

NEW RECORDS AND TAXONOMIC REEXAMINATION OF THE GENUS *LABIDOCERA* (COPEPODA : CALANOIDA), WITH NOTES ON THEIR SPECIES GROUPS AND DISTRIBUTION IN INDONESIAN WATERS

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Abstract

Only few studies on the taxonomy and biogeography of the genus *Labidocera* from Indonesian waters have been carried out. The present paper deals with relevant information on the description and illustration of eleven species of *Labidocera* collected from 15 stations in Indonesian waters. Seven out of twelve previously known, i.e., *Labidocera acuta* Dana, 1849; *L. bataviae* A. Scott, 1909; *L. detruncata* Dana, 1849; *L. kroyeri* (Brady, 1883); *L. laevidentata* (Brady, 1883); *L. minuta* Giesbrecht, 1889; *L. pavo* Giesbrecht, 1889; except *L. acutifrons* Dana, 1849; *L. euchaeta* Giesbrecht, 1889; *L. madurae* A. Scott, 1909; *L. nerii* Kroyer, 1849; and *L. papuensis* Fleminger et al., 1982, have been recorded. Two species i.e., *L. javaensis* Mulyadi, 1997; and *L. muranoi* Mulyadi, 1997, have been described as new species, and two species i.e., *L. bengalensis* Krishnaswamy, 1953; and *L. sinilobata* Shen and Lee, 1963, are new records for the area.

Introduction

The species of the genus *Labidocera* Lubbock, 1853, inhabit surface waters, provide excellent materials for a zoogeographic investigation. Some of the species are primarily neritic, others are oceanic.

In Indonesian waters, hitherto twelve species of *Labidocera* have been reported (Cleve, 1901; A. Scott, 1909; Früchtl, 1923, 1924; Delsman, 1939,

1949; Chiba and Tsuruta, 1955; Fleminger *et al.*, 1982). The recorded species are: *L. acuta* Dana, 1849; *L. acutifrons* Dana, 1849; *L. bataviae* A. Scott, 1909; *L. detruncata* Dana, 1849; *L. euchaeta* Giesbrecht, 1889; *L. kroyeri* (Brady, 1883); *L. laevidentata* (Brady, 1883); *L. madurae* A. Scott, 1909; *L. minuta* Giesbrecht, 1889; *L. nerii* Kroyer, 1849; *L. papuensis* Fleminger *et al.*, 1982; and *L. pavo* Giesbrecht, 1889. All of these, except *L. acutifrons*, *L. bataviae*, *L. euchaeta*, *L. madurae*, *L. nerii*, and *L. papuensis* have been encountered in this study. Two species, *L. javaensis* Mulyadi, 1997; and *L. muranoi* Mulyadi, 1997, have been described as new species, while 2 other species, i.e., *L. bengalensis* Krishnaswamy, 1953 and *L. sinilobata* Shen and Lee, 1963, represent new records for Indonesia waters.

Materials and Methods

Many of plankton samples analysed in the study, were kindly provided by the Research and Development Centre of Oceanology, Indonesian Institute of Sciences (LIPI). The samples were collected from 15 stations in Indonesian waters during 1985-1995 (Fig. 1). All stations except that in the Flores Sea were located near the coast. Sampling was done by surface and vertical hauls (from 10 m, 25 m, 100 m or 200 m deep to the surface) with plankton nets (0.1 mm mesh size; 0.35 m and 0.45 m diameter mouth aperture) at day and night time.

Abbreviations used are as follows: A, antennule; A2, antenna; Ms1-Ms5, metasomal somites 1-5, Ur1-Ur5, urosomal somites 1-5; CR, caudal rami; P1-P5, swimming legs 1-5; B1, B2, basipodal segments 1 and 2; Re1-Re3, exopodal segments 1-3; and Ri1, Ri2, endopodal segments 1 and 2.

Key to species of *Labidocera* in Indonesian waters

Female

1. Cephalon with median crest 2
 Cephalon without median crest 3
2. Distal end of Ur1 produced into a spine on right side *L. acuta*
 Distal end of Ur1 not produced into a spine, both margins

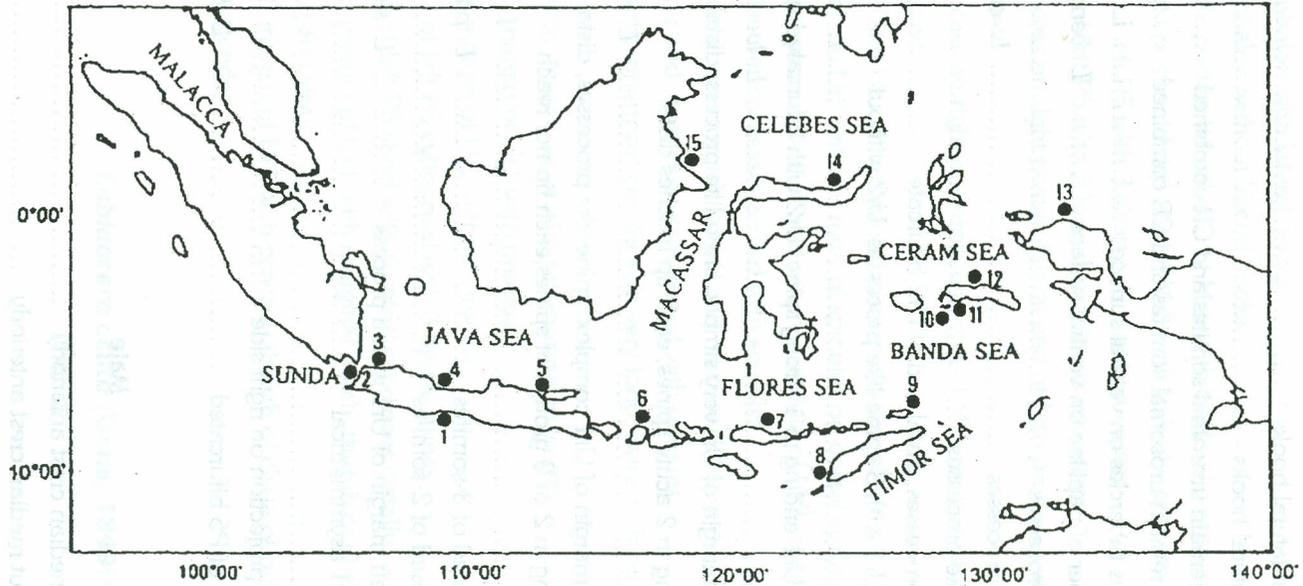


Fig. 1. MAP OF INDONESIAN WATERS SHOWING STUDY SITES 1-15

Swollen medially	<i>L. acutifrons</i>
3. Cephalon without lateral hooks	4
Cephalon with lateral hooks	10
4. Ur1 longer than remain urosomal somites and CR combined	5
Ur1 shorter than remain urosomal somites and CR combined	6
5. Ur2 with chitinous tubercles on ventral surface	<i>L. minuta</i>
Ur2 with a number of papillae on ventral surface	<i>L. bengalensis</i>
6. Ur1 with many processes	7
Ur1 without any processes	<i>L. euchaeta</i>
7. Ur1 with spine-like processes	8
Ur1 with many processes, distal end of Ur2 bifurcate	9
8. Right margin of Ur1 with 3 spine-like processes; Ur2 without any processes	<i>L. javaensis</i>
Right and left of Ur1 ending in 1 strong spine; Ur2 with bifurcated spine postero-distally	<i>L. laevidentata</i>
9. Process on right margin of Ur1 very simple, knob-like process; distal end of Ur2 ending in 2 acute spines, each tip reaches distal end of CR	<i>L. muranoi</i>
Process on right margin of Ur1 complex, spine-like processes, distal end of Ur2 ending in 2 or 3 groups of spines, each tip not reach distal end of CR	<i>L. kroyeri</i>
10. Urosome composed of 3-somites	<i>L. papuensis</i>
Urosome composed of 2-somites	11
11. P5 uniramous, left margin of Ur1 with a process	<i>L. sinilobata</i>
P5 biramous, Ur1 asymmetrical	12
12. Ur1 swollen	13
Ur1 with a large projection on right side	<i>L. pavo</i>
13. Distal ends of Ri of P5 bifurcated	<i>L. bataviae</i>

Male

1. Cephalon with median crest anteriorly	2
Cephalon without median crest anteriorly	3
2. Right posterolateral end of Ms5 with 1 long spine-like process ...	<i>L. acuta</i>

- Right posterolateral end of Ms5 almost symmetrical *L. acutifrons*
3. Cephalon with lateral hooks 4
 Cephalon without lateral hooks 9
4. Right posterolateral end of Ms5 with blade-like process 5
 Right posterolateral end of Ms5 with fork-like process 6
5. Re of left P5 with 3 short and blunt processes *L. minuta*
 Re of left P5 with 3 long and spinous processes *L. bengalensis*
6. Process on right posterolateral end of Ms5 produced into 2 spine-like
 shaped 7
 Process on right posterolateral end of Ms5 produced into 3 spine-like
 shaped 8
7. Ur2 and Ur3 with rows of spinules on dorsal surface *L. laevidentata*
 Ur2 and Ur3 without rows of spinules on dorsal surface *L. kroyeri*
8. Outer process widest and reaches middle of Ur2, between outer
 and inner processes armed with spinules *L. javaensis*
 Outer process much longer and reaches distal end of Ur2, between
 outer and inner processes armed with spinules *L. muranoi*
9. Fourth innermost caudal seta very long, twice as long as 3rd one
 *L. euchaeta*
 Fourth innermost caudal seta normal in length 10
10. Left margin of Ur1 with process 12
 Left margin of Ur1 without process 11
11. Re2 of left P5 cylindrical with 3 apical spines *L. pavo*
 Re2 of left P5 short with 4 spinal processes distally *L. detruncata*
12. Left margin of Ur1 with marginal notch; thumb of chela of right P5
 long and stout *L. bataviae*
 Left margin of Ur1 with process; thumb of chela of right P5 long
 and slender *L. sinilobata*

***Labidocera acuta* (Dana, 1849)**

(Fig. 2)

Pontella acuta Dana, 1849: 30; Brady, 1883: 89, pl. 36, figs. 1-12.

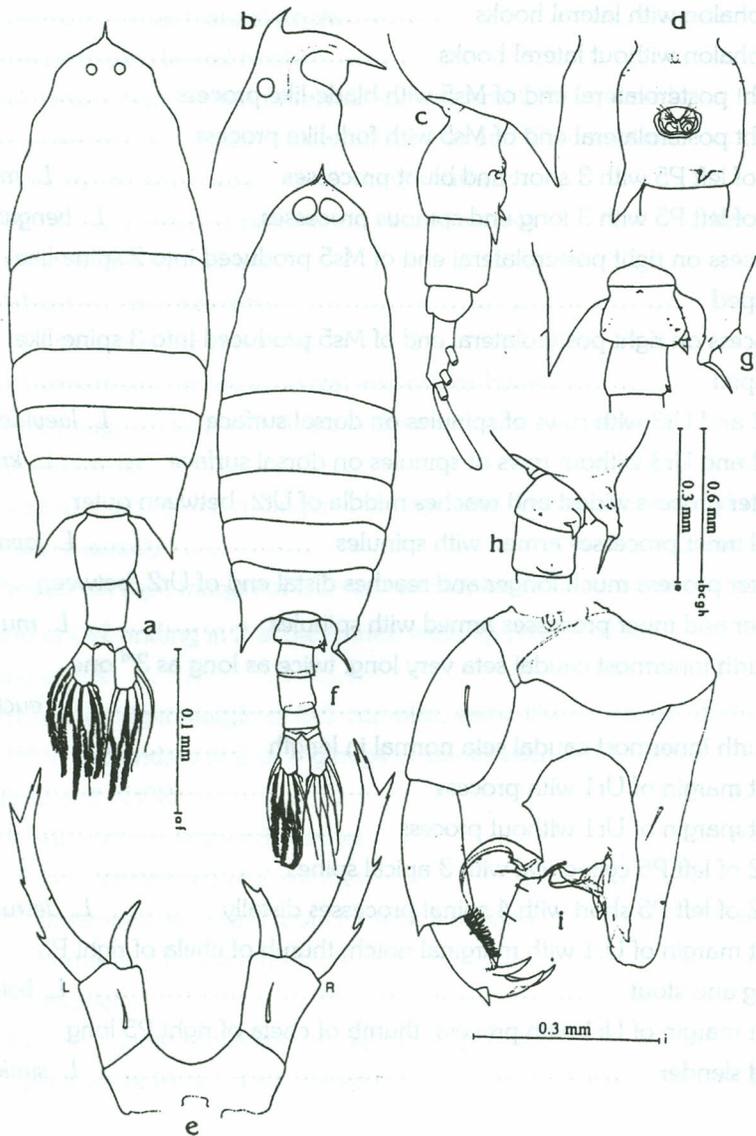


Fig. 2. *L. acuta*, female. a, whole animal, dorsal view; b, cephalon lateral view; c, Ms5 and urosome, lateral view; d, genital complex, ventral view; e, 5th leg; male. f, whole animal, dorsal view; g, Ms5 and Ur1-Ur2, dorsal view; h, Ms5 and Ur1-Ur2, lateral view; i, 5th legs.

