering to a point, fused to cephalic shield. Nauplius eye present. Urosome 5-segmented, much narrower than prosome, consists of Ms5, genital double somite and 3 free abdominal somites. Genital double somite subdivided by dorsal chitinous bar. Anal operculum small, rounded. Genital apparatus comprising paired genital apertures located ventrally on genital double-somite; copulary pore located on ventral midline some distance posterior to genital apertures. CR cylindrical, longer than wide.

A1 17-segmented, with aesthetascs on segments 4 and 7. A2 with 1-segmented Re armed with 4 plumose setae. Mandible with well developed coxal gnathobase; palp small; basis with 2 setae; Ri and Re 1-segmented, each with 7 and 5 setae, respectively. Maxillule with well developed praecoxal arthrite bearing 8 distal elements; coxa with endite bearing 3 setae; coxal epipodite absent; basis and rami combined into unsegmented lobe bearing 6 setae. Maxilla with 3 syncoxal endites bearing 3, 3, 4 elements; allobasis with claw plus 4 setae; free Ri 1-segmented, armed with 5 setae. Maxilliped extremely slender, prehensile, forming subchela; 3-segmented; syncoxa and basis unarmed, endopodal segment with setulate claw plus accessory seta. P1–P4 with following armature (spines in Roman and setae in Arabic numerals):

	coxa	basis	Re segments	Ri segments
P1	0-0	0-I	I-0; II,1,3	0-1; I,I,4
P2	0-0	0-0	I-1; I-1; II,I,3	0-1; 0-2; I,2,2
P3	0-0	0-0	I-1; I-1; II,I,3	0-1; 0-2; I,2,2
P4	0-0	0-0	I-1; I-1; II,I,2	0-1; 0-1; I,2,2

P5 long, fused medially to form a rectangular plate with 4 strong and 2 small St, 1 long and 1 short Se arising on its base, and 1 plumose seta on outer margin, furnished with ridge of spinules on inner margin.

Male. General appearance as in female. Prosome 4-segmented. Urosome 6-segmented, consists of Ms5, genital somite and 4 free abdominal somites. A1 7-segmented, prehensile with plumose setae. P1, P3 and P4 as in female, P2 with 2-segmented Ri. P5, both legs fused on base, divided at tip by median groove reaching halfway to base, armed with 2 St on either side, 1 Se with seta arising on its base, and proximal outer seta. P6 symmetrical, represented by small plate bearing 2 spines.

Remarks. *Euterpina acutifrons* is monotype, has a cosmopolitan distribution in the plankton community of shallow seas between 66° and 40° S. Its development was described by Haq (1965) and the anatomy of the naupliar stages was described by Fanta (1973). This species occurred regularly in almost the sites, but never abundant.

Family **Thalestridae** Sars, 1905
Subfamily **Dactylopodiinae** Lang, 1948
Genus ***Eudactylopus*** A. Scott, 1909
Eudactylopus latipes (T. Scott, 1894)
(fig. 4)

Dactylopus latipes T. Scott (non Boeck), 1893: 99, pl. 10, figs. 38–43.
Dactylopusia latipes, Thompson & Scott, 1903: 238, 268.
Eudactylopus latipes, A. Scott, 1909: 219, pl. 43, figs. 8–14; Sewell, 1940: 201–207, text-figs. 31–32; Lang, 1948: 561; Tanaka & Hue, 1965: 65, fig. 4a-g.

Material examined. Ten females (1.45–1.50 mm) collected from Ujung Kulon, Sunda Strait by surface tow of 0.1 mm mesh plankton net at daytime on 1 June 2008.

Female. Prosome stout and more or less depressed, 5-segmented consists of cephalon, Ms1 and 3 free metasomal somites. Cephalon well developed, rostrum long and sharply pointed at apex. Urosome rather slender, 5-segmented, consists of Ms5, genital double somite and 3 free abdominal somites. Genital double somite, Ur2 and Ur3 each fringed with 3 rows of fine spinules, one of which parallel to distal margin of somite, and the other 2 run obliquely near lateral margin. Anal somite very short; CR slightly shorter than wide, more or less divergent, 2nd inner seta much longer than others, about as long as combined lengths of urosomal somites and CR.