Pontellina acuta Dana, 1852: 1150, pl. 80.

Labidocera acutum, T. Scott, 1893: 85, pl. 23, 25, 41; 1895: 259; Cleve, 1901: 7; 1903: 363. *Labidocera acuta*, T. Scott, 1893: 85; Giesbrecht and Schmeil, 1898: 134; Thompson, 1900: 282; A. Scott, 1902: 407; 1909: 164; Thompson and Scott, 1903: 251; Cleve, 1904: 191; Wolfenden, 1905: 1016; van Breemen, 1908: 150, fig. 168; Sewell, 1932: 35 1; Farran, 1936: 116; Mori, 1937: 91, pl. 41, figs. 1-5; Wilson, 1950; Tanaka, 1964: 254; Chen *et al.*, 1964: 121, fig. 55; Chen and Zhang, 1965, pl. 41, figs. 5- 10; Silas and Pillai, 1967: 346-364, figs. 1 h-1, 2f, J-k; 1973: 795, fig. 9; Saraswathy, 1967: 81; Greenwood, 1979: 95, fig. 1a-d; Matsuo and Marumo, 1982:93.

Material examined.- Two females (3.25 mm), 5 males (2.75-3.10 mm) collected from Jakarta Bay by surface tow of 0.1 mm mesh plankton net at daytime on 2 June 1994.

Female.- Cephalosome with anterior median crest, without lateral hooks, dorsal eye lenses large. Rostrum deeply, rami divergent posteriorly. Ms4 and Ms5, posterolateral ends produced into symmetrical acuminate lobes, reaching middle of Ur1. Urosome composed of 3 somites, asymmetrical; Ur1 with 1 stout distolateral conical process on right side; Ur2 as long as wide; anal somite short. CR symmetrical, 1.7 times as long as wide, with 5 large plumose setae, of which 2nd, 3rd and 4th caudal setae thickened proximally, enlarged portion of seta distinctly longer than ramus. P5 asymmetrical, right leg being stouter and longer than left, Re with 3 outer, 1 inner, and 3 apical spines of which medial one longest; Ri bifurcated at apex.

Male.- Cephalon similar to female except for dorsal eye lenses which are large and in contact with each other; Ms4 and Ms5 fused, posterolateral ends asymmetrical, left side modified into acute pointed lobe, right side produced into a curved process turned distolaterally and reaching distal end of Ur2. Urosome composed of 5 somites, Ur1 widest, asymmetrical, left side convex posteriorly, right side armed on posterior end with pointed process extending posteriorly beyond anterior third of Ur2. CR slightly asymmetrical, right ramus being larger, 2nd, 3rd and 4th caudal setae thickened proximally.

Right A1 geniculate, segment 17 naked, anterior margin of segment 18 with row of prominent denticles, extends proximally to almost whole length of segment 17, fused segments 19-21 with toothed plate extending to 2/3 length

of the segment, segment 22 prolonged distally into spur-like process which is as long as its own segment. P5 asymmetrical, right leg, B2 with 1 plumose seta on posterior surface, Re1 orbicular, with 1 triangular outgrowth on inner margin; Re2 short, broader medially, with 2 inner and 2 apical setae. Left leg, Rel with distolateral spine; Re2 ending in 3 finger-like processes, 1 small crenated basal process and 1 spine near distal end, inner margin of segment hirsute.

Remarks.- *Labidocera acuta* is easily identifiable by the median crest, the thickened 2nd to 4th caudal setae, and the form of P5 in both sexes. The female is identified by the stout distolateral conical process on right side of Ur1; the right A1, the posterolateral end of right Ms5, and the pointed process on right side of Ur1 in the male. An oceanic cognate of *L. acuta* has been recently described as *L. pseudacuta* Silas and Pillai, 1969.

Distribution.- Recorded from the tropical and subtropical neritic waters of Indo-Pacific (Silas and Pillai, 1973). Australasian region: off New South Wales coast (Dakin and Colefax, 1933, 1940), Great Barrier Reef waters (Farran, 1936), Moreton Bay (Greenwood, 1979). Indo-Malaysian region. Frequently recorded throughout as noted by Brady (1883), Cleve (1901), A. Scott (1909), Früchtl (1924), Delsman (1949), Chiba and Tsuruta (1955), Wickstead (1961) and Fleminger (1963).

***Labidocera bataviae* A. Scott, 1909**

(Fig. 3a-e)

Labidocera bataviae A. Scott, 1909: 168, pl. 50, figs. 1-8 (Type locality: eastern Indonesian waters); Sewell, 1932: 359, fig. 118; Silas and Pillai, 1973: 807, fig. 16; Matsuo and Marumo, 1982: 93.

Material examined.- Two males (1.95 mm) collected from Ambon Bay by surface tow of 0.1 mm mesh plankton net at night on 13 March 1995.

Male.- Cephalosome without lateral hooks, dorsal eye lenses small, Ms4 and Ms5 fused, posterolateral ends asymmetrical, right side longer than left and

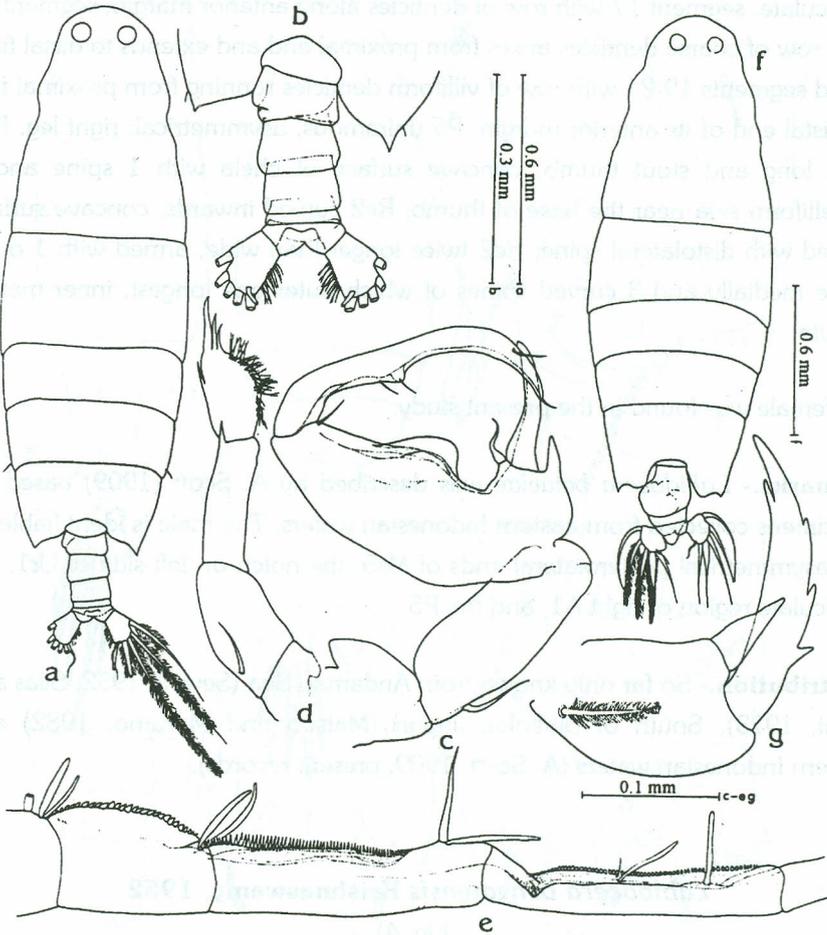


Fig. 3. *L. bataviae*, male. a, whole animal, dorsal view; b, Ms5 and urosome, dorsal view; c, right leg; d, left 5 leg; e, geniculate region of right Al. *L. detruncata*, female. f, whole animal, dorsal view; g, 5th leg.

extending beyond distal end of Ur1. Rostrum bifid, rami elongated and tapering posteriorly. Urosome composed of 5 somites, Ur1 with 1 notch on left side; caudal rami slightly asymmetrical, right ramus wider than left. Right A1 geniculate, segment 17 with row of denticles along anterior margin; segment 18 with row of coarse denticles arises from proximal end and extends to distal fifth; fused segments 19-21 with row of villiform denticles running from proximal fifth to distal end of its anterior margin. P5 uniramous, asymmetrical; right leg, Re1 with long and stout thumb, concave surface of chela with 1 spine and 1 flagelliform seta near the base of thumb; Re2 curved inwards, concave surface armed with distolateral spine; Re2 twice longer than wide, armed with 1 outer spine medially and 3 curved spines of which outer one longest, inner margin hirsute.

No female was found in the present study.

Remarks.- *Labidocera bataviae* was described by A. Scott (1909) based on specimens collected from eastern Indonesian waters. The male is identifiable by the asymmetrical posterolateral ends of Ms5, the notch on left side of Ur1, the geniculate region of right A1, and the P5.

Distribution.- So far only known from Andaman Sea (Sewell, 1932; Silas and Pillai, 1973), South of Shikoku, Japan (Matsuo and Marumo, 1982) and eastern Indonesian waters (A. Scott, 1909; present records).

***Labidocera bengalensis* Krishnaswamy, 1952**

(Fig. 4)

Labidocera bengalensis Krishnaswamy, 1952: 321-323, fig. 1a-i (Type locality: Madras coast); Silas and Pillai, 1973: 802-803, fig. 13a-g; Othman *et al.*, 1990: 564.

Material examined.- Ten females (1.41-1.65 mm), 10 males (1.09-1.25 mm) collected off Labuan, West Java by horizontal tow of 0.1 mm mesh plankton net at night on 18 June 1994.

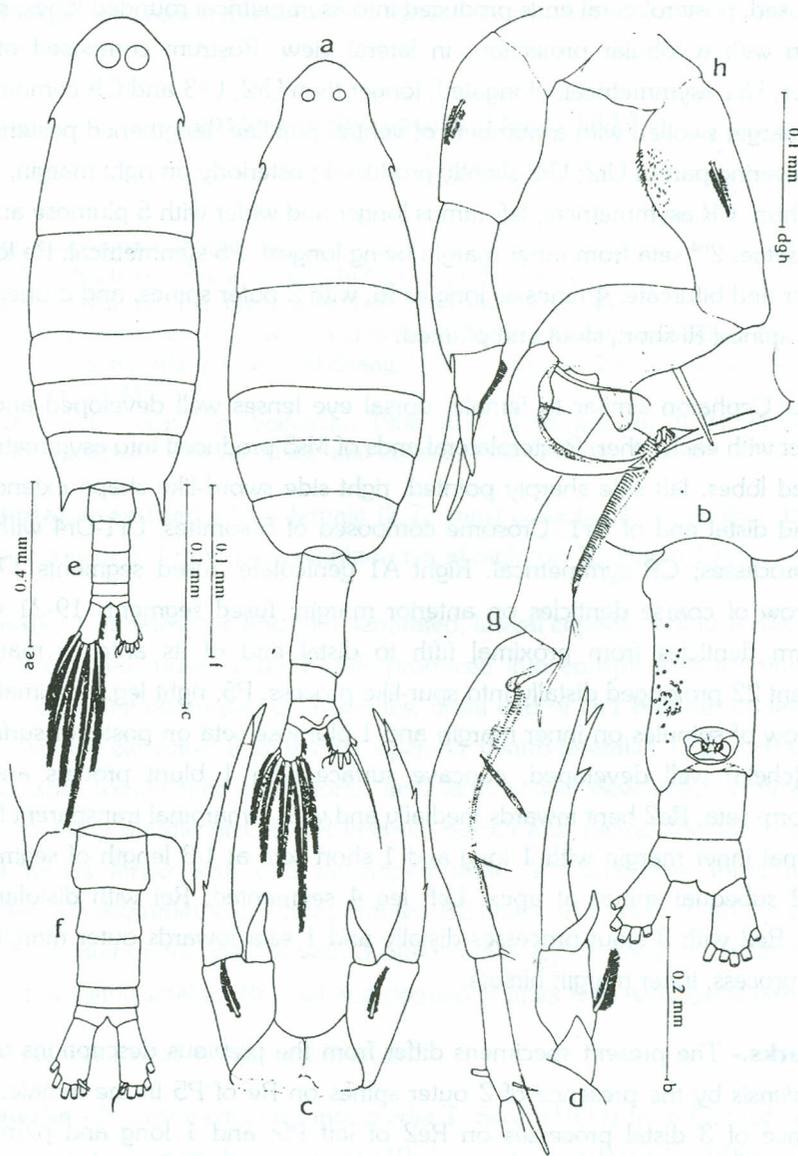


Fig. 4. *L. bengalensis*, female. a, whole animal, dorsal view; b, Ms5 and urosome, ventral view; c-d, 5 h leg; male. e, whole animal, dorsal view; f, Ms5 and urosome, dorsal view; g, geniculate region of right A1; h, 5th legs.

Female.- Cephalon squarley rounded anteriorly, with lateral hooks; Ms4 and Ms5 fused, posterolateral ends produced into asymmetrical rounded lobes, right margin with a lobular projection, in lateral view. Rostrum composed of 3-somites; Ur1 asymmetrical, elongated, longer than Ur2, Ur3 and CR combined, right margin swollen with a numbers of ventral papillae, lengthened posteriorly and covering part of Ur2; Ur2 slightly produced posteriorly on right margin; Ur3 very short; CR asymmetrical, left ramus longer and wider with 5 plumose and 1 small setae, 2nd seta from inner margin being longest. P5 symmetrical, Re long, slender and bifurcate, 4 times as long as Ri, with 2 outer spines, and 2 unequal apical spines; Ri short, stout and pointed.

Male.- Cephalon similar to female, dorsal eye lenses well developed and in contact with each other. Posterolateral ends of Ms5 produced into asymmetrical pointed lobes, left side sharply pointed, right side sword-like shape extending beyond distal end of Ur1. Urosome composed of 5 somites, Ur1-Ur4 without any processes; CR symmetrical. Right A1 geniculate, fused segments 17-18 with row of coarse denticles on anterior margin; fused segments 19-21 with villiform denticles from proximal fifth to distal end of its anterior margin, segment 22 prolonged distally into spur-like process. P5, right leg, proximal B2 with row of spinules on inner margin and 1 plumose seta on posterior surface; Re1 (chela) well developed, concave surface with 1 blunt process and 1 spiniform seta. Re2 bent inwards medially and with 1 marginal transparent flap, proximal inner margin with 1 long and 1 short seta at 1/3 length of segment, and 2 subequal spines at apex. Left leg 4 segmented, Rel with distolateral spine; Re2 with 3 stout processes distally and 1 seta towards outer margin of inner process, inner margin hirsute.

Remarks.- The present specimens differ from the previous descriptions of *L. bengalensis* by the presence of 2 outer spines on Re of P5 in the female; the presence of 3 distal processes on Re2 of left P5; and 1 long and plumose proximal seta on Re2 of right P5 in the male.

Distribution.- Recorded for the first time from Madras coast (Krishnaswamy, 1952, 1953), also from Andaman Sea (Silas and Pillai, 1973), Gulf of Mannar

and Palk Bay (Ummerkutty, 1964), Gulf of Carpentaria (Othman *et al.*, 1990), and Malaysian coast (Othman *et al.*, 1987).

***Labidocera detruncata* (Dana, 1849)**

(Fig. 3f-g)

Pontella detruncata Dana, 1849: 29.

Pontellina detruncata Dana, 1852: 1143-1145, pl. 80, fig. 7a-i.

Labidocera detruncatum, Giesbrecht, 1892: 445, pls. 23, 25, 41.

Labidocera detruncata, Giesbrecht and Schmeil, 1898: 135, Silas and Pillai, 1973: 797-798, fig. 10a-g; Chen and Zhang, 1965, pl. 43, figs. 1-4; Matsuo and Marumo, 1982:93.

Labidocera detruncata var. Wolfenden, 1906: 1017, pl. 98, figs. 16, 19, 21, 34, 36.

Labidocera detruncatum var. Dakin and Colefax, 1940: 103, fig. 146a-g.

Material examined.- One female (2.72 mm) collected from Ambon Bay by surface tow of 0.1 mm mesh plankton net at night on 13 March 1995.

Female.- Cephalosome and Ms1 separated, lateral cephalic hooks absent; Ms4 and Ms5 fused, posterolateral ends produced into conspicuous asymmetrical lobes. Urosome composed of 3-somites, distal end of Ur1 broader on left side, with ventral elevation and genital opening ventro-laterally; Ur2 narrow and wide; anal somite bifid posteriorly, anal lamina well developed, conical, left side reaching middle of CR. CR laterally placed and nearly circular in shape, right ramus larger with well developed setae, 2nd seta from inner margin swollen. P5 asymmetrical, left leg stouter, B2 wider and stouter with 1 plumose seta on posterior surface; Re with 3 outer spines and 2 unequal apical spines, inner one being smaller; Ri stout and pointed at apex with wide basal part.

No male was found in the present study.

Remarks.- *L. detruncata* var. *intermedia* T. Scott (1894) from Gulf of Guinea transferred to *L. nerii* by Vervoort (1957), as well as Brady's (1883) records from Buenos Aires (Fleminger, 1965). Wolfenden's (1906) records of *L. detruncata* var. from Maldive Archipelago, and the *L. detruncata* Sydney var. described by Dakin and Colefax (1940) are referable to *L. detruncata* sensu stricto and not to the variant (Silas and Pillai, 1973).

Distribution.- Indo-Pacific. Widely distributed in Indian Ocean: Bay of Bengal and Andaman Sea (Sewell, 1933; Silas and Pillai, 1973), Indian coast (Krishnaswamy, 1953; Wolfenden, 1906), northern Indian Ocean (Veronina, 1962), Red Sea (Thompson and Scott, 1903), Arabian Sea (Sewell, 1947), western Indian Ocean and African coast (Grice and Hulsemann, 1967; Brady, 1915). South of Shikoku, Japan (Matsuo and Marumo, 1982), East China Sea Chen and Zhang, 1965), and Indonesian waters (A. Scott, 1909).

***Labidocera javaensis* Mulyadi, 1997**

(Figs. 5-6)

Labidocera javaensis Mulyadi, 1997: 656-662, figs. 1-3.

Material examined.- Five females (1.90-2.10 mm), 5 males (1.75-1.80 mm) collected off Tegal, Central Java by surface tow of 0.1 mm mesh plankton net at night on 3 June 1994.

Female.- Cephalosome rounded anteriorly with lateral hooks. Dorsal eye lenses small. Rostrum pronounced, directed ventrally, bifid in frontal view, each ramus robust and conical. Ms1 separated from cephalon; Ms4 and Ms5 fused, with slightly asymmetrical posterior ends, right side slightly longer than left and reaching middle of Ur1.

Urosome composed of 3 somites, Ur1 1.2 times longer than Ur2 and Ur3 combined, wider than other two somites, remarkably asymmetrical, left margin with swelling in middle part, right margin with 1 small pointed projection in anterior portion and 2 large pointed ones in posterior portion, dorsal one of the latter two projections longer than the ventral one and bearing a small spine in the middle. Ur2 slightly asymmetrical, right margin with swelling in anterior part. Ur3 exceedingly short, only 0.1 length of Ur1. CR separated from Ur3 by articulation, 1.15 times as long as wide and longer than Ur3, with 5 plumose and 1 small setae, left ramus slightly broader than right one.

A1 23-segmented, reaching distal end of Ur1 when folded backwards. P5 asymmetrical, consisting of 2 basal, 1 exopodal and 1 endopodal segments; right Re with 2 minute prominences on outer margin and 2 processes on inner

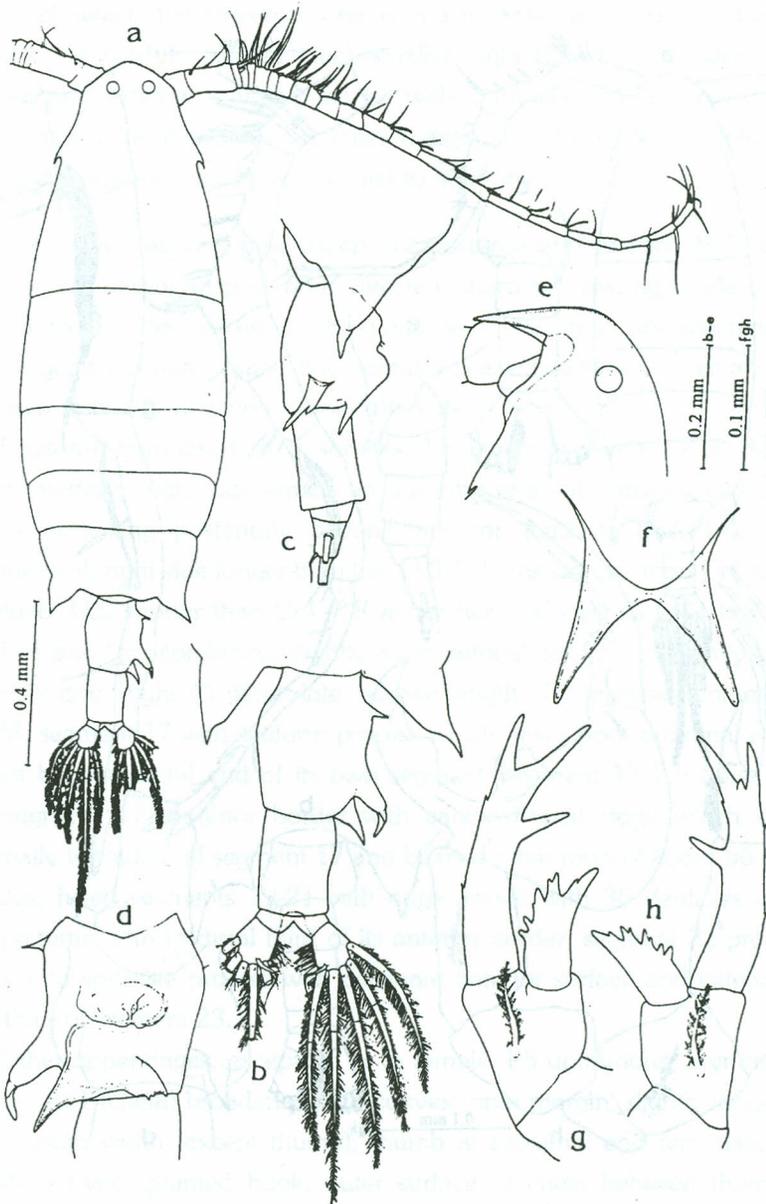


Fig. 5. *L. javaensis*, female. a, whole animal, dorsal view; b, Ms5 and urosome, dorsal view; c, Ms5 and urosome, lateral view; d, Ur1-Ur2, ventral view. e, cephalon, lateral view; f, rostrum, anterior view; g, left 5th leg; h, right 5th leg.