A1 7-segmented, 1st segment long, broad and stout; segments 2, 3 and 4 well developed, segments 5 and 6 short and small, but terminal segment elongated. A2 with separate coxa, allobasis with 1 abexopodal seta, Ri 1-segmented, bearing 3 subapical setae; Re 1-segmented, bearing 9 setae. Maxilliped prehensile, 3-segmented, without characteristic features. P1–P4 with following armature (spines in Roman and setae in Arabic numerals):

	coxa	basis	Re segments	Ri segments
P1	0-0	I-I	I-0; I-1; IV-0	0-1; II,1
P2	0-0	I-0	I-1; I-1; III,I,3	0-0; 0-1; I,II,2
P3	0-0	I-0	I-1; I-1; III,I,4	0-1; 0-2; I,3,3
P4	0-0	1-0	I-1; I-1; III,I,4	0-1; 0-1; I,2,2

P5 2-segmented, extending to distal end of Ur2, segments very large and foliaceous, proximal segment broad and wedge-shape, outer margin of segment furnished with 5 short feeble setae, distal segment sub-quadrate in outline and bears 6 short feeble setae, and fringed with short hairs on periphery.

No male was found in the present study

Remarks. *Eudactylopus latipes* is easily identified by the 2-segmented Re of the A2, the structure of P1, and the very large, foliaceous and transparent P5. This species was described for the first time by T. Scott (1894) based on a single specimen from the Gulf of Guinea. It has also been recorded from the Island of Ceylon by Thompson & Scott (1903). Sars (1903) points out that *Dactylopus latipes* Boeck is identical with *Dactylopusia brevicornis* (Claus), but is quite distinct from *Dactylopus latipes* T. Scott (1894). A. Scott (1909) was recorded 2 specimens of this species from St. 273, east coast of Aru Islands at a depth of 13 metres. I have found this species at the following sites 1, 3, 4, 6, 7 and 8.

Distribution. Nankauri Harbour, Nicobar Islands, East coast of Aru Islands (A. Scott, 1909), and Singu tide pool, Northwest coast of Kyushu, Japan (Tanaka & Hue, 1965).

Family **Miraciidae** Dana, 1846
Genus ***Macrosetella*** A. Scott, 1909
Macrosetella gracilis (Dana, 1848)
(fig. 5)

Setella gracilis Dana, 1852: 1198, pl. 48, fig. 3a-g; Brady, 1883: 108, pl.50, figs. 1–10; Mori, 1937: 115, pl. 64, figs. 1–5.
Macrosetella gracilis, A. Scott, 1909: 230; Wilson, 1932: 281, fig. 174a-d.

Material examined. Ten females (1.20–1.45 mm), 10 males (1.15–1.30 mm) collected from Ujung Kulon, Sunda Strait by surface tow of 0.1 mm mesh plankton net at night on 13 June 2008.

Female. Body slender, prosome 4-segmented. Cephalon narrowed anteriorly, fused with Ms1, paired cuticular lenses absent. Rostrum uniramous, well developed, long and pointed, ventrally projected, defined at base. Urosome 5-segmented, consists of Ms5, genital double somite and 3 free abdominal somites. Anal operculum small, ornamented with rows of spinules. Genital double somite subdivided

dorsally and laterally by cuticular ridges; CR short, longer than wide, innermost caudal seta (seta V) very long.

A1 8-segmented; A2 2-segmented, without Re. Mandible and maxilla 1-segmented, without Re and Ri. P1–P4 with following armature (spines in Roman and setae in Arabic numerals):

	coxa	basis	Re segments	Ri segments
P1	0-0	1-I	I-0; I-1; 1,1,1	0-1; 3
P2	0-0	1-0	I-0; I-1; II,I,3	0-1; 0-1; 1,1,2
P3	0-0	1-0	I-0; I-1; II,1,4	0-1; 0-1; I,2,2
P4	0-0	1-0	I-0; I-1; II,1,4	0-1; 0-1; I,2,2

P5 symmetrical, 2-segmented, 1st segment with 4 inner corner and 1 outer setae; 2nd segment with 6 setae.