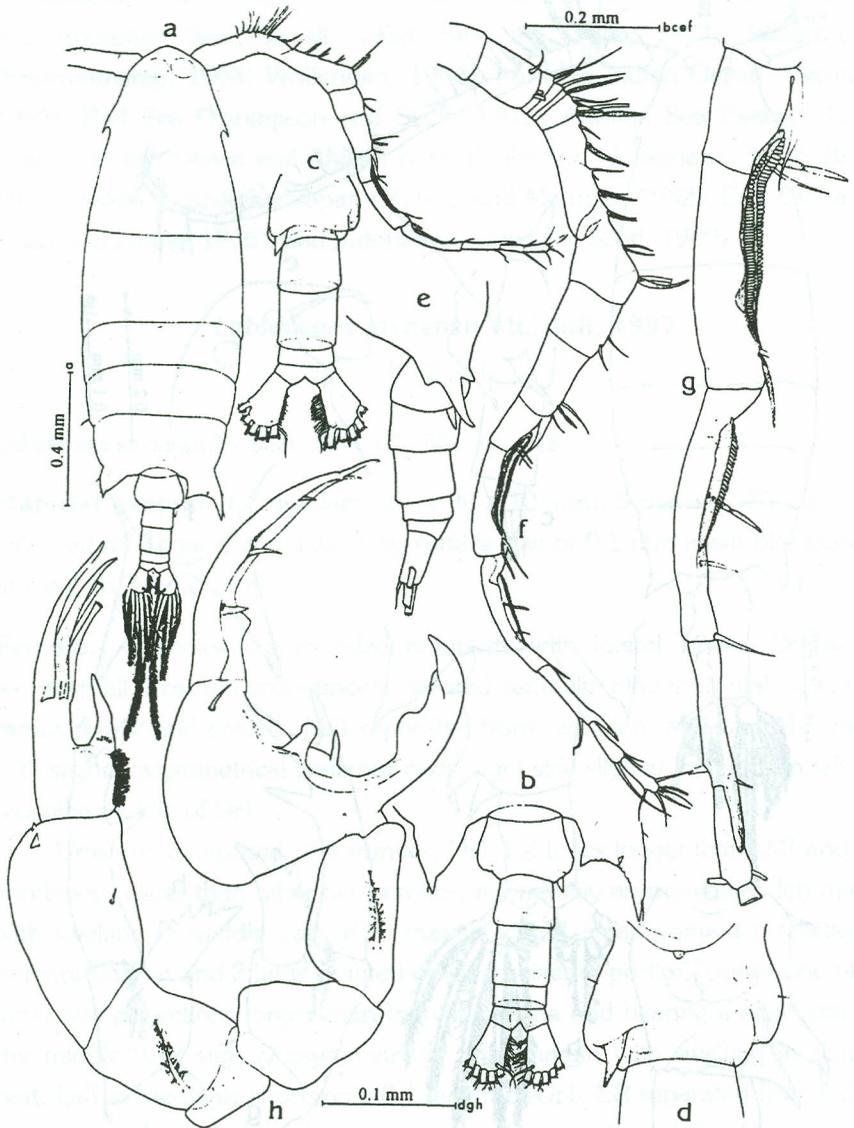


Fig. 6. *L. javaensis*, male. a, whole animal, dorsal view; b, Ms5 and urosome, dorsal view; c, urosome, ventral view; d, genital somite and Ur2, ventral view; e, Ms5 and urosome, lateral view; f, right antennule; g, geniculate region of right A1; h, 5th legs.

margin of which the proximal one is much larger and stouter, distal end trifurcate but median process much smaller; right Ri with many denticles on terminal and external margins; left Re with 2 minute prominences on outer margin and 1 stout process on inner margin, distal end terminating into 2 spine-like projections; left Ri very similar to right one.

Male.- Prosoma as in female except for posterior end of Ms5. Ms5 with left posterior side ending in posteriorly directed, sharp process, right side bifurcate in dorsal view, outer process reaching middle of Ur2, inner one reaching distal third of genital somite, many fine spinules present between inner and outer processes, in lateral view right corner trifurcate.

Urosome composed of 5 somites, Ur1 widest, asymmetrical, left side convex medially, right side armed on posterior end with pronounced pointed process extending posteriorly beyond anterior third of Ur2. Ur2 slightly asymmetrical, right side longer than left. Ur3 1.8 times longer than Ur4 and Ur5 combined. Ur5 shorter than Ur4. CR about twice as long as wide and longer than Ur4 and Ur5 combined, slightly asymmetrical, left ramus slightly broader than right one. Right A1 geniculate, relative length of 3 terminal segments 44 : 28 : 28; segment 17 with setiform process which arises from proximal end and extends beyond distal end of its own segment; segment 18 2.5 times longer than segment 17, anterior border with canoe-shaped ridge which extends proximally to middle of segment 17 and bears double rows of about 56 and 60 denticles; fused segments 19-21 with ridge armed with 36 denticles running from proximal fifth to distal third of its anterior border; segment 22 prolonged distally into spur-like process with pectinate anterior surface and extending to distal third of segment 23.

Other appendages, except P5 as in female. P5 uniramous, asymmetrical; right leg, Re1 (chela) broadened with convex inner margin, slightly longer than its maximum width (except thumb), thumb at proximal end terminating into inwardly curved, pointed hook, outer surface of chela between thumb and distal end of Re1 with 1 stout process near base and 1 large, anvil-shaped lamella just distal to process, single seta present on posterior surface near base of Re2; Re2 (finger) evenly curved outwardly and terminating into 2 unequal spines, longer than Re1, furnished with 3 spines on concave surface, one on

proximal third, one on middle, and another one near distal end. Left leg with B1 very short, B2 2.5 times longer than B1, bearing 1 plumose seta on posterior surface; Re1 broadly rectangular, 2 small triangular spines arise on and near outer distal corner, Re2 about half as long as Re1, bulb-shaped, inner margin divided into two parts by strong projection extending beyond distal margin of segment, proximal part hirsute, distal part narrowing abruptly just behind projection and unarmed; distal end with 2 stout, round-tipped spines and 2 aesthete-like setae, these spines and setae longer than their own segment.

Remarks.- *L. javaensis* belongs to the *Labidocera pectinata*-group which was hitherto composed of six species: *L. pectinata* Thompson and Scot, 1903; *L. japonica* Mori, 1935; *L. rotunda* Mori, 1929; *L. moretoni* Greenwood, 1978; *L. carpentariensis* Fleminger, Othman and Greenwood, 1982; and *L. papuensis* Fleminger, Othman and Greenwood, 1982; it is distinguished by characteristics of the female P5 and the male right A1 and P5. The *L. javaensis*, however, is distinguishable from all the species of this group by (1) the female Ur1 with 3 processes on the right side, (2) the female of Ur2 without a spine-like process on the right margin, (3) the female left CR without any inner marginal protuberance, (4) the Re of the female P5 with a strong process on the inner margin, (5) the male Ms5 with right posterior angle bifurcate, (6) the male Ur1 with a stout, short acicular process on the right posterior margin, (7) the Re2 of the male left P5 with 2 round-tipped spines and 2 aesthete like setae on the apex and with a relatively long spur in the middle of the inner margin, and (8) the male right PS with 1 stout seta on the outer surface near base of the thumb and with proximally 1 stout spine-like seta on the concave surface of Re2.

***Labidocera muranoi* Mulyadi, 1997**

(Figs. 7-8)

Labidocera muranoi Mulyadi, 1997: 662-667, figs. 4-6.

Material examined.- Ten females (2.24-2.28 mm), 10 males (2.10-2.16 mm) collected from Cilacap Bay, Central Java by surface tow of 0.1 mm mesh plankton net at night on 19 May 1993.

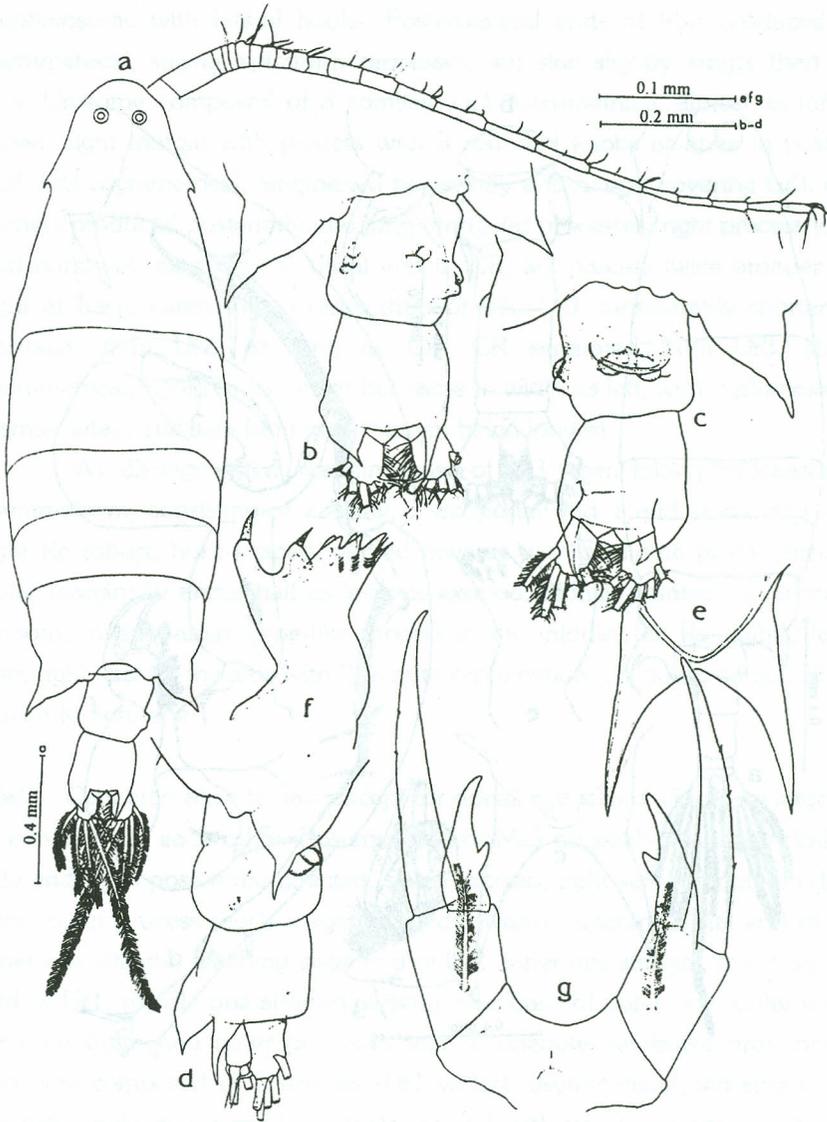


Fig. 7. *L. muranoi*, female. a, whole animal, dorsal view; b, Ms5 and urosome, dorsal view; c, Ms5 and urosome, ventral view; d, Ms5 and urosome, lateral view; e, rostrum, anterior view; f, mandible dentition; g, 5th legs.

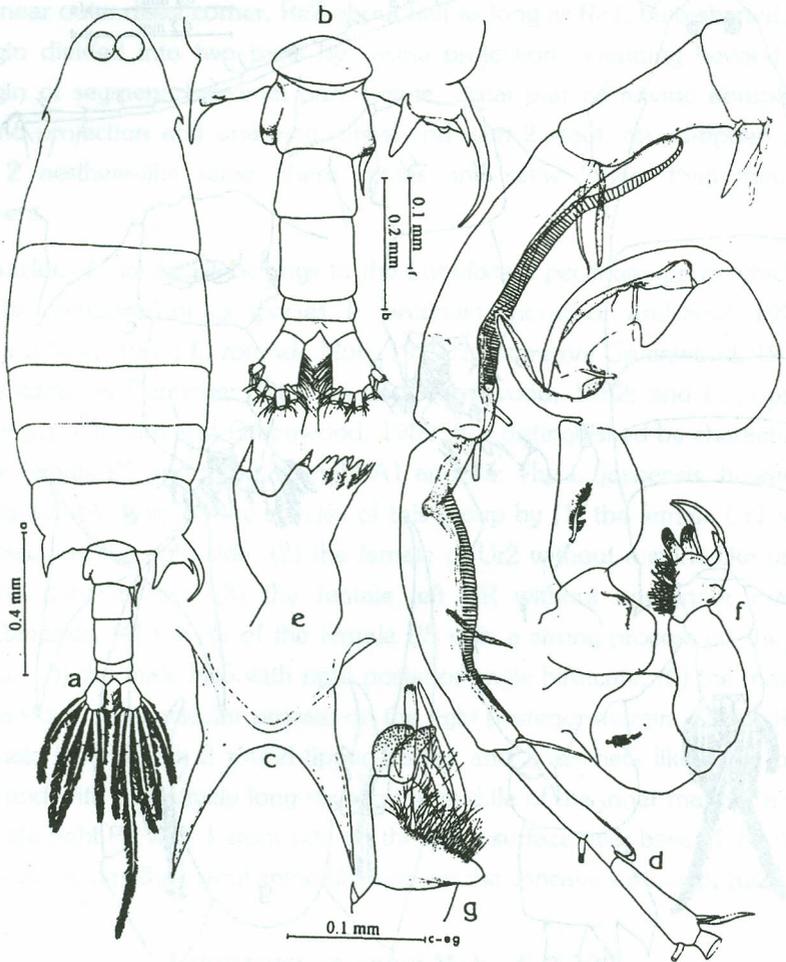


Fig 8. *L. muranoi*, male. a, whole animal, dorsal view; b, Ms5 and urosome, dorsal view; c, rostrum, anterior view; d, geniculate region of right A1; e, mandible dentition; f, 5th legs; g, distal segment of left 5th leg.

Female.- Body elongated, relative length of prosome to urosome 4 : 1. Cephalosome with lateral hooks. Posterolateral ends of Ms5 produced into asymmetrical, strong, spiniform processes, left side slightly longer than right one. Urosome composed of 3 somites, Ur1 asymmetrical, almost as long as broad, right margin with process with 2 rounded knobs at apex in posterior half. Ur2 asymmetrical, lengthened posteriorly and almost covering Ur3, distal corners produced posteriorly into long triangular processes, right process longer and narrower, extending to distal end of CR, left process twice broader than right at base, extending to distal third of CR. Ur3 considerably shorter and narrower than Ur2. as long as CR. CR separated from Ur3, slightly asymmetrical, right ramus longer but same in width as left, with 5 plumose and 1 small setae, 2nd seta from inner margin being longest.

A1 23-segmented, reaching base of Ur3 when folded backwards. P5 asymmetrical, consisting of 2 basal, 1 exopodal and 1 endopodal segments, right Re robust, horn-shaped, curved inwards with 3 minute prominences on outer margin; Ri about half as long as exopod, bluntly pointed, outer margin smooth, inner margin spine-like process in the middle; left Re slightly longer than right, curved inwards with 3 minute prominences on outer margin; Ri very similar to right one.

Male.- Cephalon as in female except for dorsal eye lenses which are large and in contact with each other. Posterior end of Ms5 noticeably asymmetrical; left side ending in posteriorly directed, sharp process, right side trifurcate in dorsal view, outer process much longer, curved inwards, reaching distal end of Ur2, inner one straight, reaching distal end of Ur2, inner one straight, reaching distal end of Ur1, middle one shortest, arising near base of outer one, distal margin between outer and inner processes with 2 unequal, knob-like prominences. Urosome composed of 5 somites, Ur1 widest, asymmetrical, left side convex medially, right side armed on posterior end with pointed process, extending posteriorly beyond middle of Ur2. Ur2 almost symmetrical, as long as Ur1. Ur3 longest, longer than broad, 2.25 times longer than Ur4 and Ur5 combined. Ur5 shorter than Ur4. CR symmetrical, about 1.46 times as long wide and longer than Ur4 and Ur5 combined.

Right A1 geniculate, relative length of 3 terminal segments 42.5 : 30 : 27.5; segment 17 broadened proximally with 1 stout process; segment 18 armed on its anterior margin with crescented, denticulated ridge extending backwards to middle of segment 17; fused segments 19-21 with villiform teeth almost throughout anterior margin; segment 22 prolonged distally into short, spur-like process with pectinate anterior surface and extending to proximal seventh of segment 23. Left A1 as in female.

Other appendages except P5 as in female. P5 uniramous, asymmetrical; B1 of right leg short and broad, with rounded process on medial posterior surface; B2 1.7 times length of B1, with 1 seta on proximal posterior surface. Re1 (chela) ovate, stout and stocky, 1.7 times longer than wide; thumb of chela relatively long and narrow, 0.63 length of chela, inwardly curved; outer margin between thumb and distal end of Re1 with 1 semi-circular lamella near base and 1 large lamella just distal to semi-circular lamella, 2 setae present on posterior surface, one near base of large lamella and another near base of Re2. Re2 cylindrical, elongated, almost as long as Re1, longer than thumb of Re1, evenly curved outward and ending in pointed tip, with 3 setae on outer margin. Left leg, B1 short, 1/3 length of B2. B2 broader, with 1 plumose seta on proximal posterior surface. Re1 longest, with 1 plumose seta on proximal posterior surface and 1 spine on outer distal corner; Re2 with well developed outer marginal protuberance, distally with 2 blunt lamelliform structures crowned with tubercles, 1 stout spine with papillated tip, 2 curved spines, 1 serrated spine, inner margin with dense cover of hairs in which 1 plumose seta is present.

Remarks.- Fleming *et al.* (1982) instituted the *Labidocera kroyeri* species-group for an intrageneric lineage consisting of *L. kroyeri* (Brady, 1883); *L. stylifera* (Thompson and Scott, 1903); *L. gallensis* Thompson and Scott, 1903; *L. dakini* Greenwood, 1978; and two undescribed species. Although they did not give a definition for this group, it may be characterized by a combination of (1) the male right A1 in which segment 18 is armed with a single crescented and denticulated ridge on its anterior margin, (2) the male left P5 with the Re2 armed distally with two blunt, lamelliform structures crowned with tubercles, and (3) the female P5 with the Ri with bifurcate termination.

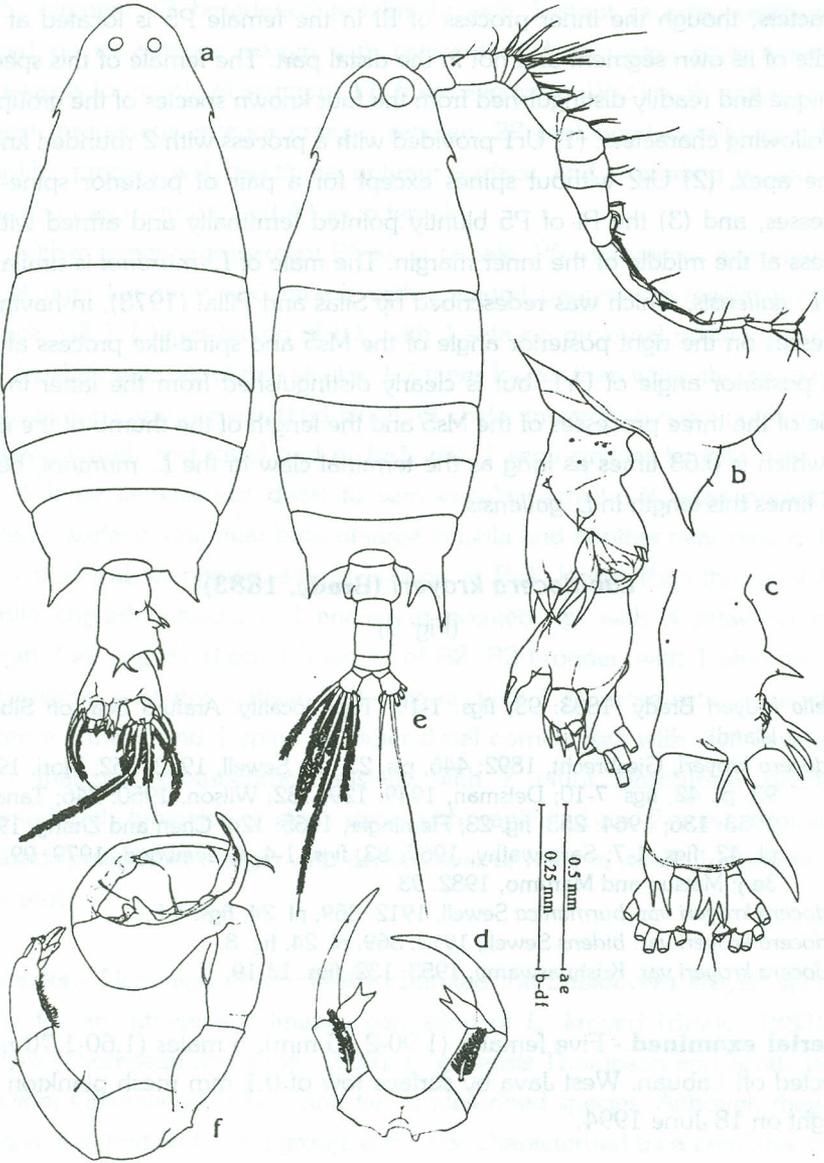


Fig 9. *L. kroyeri*, female. a, whole animal, dorsal view; b, Ms5 and urosome, lateral view; c, urosome, dorsal view; d, 5th legs; male. e, whole animal, dorsal view; f, 5th legs.

Urosome composed of 3-somites; Ur1 large, asymmetrical, right margin with 2 processes, proximal one consist of 1 spine, distal process consists of 2 sets of spines, 1st set with 3 spines and accessory 2 minute spines, 2 set with 2 spines directed posteriorly. Ur2 produced into a robust triangular process extending from right lateral margin of somite, posteriorly somite extends over anal somite and is produced on its distal margin into 5 sharp teeth in 2 sets, one set on its distal outer angle (2 spines), and another on its distomedial margin (3 teeth); Ur3 very short. CR symmetrical, with 5 plumose and 1 small setae, 2nd caudal seta from inner margin being longest.

A1 23-segmented reaching distal end of Ms4 when folded backwards. P5 almost symmetrical, consisting of 2 basal, 1 exopodal and 1 endopodal segments; Re robust, hornshape, curved inwards with 3 minute prominences on outer margin; Ri slightly asymmetrical, with the bifurcate termination, curved posteriorly.

Male.- Cephalosome as in female except for dorsal eye lenses which are large and in contact with each other. Posterolateral ends of Ms5 noticeably asymmetrical, left side ending in posteriorly directed sharp process; right side bifurcate, outer process longer, curved inwards, reaching middle of Ur2. Ur1, left margin expanded, Ur2 shorter than Ur3, CR as in female. Right A1 geniculate, segment 17 broadened proximal with 1 stout process; segment 18 armed on its anterior margin with crescented, denticulated ridge extending backwards to middle of segment 17, fused segments 19-21 with villiform teeth almost throughout anterior margin; segment 22 prolonged distally into spur-like process with pectinate anterior surface and extends to proximal half of segment 23.

Other appendages except P5 as in female. P5 uniramous, asymmetrical, right leg, Re1 (chela) ovate, stout; thumb of chela shorter than Re2, curved inwards; outer margin between thumb and distal end of Re1 with 2 triangular lamella, 1 seta present on posterior surface. Re2 elongated with 3 inner setae, claw narrowed distally and bears 1 distal seta. Left leg, Re1 1.5 times length of Re2, with distolateral spine and 1 small inner seta; Re2 with 2 blunt, finger-shape papillae, and 3 unequal spiniform processes.

Remarks.- *L. kroyeri* has many variations in the peculiar outgrowths of urosomal somites. At least five varieties of this species have been described from Indian Ocean, *stylifera*, *gallensis*, *similis*, *burmanica*, and *bidens*. *L. kroyeri* var. *similis* Wolfenden (1906) is a synonym of *L. laevidentata* (Brady), var. *bidens* Krishnaswamy are known from females, var. *burmanica* Sewell (1912) are known from males, and the rest two varieties *stylifera* and *gallensis* Thompson and Scott, 1903, redescribed by Silas and Pillai (1973) to species.

Distribution.- Widely recorded from tropical and subtropical Indo-West Pacific regions. Central western Pacific (Mori, 1937; Yamazi, 1958; Tanaka, 1964; Matsuo and Marumo, 1982), East China Sea (Chen and Zhang, 1965), and Indonesian waters (Cleve, 1901; Delsman, 1949). Previous records of this species from the eastern Pacific (Wilson, 1950) and north west Atlantic (Giebrecht and Schmeil, 1898) were a misidentification. Indian Ocean and Australasian records given by Sewell (1932) and Greenwood (1979), respectively.

***Labidocera laevidentata* (Brady, 1883)**

(Fig. 10)

Pontella laevidentata Brady, 1883: 93, pl. 38, figs. 1-6 (Type locality: Off Sibago Island, Philippines, single male).

Labidocera laevidentatum, Giesbrecht, 1892: 446.

Labidocera kroyeri var. *similis* (female) Wolfenden, 1906: 1016, pl. 48, figs. 23, 24, 33.

Labidocera laevidentata, Giesbrecht and Schmeil, 1898: 137; Wolfenden, 1905: 1016, figs. 22, 23, 33 (female); A. Scott, 1909: 166, pl. 51, figs. 1-10; Wilson, 1950: 246, pl. 24, figs. 351-355, Silas and Pillai, 1973: 789, fig. 11; Fleminger, 1963: table 1; Greenwood, 1979: 101, fig. 4a-e; Matsuo and Marumo, 1982: 93.

Material examined.- Five females (2.20-2.35 mm), 5 males (1.90 - 2.10 mm) collected from Ambon Bay by surface tow of 0.1 mesh plankton net at night on 13 March 1995.