Male. Prosome 6-segmented. Urosome 6-segmented, consists of Ms5, genital somite and 4 free abdominal somites; CR as in female. A1 prehensile, with knee-like articulation between segments 5 and 6. P1–P2 2-segmented. P5 symmetrical, 2-segmented, 1st segment with 2 setae on inner corner and 1 outer seta; 2nd segment with 2 setae on outer margin, 1 very long apical seta, 1 short and 2 small setae on inner margin.

Remarks. The family Miraciidae consists of 363 species from 53 genera. They are brightly pigmented, usually purplish-blue, when alive. *Macrosetella gracilis* is the only species of the genus. This species belongs to the *Miracia*-group are typical inhabitants of epipelagic zone in warm oceanic waters. Björnberg (1965) noted that the adults and developmental stages of *M. gracilis* are usually found in association with cyanobacteria (*Trichodesmium*) and it seems likely that all planktonic miraciids exhibit a similar specialised life-style.

Distribution. Widely recorded in subtropical and tropical zones of all oceans, roughly between 40ºN and 40° S, mainly between the 15° C mean annual surface temperature isotherms. A. Scott (1909) recorded this species from Sulawesi Sea, Flores Sea, Banda Sea and Arafura Sea. I have found this species from sites 2, 3, 4, 6, 7 and 8.

Family **Ectinosomatidae** Sars, 1903
Genus ***Microsetella*** Brady & Robertson, 1873
Microsetella rosea (Dana, 1848)
(fig. 6 and 7a-c)

Canthocamptus roseus Dana, 1852: 1189, pl. 183, figs. 1–10.
Microsetella rosea, Giesbrecht, 1892: 550, pl. 44, figs. 32, 35, 37–38; Esterly, 1932: 177, fig. 122a-c; Mori, 1937: 116, pl. 64, figs. 6-8.

Material examined. Ten females (0.52–0.56 mm), 10 males (0.40–0.45 mm) collected from Ujung Kulon, Sunda Strait by surface tow of 0.1 mm mesh plankton net at daytime on 13 June 2008.

Female. Body fusiform, compressed laterally. Prosome 4-segmented, consists of cephalon, Ms1 and 3 free metasomal somites. Cephalon triangular anteriorly, fused with Ms1; rostrum well developed and not defined at base, bent ventrally, and not visible from dorsal view; nauplius eye present. Urosome 5-segmented, consists of Ms5, genital double somite and 3 free abdominal somites; anal somite with consoicuous ornamentation around anal opening; CR short, inner caudal seta (seta V) very long, almost twice as long as body.

A1 6-segmented, 3rd segment elongated with aesthetasc. A2 biramous, with 3-segmented Re. Mandible biramous, well developed, gnathal lobe with few teeth, Re very small, Ri large, with single enlarged seta on middle of inner margin. P1–P4 with following armature (spines in Roman and setae in Arabic numerals):

	coxa	basis	Re segments	Ri segments
P1	0-0	I-1	I-0; I-1; III, I,2	0-1; 0-1; I,I+1,2
P2	0-0	I-0	I-1, I-1; III,I,3	0-1; 0-1; I, I+1, 2
P3	0-0	1-0	I-1, I-1; II,I, 4	0-1; 0-1; I,I+1,2
P4	0-0	1-0	I-1; I-1; II,I,4	0-10-1; I,I+1,2

P5 with outer lobe of baseoendopod well developed; Re foliaceous, 2-segmented, 1st segment with 2 inner and 1 outer setae, 2nd segment with 3 marginal and 1 surface setae, innermost seta nearly as long as the other seta.

Male. Body as in female, but slightly shorter. Prosome 6-segmented. Urosome 6-segmented, consists of Ms5, genital somite and 4 free abdominal somites. Caudal rami cylindrical with directed spinous processes, armed with 7 setae. A1 prehensile, with knee-like articulation between segments 5 and 6. P1–P4 as in female. P5 symmetrical, 2-segmented, 1st segment with 2 inner and 1 outer setae; 2nd segment with 2 outer setae, 1 very long apical seta, 1 long and 2 very short inner setae. P6 represented by small plate, typically with 2 setae.