Female.- Cephalon with cephalic hooks much closer to frontal margin. Posterolateral ends of Ms5 produced into symmetrical spiniform processes. Urosome composed of 3 somites, Ur1 symmetrical, distal ends produced into strong spine, as long as Ur2 and Ur3 combined; Ur2 asymmetrical with

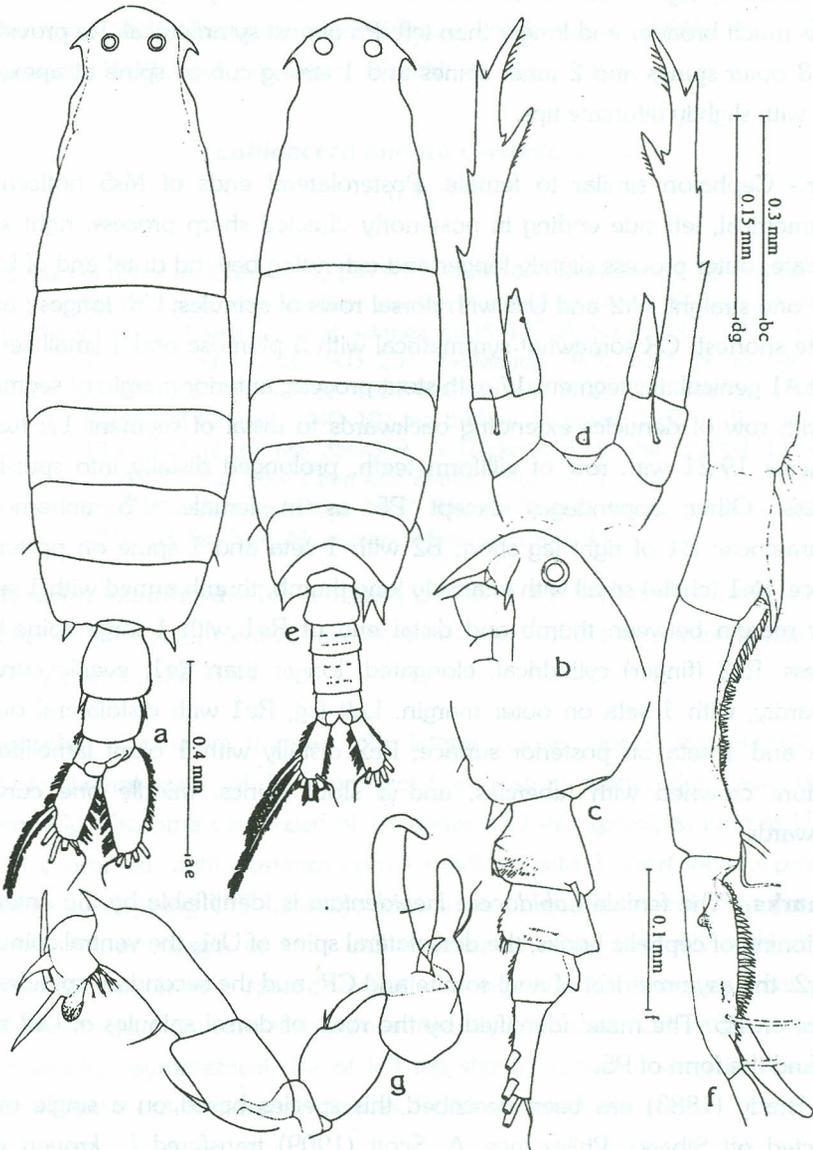


Fig 10. *L. laevidentata*, female. a, whole animal, dorsal view; b, cephalon, lateral view; c, Ms5 and urosome, lateral view; d, 5th legs; male. e, whole animal, dorsal view; f, geniculate region of right A1; g, 5th legs.

ventrolateral surface fringed with closely set small spinules; anal somite asymmetrical, right side shorter than left; CR distinctly asymmetrical, right ramus much broader and longer than left. P5 almost symmetrical, Re provided with 3 outer spines and 2 inner spines and 1 strong curved spine at apex; Ri short with slightly bifurcate tips.

Male.- Cephalon similar to female. Posterolateral ends of Ms5 noticeably asymmetrical, left side ending in posteriorly directed sharp process, right side bifurcate, outer process slightly longer and extending beyond distal end of Ur1, inner one straight. Ur2 and Ur3 with dorsal rows of spinules; Ur3 longest; anal somite shortest; CR somewhat symmetrical with 5 plumose and 1 small setae. Right A1 geniculate, segment 17 with stout process; anterior margin of segment 18 with row of denticles extending backwards to distal of segment 17; fused segments 19-21 with row of villiform teeth, prolonged distally into spur-like process. Other appendages except P5 as in female. P5 uniramous, asymmetrical; B1 of right leg short; B2 with 1 seta and 1 spine on posterior surface; Re1 (chela) small with relatively long thumb, thumb armed with 1 seta; outer margin between thumb and distal end of Re1 with 1 large spine-like process. Re2 (finger) cylindrical, elongated, longer than Re1, evenly curved outwardly, with 1 seta on outer margin. Left leg, Re1 with distolateral outer spine and 1 seta on posterior surface; Re2 distally with 1 blunt lamelliform structure crowned with tubercles, and 3 stout spines, middle one curved backwards.

Remarks.- The female *Labidocera laevidentata* is identifiable by the anterior positioning of cephalic hooks, the dorsolateral spine of Ur1, the ventral spinules of Ur2, the asymmetrical of anal somite and CR, and the secondary spinules of spines on P5. The male. identified by the rows of dorsal spinules of Ur2 and Ur3 and the form of P5.

Brady (1883) has been described this species based on a single male collected off Sibago, Philippines. A. Scott (1909) transferred *L. kroyeri* var. *similis* Wolfenden, 1906, to *L. laevidentata*.

Distribution.- Described and most recorded from the Indian Ocean around Maldive and Laccadive Archipelagoes (Wolfenden, 1906; Silas and Pillai,

1973). Australasian region: Great Barrier Reef waters (Farran, 1936), Moreton Bay (Greenwood, 1979). Pacific Ocean: South of Shikoku, Japan (Matsuo and Marumo, 1982), Philippine waters (Brady, 1883; Wilson, 1950), South Celebes (A. Scott, 1909), and Aru Islands (Früchtl, 1924).

Labidocera minuta Giesbrecht, 1889

(Fig. 11)

Labidocera minutum Giesbrecht, 1889: 27; 1892: 446, 459, pl. 16, 35 and 36, pl. 41, figs. 8, 15, 16 and 35 (Type locality: Hongkong); Cleve, 1901: 7; 1903: 363.

Labidocera minuta Giesbrecht and Schmeil, 1898: 137; A. Scott, 1902: 407; 1909: 167; Thompson and Scott, 1903: 251; Wolfenden, 1905: 1018, pl. 48, figs. 18, 24, 25, 29, 32, 37; Gurney, 1927:154; Sewell, 1932: 363; Farran, 1936: 116; Dakin and Colefax, 1940: 101, fig. 145a-e; Delsman, 1949: 129, 132; Wilson, 1950: 247, pl. 24, figs. 356-359; De Decker and Mombeck, 1964: 13; Tanaka, 1964: 257, fig. 233; Chen and Zhang, 1965, pl. 41, figs. 11-16; Saraswathy, 1967: 82; Silas and Pillai, 1967: 346; 1973: 800, fig. 12; Greenwood, 1979: 101-103, fig. 5a-g; Matsuo and Marumo, 1982: 93.

Material examined.- Ten females (1.95-2.15 mm), 10 males (1.65-1.80 mm) collected off Tegal, Central Java by surface tow of 0.1 mm mesh plankton net at night on 3 June 1994.

Female.- Cephalon narrow with lateral hooks, dorsal eye lenses small. Posterolateral ends of Ms5 produced into short spine, right side directed ventrally. Urosome composed of 3 somites; Ur1 elongated, as long as Ur2 and Ur3 combined, right posterior corner modified into 1 short lobular projection partly overlapping Ur2 laterally, another rudimentary lateral lobe present at right anterior margin of Ur1; Ur2 as long as wide, ventrally with chitinous tubercles which are spread laterally along its right margin; anal somite asymmetrical, right lateral margin outwardly produced; CR longer than wide. P5 slightly asymmetrical, Re of left leg slightly longer ending in 2 subequal spines and 2 outer marginal spinules; Ri bifurcated at apex.

Male.- Cephalon as in female except for dorsal eye lenses which are large and in contact with each other, Posterolateral ends of Ms5 asymmetrical, left side ending in short pointed process, right side produced into a narrow and curved

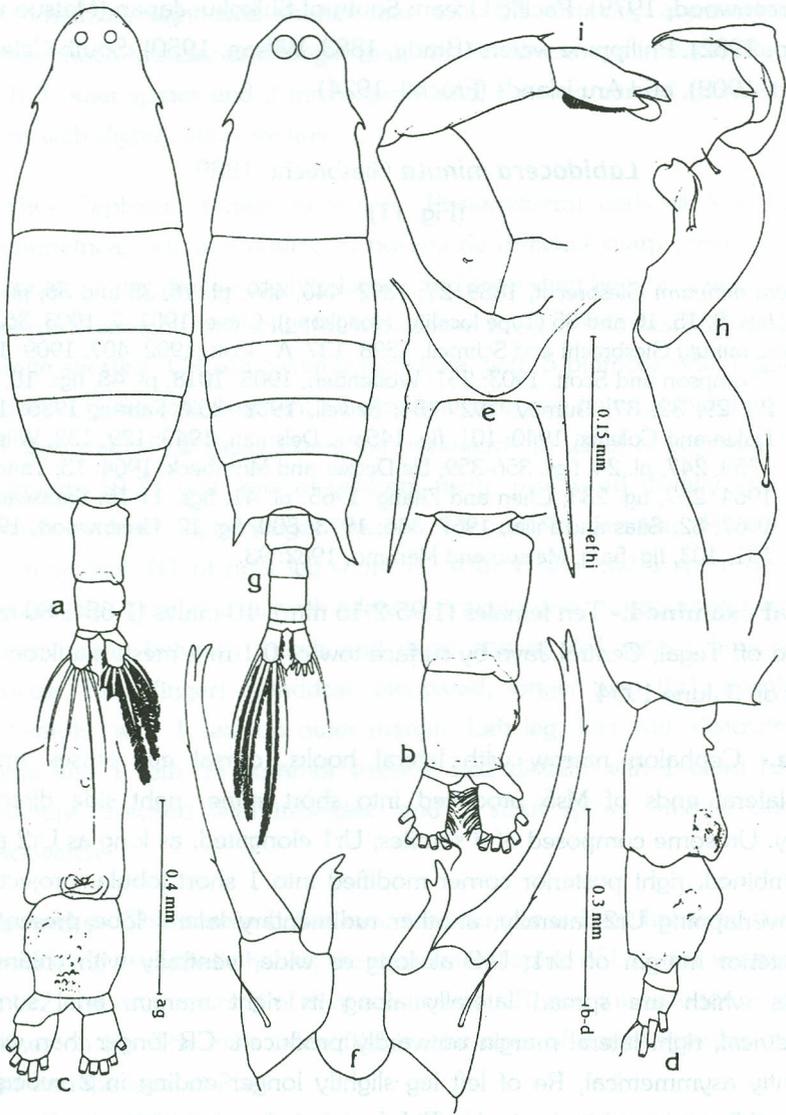


Fig 11. *L. minuta*, female. a, whole animal, dorsal view; b, urosome, dorsal view; c, urosome, ventral view; d, Ms5 and urosome, lateral view; e, rostrum, anterior view; f, 5^h legs; male. g, whole animal, dorsal view; h, right 5^h leg; i, left 5^h leg.

blade-like process. Right A1 geniculate with 1 conspicuous spine on segment 17; anterior margin of segment 18 with villiform denticulate ridge; fused segments 19-21 with blunt denticulated plate, segment 22 with spur-like process distally. P5, right leg, thumb of chela short, broader toward tip with 1 process and 2 setae; Re2 (finger) bent inwards at distal half, inner margin with 1 transparent flap, 3 setae along its inner margin and 2 setae at apex. Left leg 3-segmented, Re1 with 1 distolateral rudimentary spine; Re2 with 2 pairs of unequal stout processes, outer one of longer pair pointed, inner margin hirsute.

Remarks.- *L. minuta* is identifiable by the characters of cephalic hooks and the forms of P5 in both sexes. The female is identified by the long genital complex, the process on right margin of Ur2 and the process on right lateral margin of anal somite; and the asymmetry posterolateral ends of Ms5, that on right side being thickened and longer in male.

Distribution.- Recorded from tropical and subtropical regions of Indo-Pacific (Sewell, 1947; and records given above). Australasian region records given by Greenwood (1979). Indonesian waters (A. Scott, 1909; Delsman, 1949).

Labidocera pavo Giesbrecht, 1889

(Fig. 12)

Labidocera pavo Giesbrecht, 1889: 27; 1892: 446, 460, pl. 25, 34, pl. 41, figs. 18, 38 (Type locality: Red Sea); Cleve, 1903; Sewell, 1914: 234, pl. 21, figs. 1-3; 1924: 789; 1932: 365; Gurney, 1927: 154; Mori, 1937: 92, pl. 41, figs. 6-12; Wilson, 1950: 248, pl. 25, fig. 363; Tanaka, 1964: 255; Silas and Pillai, 1973: 804, fig. 14.

Material examined.- Ten females (1.95-2.35 mm), 10 males (1.75-2.00 mm) collected of Labuan, West Java by surface tow of 0.1 mm mesh plankton net at night on 18 June 1994.

Female.- Body robust, without lateral hooks, dorsal eye lenses moderately developed and placed apart; rostrum bifurcate with acuminate tips. Posterolateral ends of Ms5 produced into asymmetrical pointed lobes.
Urosome

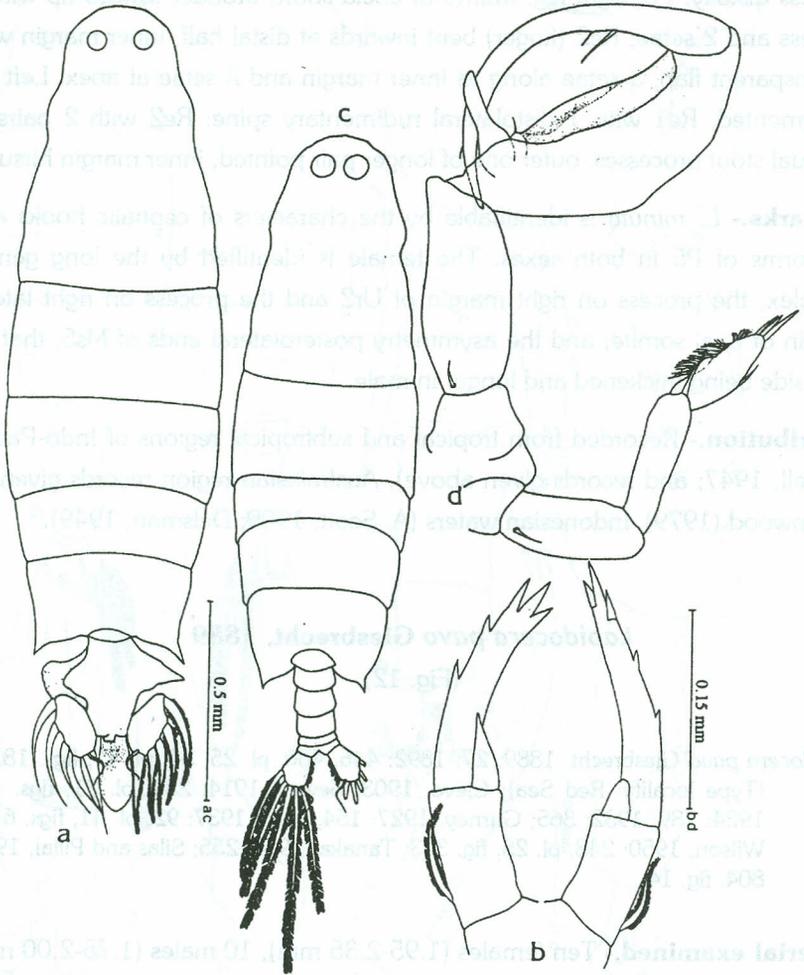


Fig 12. *L. pavo*, female. a, whole animal, dorsal view; b, 5th legs; male. c, whole animal, dorsal view; d, 5th legs.

composed of 2 somites; Ur1 asymmetrical, right margin with 1 conical lobe, left margin with rounded knob-like process; anal somite produced into a bottle-like lobe ventrally, extending to middle of CR. CR broad, arranged perpendicular to urosome, almost symmetrical, caudal setae short and bulbous at base. P5 asymmetrical; right leg, Re with 2 outer spinules and 3 unequal spines at apex, middle one longest; Ri long and produced at apex. Left leg, Re with 2 outer spinules and 3 subequal spines at apex, Ri short and rounded.

Male.- Cephalon as in female except for dorsal eye lenses which are large and in contact with each other. Posterolateral ends of Ms5 produced into asymmetrical directed sharp processes. Urosome composed of 5 somites, CR slightly asymmetrical, right ramus slightly broader than left. Right A1 geniculate, segment 17 rounded anteriorly into arched ridge, slightly sculptured with irregular ribbing, segment 18 with row of denticles on anterior margin which are closely placed, fused segments 19-21 with row of villiform denticles on anterior margin, extending to 3/4 length of segment, segments 24-25 completely fused.

P5, right leg, Re1 (chela) with well developed thumb, outer margin between thumb and distal end of Re1 with 1 seta; Re2 (finger) elongated, curved with 1 blunt conical projection along inner margin at 1/3 distance from base, inner margin with 2 mid-marginal setae and 1 terminal seta. Left leg, Rel with distolateral spine; Re2 with 1 outer spine and 3 subequal spines at apex, all turned inwards, inner margin of segment irregularly lobular and hirsute.

Remarks.- *L. pavo* has been described based on female specimens (Giesbrecht, 1888). The male of this species was described by Mori (1937). *L. pavo* resembles to the two Indonesian species, *L. bataviae* Scott, 1909, and *L. madurae* Scott, 1909. Fleminger (1967) grouped this species under the super species *detruncata*.

Distribution.- Tropical to subtropical Indo-Pacific. Widely recorded from Indian Ocean (Silas and Pillai, 1973; and records given above). Philippines waters (Wilson, 1950), and Indonesian waters (Cleve, 1901). No records from Australasian region.

***Labidocera sinilobata* Shen and Lee, 1963**

(Fig. 13)

Labidocera sinilobata Shen and Lee, 1963: 594, figs. 20-25; Chen and Zhang, 1965: 42, figs. 8-14; Zheng *et al.*, 1989.

Material examined.- Ten females (2.50-2.55 mm), 10 males (2.10-2.20 mm) collected off Surabaya, East Java by surface tow of 0.1 mm mesh plankton net at day- and night times on 8 June 1994.

Female.- Body elongated, cephalon rounded in dorsal and lateral views, without cephalic hooks, dorsal eye lenses moderately small. Posterolateral ends of Ms5 produced into asymmetrical strong spiniform processes, reaching middle of Ur1. Urosome composed of 2 somites; Ur1 asymmetrical, smooth and elongated with 1 protruded lobe on left margin; anal somite smooth, almost symmetrical. CR asymmetrical, fan-shaped, right ramus longer and wider than left, with 5 thicker and 1 small setae, 1st and 2nd innermost caudal setae much thicker than others. A1 23-segmented, reaching middle of Ur1 when folded backwards, distal end of segment 18 produced into spur-like process, extending to middle of segment 19. P5 uniramous, asymmetrical; left leg with B2 slightly longer than right, Re slightly curved inwards with 1 outer spiniform process medially and 4 rounded spiniform prominences at apex.

Male.- Cephalon as in female except for dorsal eye lenses small. Posterolateral ends of Ms5 asymmetrical and ending in sharp processes posteriorly, right side reaching distal end of Ur1. Urosome composed of 5 somites, Ur1 slightly asymmetrical, left margin more convex than right; CR symmetrical with 5 plumose and 1 small setae. Right A1 very characteristic, segment 17 armed on its anterior margin with 1 row of 25 weakly developed denticles; segment 18 elongated 2.2 times length of segment 17, with 1 denticulated ridge from proximal to about 1/5 length to distal end, ridge with 1 row of 53-55 various shape and size denticles, proximal ones narrow and long, gradually being broad and short and small and weakly developed distally; fused segments 19-21 with 1 ridge on anterior margin from proximal 1/5th extending to distal end; segment 22 with rounded spiniform process extending beyond segment 23.

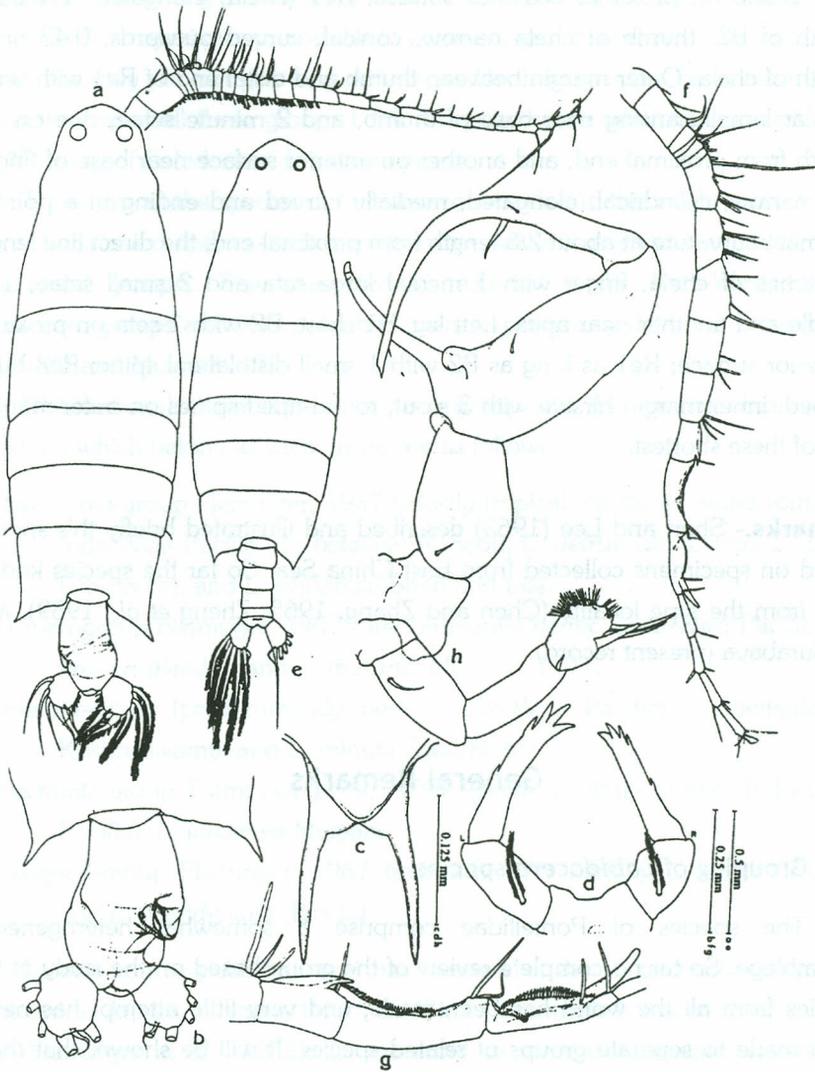


Fig 13. *L. sinilobata*, female. a, whole animal, dorsal view; b, Ms5 and urosome, dorsal view; c, rostrum, anterior view; d, 5th legs; male. e, whole animal, dorsal view; f, right antennule; g, geniculate region of right A1; h, 5th leg.

P5 uniramous, asymmetrical; right leg, B1 short, B2 twice length of B1 with 1 seta on proximal posterior surface; Re1 (chela) elongated, 1.4 times length of B2, thumb of chela narrow, conical, curved outwards, 0.43 times length of chela. Outer margin between thumb and distal end of Re1 with semi-circular lamella arising near base of thumb, and 2 minute setae, one on 1/3 length from proximal end, and another on anterior surface near base of finger. Re2 narrow, cylindrical, elongated, medially curved and ending in a pointed tip, main curvature at about 2/5 length from proximal end, the direct line length 1.5 times of chela, finger with 1 medial large seta and 2 small setae, 1 at middle and another near apex. Left leg, B1 short; B2 with 1 seta on proximal posterior surface; Re1 as long as B2 with 1 small distolateral spine; Re2 bulb-shaped, inner margin hirsute with 3 stout, round-tipped spines on outer margin, one of these shortest.

Remarks.- Shen and Lee (1963) described and illustrated briefly this species based on specimens collected from East China Sea. So far the species known only from the type locality (Chen and Zhang, 1965; Zheng *et al.*, 1989), and off Surabaya (present record).