Remarks. The family Ectinosomatidae consists of 226 species from 20 genera. The genus *Microsetella* consists of two species, *M. rosea* (Dana, 1848) and *M. norvegica* (Boeck, 1864). *M. rosea* most resembles *M. norvegica*, but it is distinguishable from the latter by the longest of caudal seta is almost twice as long as the body, and the inner most seta of the P5 is nearly as long as the other setae. In *M. norvegica* the longest caudal seta is nearly as long as the body, and the inner seta of the P5 is nearly half times as long as the neighbouring seta.

The two species of *Microsetella* have succesfully colonised the marine plankton and are widely distributed, especially in shallow coastal waters (Boxshall, 1979). A. Scott (1909) recorded this species from Java Sea, Flores Sea, Banda Sea and Arafura Sea. I have found this species from the sites 3, 6, 7 and 8.

Microsetella norvegica (Boeck, 1864)
(fig. 7d-f)

Ectinosoma atlanticum, Brady, 1883: 100, pl. 4, figs. 10–14.

Microsetella atlantica, Giesbrecht, 1892: 550, pl. 44, figs. 33-34, 36, 39.

Microsetella norvegica, A. Scott, 1909: 199; Mori, 1937: 116, pl. 64, figs. 9-10; Wilson, 1932: 176, fig. 121a-c; Tanaka & Hue, 1965: 59, fig. 1g-k.

Material examined. Ten females (0.45–0.55 mm), 10 males (0.35–0.40 mm) collected from Ujung Kulon, Sunda Strait by surface tow of 0.1 mm mesh plankton net at daytime on 13 June 2008.

Female. Body extremely slender and compresses, almost linear in form. Prosome 4-segmented, cephalon dorsally flattened, fused with Ms1. Rostrum short and abruptly deflexed. Urosome 5-segmented, each segments with rows of minute spinules arranged transversely, CR scarcely shorter than broad with long caudal seta V, as long as body. A1 6-segmented. A2 biramous, with 3-segmented Re. Mandible biramous. P1–P4 as in *M. rosea* with 3-segmented Re and Ri, Ri longer than Re. P5 symmetrical, 2-segmented, 1st segment with 2 setae on inner corner, and 1 seta on outer corner; 2nd segment with 2 long and 2 short setae. Inner seta on base of Ri of P5 less half as long as outer seta.

Male. Prosome 6-segmented. Both A1 modified into grasping organs. P5 rudimentary and asymmetrical, distal segment with 2 unequal long setae and 1 plumose seta medially.

Remarks. *Microsetela norvegica* has a moderately wide distribution in all oceans (circumglobal species). *M. norvegica* is readily distinguished from *M. rosea* by the small size, the caudal seta V as long as body, and the form of the fifth legs. I have found this species from sites 3 and 8. *Microsetella* species appear to have retained a surface-feeding life-style, attaching themselves to discarded and occupied larvaean houses.

REFERENCES

Bodin P, 1977. *Catalogue of the new marine harpacticoid copepods*. Studiedcumenten van het Koninklijk Belgisch Instituut voor Natuurwenschappen, 89: 1–304.

Björnberg TKS, 1965. Observations on the development and the biology of the Miraciidae Dana (Copepoda: Crustacea). *Bull. mar. Sci*., 15: 512–520.

Boxshall GA, 1979. The planktonic copepods of the northeastern Atlantic Ocean: Harpacticoida, Siphonostomatoida and Mormonilloida. *Bull. British Mus. Nat. Hist.* (*Zool*.), 35(3): 201–264.

Brady GS, 1883. Report on the Copepoda obtained by H.M.S. Challenger, during the years 1873-1876. *Rep. Scient. Results Voy. Challenger* (Zool.) 8(23): 1–142, pls. 1–55.

Dana JD, 1849. Conspectus Crustaceorum, in orbis terrarum circumnavigatione, C. Wilkes e classe Reipublicae Foederatae duce, lexit et descripsit Jcobus D. Dana. *Am. Journ. Sci*. (2) 8: 276–285.

Fanta ES, 1973. Anatomy of the nauplii of *Euterpina acutifrons* (Dana) (Copepoda, Harpacticoida). *Crustaceana* 23 (2): 165–181.

Gonzales JG and Bowman TE, 1965. Planktonic coprepods from Bahia Fosforescente, Puerto Rico, and adjacent waters. *Proc. U.S. natn. Mus*., 117: 241–303.

Haq SM, 1965. Development of the copepod *Euterpina acutifrons* with special reference to dimorphism in the male. *Proc. zool. Soc. London*, 144: 175–201.

Huys R and Bottger-Schnack R, 1994. Taxonomy, biology and phylogeny of Miraciidae (Copepoda: Harpacticoida). *Sarsia*, 79: 207–383.

Huys R, Gee JM, Moore CG and Hamond R, 1996. *Marine and brackish water harpacticoid copepods. Part 1. Synopses of the British fauna (new series)* edited by D.M. Kermack, R.S.K. Barnes & J.H. Crothers, No. 51. The Linnean Society of London and The Estuarine and Coastal Sciences Association, London, 352 pp.

Huys R and Conroy-Dalton S, 2000. Generic concepts in the Clytemnestridae (Copepoda, Harpacticoida), revision and revival. *Bull. nat. Hist. Mus. London* (Zool.) 66(1): 1–48.

Kim DJ, 1985. Taxonomical study on calanoid copepod (Crustacea: Copepoda) in Korean waters. PhD Thesis. Hanyang Univ. Korea, 1–187, 50 pls.

Lang K, 1948. Monographie der Harpacticiden. Lund, Hakan Ohlsson's Boktrycheri, Stockholm, Nordiska Bokhandeln, 1682 pp.

Lang K, 1965. Copepoda Harpacticoidea from the Californian Pacific coast. *Kungliga Svenska Vetenskapsakademiens Handlingar*, 10 (2): 1–560.

Park T, 1970. Calanoid copepods from the Caribbean Sea and Gulf of Mexico. 2. New species and new records from plankton samples. *Bull. Mar. Sci*., 20(2): 472–546.

Scott A, *The Copepoda of the Siboga Expedition. Part I. Free-swimming, littoral and semi-parasitic Copepoda*. Siboga Exped. Monograph., 29a: 323 pp.

Scott T, 1894. Report on Entomostraca from the Gulf of Guinea, collected by John Rattray BSc. *Trans. Roy. Soc. London*, 6(1): 1–161.

Sewell RBS, 1940. Copepoda. Harpacticoida. Scient. *Rep. John Murray Exped*. 7 (2): 117–382, 1 chart.

Tanaka O and Hue JS, 1965. Preliminary report on the copepods found in the tide pool along the north-west coast of Kyushu. *Proc. Symposium on Crustacea. Part 1*. 57–73.

Thompson IC and Scott A, 1903. Pearl Oyster Fisheries of the Gulf of Mannar. 1: 227–307, pls. 1–20, text-fig. 1.

Wells JBJ, 1970. Copepoda. I. Sub-order Harpacticoida. *Fich. Ident. Zooplancton*, 133: 1–7.

Wells JBJ, 1976. *Key to aid the identification of marine harpacticoid copepods*. Department of Zoology, Univ. of Aberdeen, 215 pp.

Wells JBJ, 1981. *Key to aid the identification of marine harpacticoid copepods*. Amendment Bulletin No. 3. Zoology Publications from Victoria Univ. of Wellington, 75: 1–13.

Wells JBJ, 1983. *Key to aid the identification of marine harpacticoid copepods*. Amendment Bulletin No. 4. Zoology Publications from Victoria Univ. of Wellington, 77: 1–9.

Wells JBJ, 1985. *Key to aid the identification of marine harpacticoid copepods*. Amendment Bulletin No. 5. Zoology Publications from Victoria Univ. of Wellington, 80: 1–19.

Wilson CB, 1932. The copepods of the Woods Hole region. Massachusetts. *Bull. U.S. natn. Mus*. 158: 1–635, pls. 141.

1. Sempu Island, East Jawa (28–29 June 2006, 24–30 June 2010)
2. Segara Anakan Cilacap (28 April–8 May 2009)
3. Ujung Kulon, Sunda Strait (13–15 June 2008)
4. Muara Angke, Jakarta Bay (14–21 July 2010)
5. Off Kenjeran, Surabaya (18 October 2010)
6. Gilimanuk, Bali Strait (11–24 July 2009)
7. Lembeh Strait, Bitung, North Sulawesi (14–30 May 2004)
8. Ambon Bay (14–15 March 1995)
9. Manyailibit Bay, Raja Ampat, West Papua (6–7 June 2007)