General Remarks

1. Grouping of *Labidocera* species

The species of Pontellidae comprise a somewhat heterogeneous assemblage. So far no complete review of the group based on the study of the species from all the world has been made, and very little attempt has never been made to separate groups of related species. It will be shown, that there are several different groups of species each with a number of important features in common, which tend to constitute morphologically and also zoogeographically distinct groups. In the genus *Labidocera*, species and species groups can be distinguished by the structure of the last metasomal somite, the 1st urosomal somite, caudal rami, rostrum, and 5th legs of both sexes (Fleminger *et al.*, 1982; Ohtsuka *et al.*, 1987; Mulyadi, 1997).

Fleminger (1967; 1986) and Fleminger *et al.* (1982) recognized four species-groups among the Indo-West Pacific *Labidocera*, i.e., the *L. detruncata*-group, the *L. kroyeri*-group, and the *L. pectinata*-group, and yet to be assigned-group, but they did not give any definitions for these groups. By analyzing the characteristics of all these groups I still recognize some other new groups. It is the 4th group of *Labidocera*, *L. minuta*-group.

Therefore all the species of *Labidocera* recorded in this study was divided into 5 *Labidocera* species-groups (*detruncata*, *kroyeri*, *pectinata*, *minuta**, and *unassigned* groups). The characteristic features of the Indo-West Pacific *Labidocera*-groups and their members were explained in detail by Ohtsuka *et al.* (1986) and Mulyadi (1997).

Distributional characteristics of each group and the species obtained in this study which belong to each group are as follows:

- L. detruncata*-group Fleminger, 1967 (mostly tropical, neritic or island forms of Indo-West Pacific): *L. bataviae* A. Scott, *L. detruncata* (Dana), *L. pavo* Giesbrecht, and *L. sinilobata* Shen and Lee.
- L. kroyeri*-group Fleminger, 1967 (predominantly neritic, Indo-West Pacific): *L. kroyeri* (Brady), and *L. muranoi* Mulyadi, 1997.
- L. minuta*-group (predominantly neritic, Indo-West Pacific): *L. bengalensis* Krishnaswamy, and *L. minuta* Giesbrecht.
- L. pectinata*-group Fleminger *et al.*, 1982 (predominantly neritic, Indo-West Pacific): *L. javaensis* Mulyadi.
- Unassigned-group Fleminger, 1967 (predominantly neritic): *L. acuta* (Dana), and *L. laevidentata* (Brady).

Distribution of published and new records of the *L. pectinata*-group are restricted to Japanese waters (Mori, 1937); *L. papuensis* is endemic to Sorong Sea (Fleminger *et al.*, 1982); *L. moretoni* to eastern Australian waters; *L. carpentariensis* to Gulf of Carpentaria and northern Arafura Sea; *L. pectinata* to coastal neritic waters of north-east Indian Seas; and *L. javaensis* to Java Sea (Fig. 14). Fleminger (1986) mentioned undescribed species belonging to the *L. pectinata*-group, *Labidocera* sp.#3, inhabiting coastal waters of Indian side of the Greater Sunda Islands. There is a high possibility that *L. javaensis* is identical

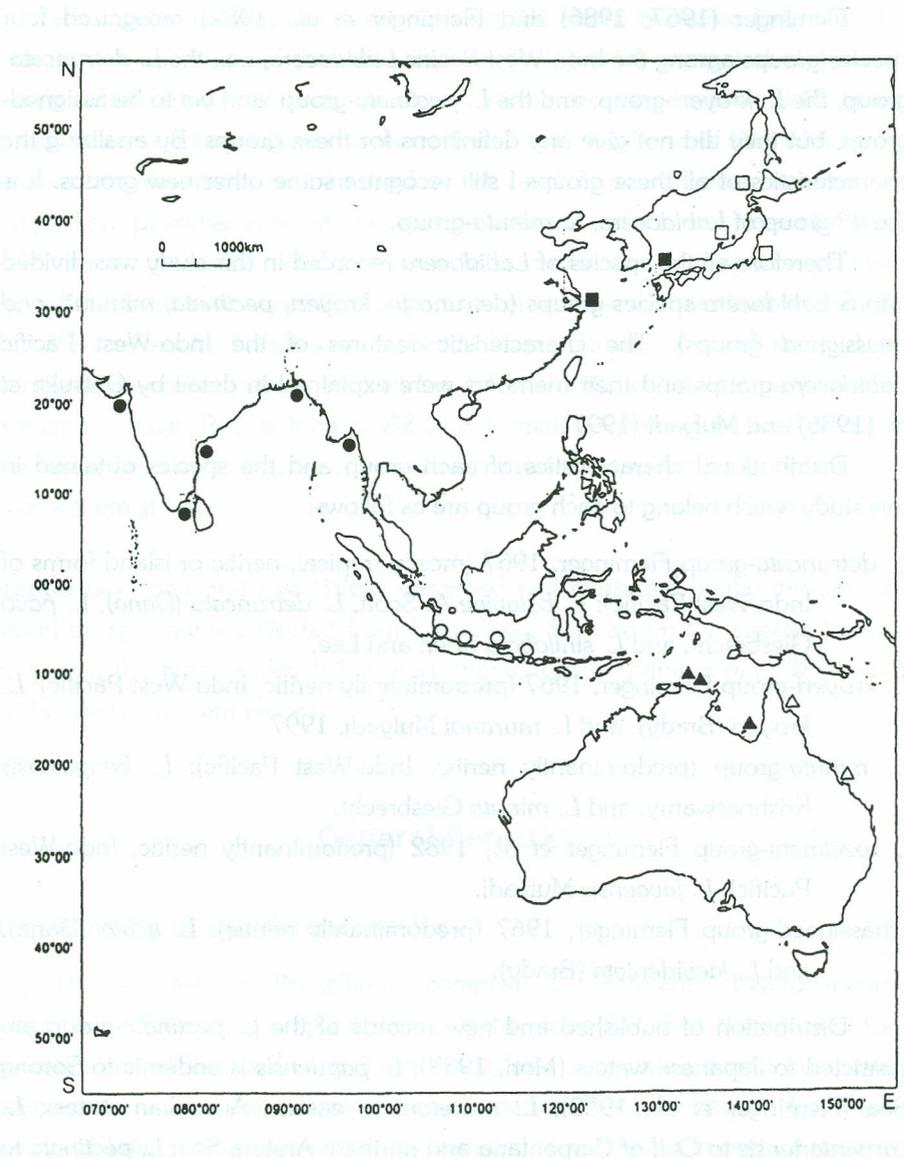


Fig. 14. Distribution of new and published records of the *Labidocera pectinata* group. ● : *L. pectinata* Thompson and Scott, ○ : *L. javensis* n.sp., ■ : *L. rotunda* Mori □ : *L. Japonica* Mori, ▲ : *L. carpentariensis* Fleminger, Othman and Greenwood, △ : *L. moretoni* Greenwood, ◇ : *L. papuensis* Fleminger, Othman and Greenwood.

with this undescribed species, but the whereabouts of the specimen was unknown. Fleminger records (1986) of the *L. rotunda* inhabiting coastal-neritic waters from the southern Japan Sea to Java Sea is doubtful, because no *L. rotunda* specimen was obtained during this study.

Published records of the *L. kroyeri*-group are restricted to inshore regions of tropical and subtropical areas between 35°N and 25°S and 70°E and 150°E (Fig. 15). *L. kroyeri* is widely distributed within this area, however, the rest of the group seems to have a relatively narrow distribution range, i.e., *L. dakini* from eastern Australian waters and Gulf of Carpentaria; *L. gallensis* and *L. stylifera* have only been recorded from the periphery of north-east Indian Sea. *L. muranoi* collected from Cilacap Bay, a mangrove estuary facing the Indian Ocean, may also have a narrow distribution range with a preference for low salinity.

2. Distribution of *Labidocera* species recorded in this study

For the convenience of discussion, these sites were divided into three study areas. The areas including Cilacap Bay and Off Labuan (Stns. 1 and 2) as Area A, the Java Sea (Stns. 3, 4 and 5) as Area B, and the eastern waters (Stns. 6 to 15) as Area C.

Among the *Labidocera* species occurred in this study, five species (*L. acuta*, *L. bengalensis*, *L. kroyeri*, *L. minuta*, and *L. pavo*) have been found from all the study areas. These common species in Indonesian waters are mostly neritic and neritic-oceanic forms.

Three species, *L. bataviae*, *L. detruncata*, and *L. laevidentata*, restricted to eastern waters (Area C). In this area, the species recorded were mainly composed of those recorded from Indo-Pacific waters. One species, *L. muranoi* was only found in Area A, and one other species, *L. sinilobata* found in Area B. The remainder of species, *L. javaensis* occurred in Areas A-B (Fig. 16).

The *Labidocera* communities between the west (Area B) and eastern regions (Area C) were completely different from each other. The differences in *Labidocera* species may depend partly on the depth of occurrence, sea currents, and their response to the external conditions (temperature and salinity). The neritic-oceanic species appeared to be isolated at eastern region by the shallower waters and temperature barrier of Macassar Strait.

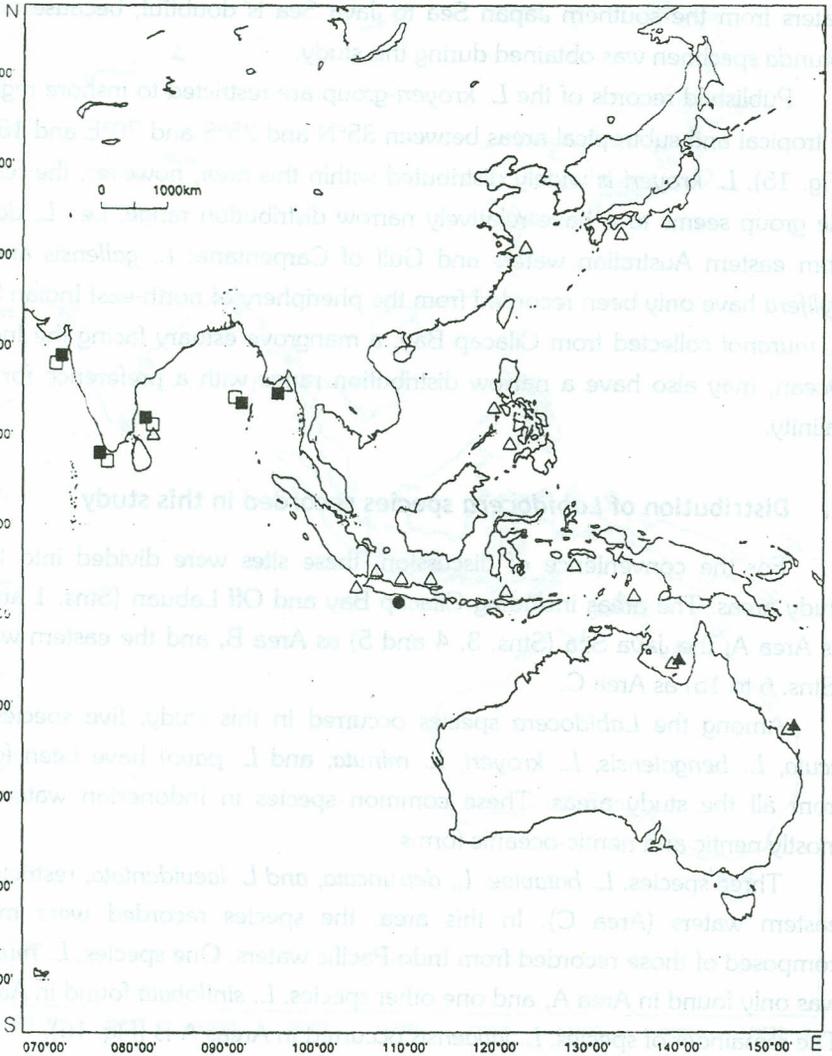


Fig. 15. Distribution of new and published records of the *Labidocera kroyeri* Group. ▲: *L. dakini* Greenwood, △: *L. kroyeri* (Brady), ■: *L. gallensis* Thompson and Scott, □: *L. stylifera* (Thompson and Scott), ●: *L. nuranoi* n.sp.

Table 2. Distribution of the *Labidocera* species recorded in the present study, their sampling stations and their previous records in Indonesian waters, neighbouring areas and the major oceans. o = present records, • = previous records, n = new species, nr = new record, A = Indonesian waters, B = Malaysian waters, C = China Seas, D = Australian waters, E = Japanese waters, F = Philippine waters, I = Indian Ocean, P = Pacific Ocean, At = Atlantic Ocean.

Species	Stations																Neighbouring Areas						Oceans		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	A	B	C	D	E	F	I	P	At
<i>L. acuta</i>	o	o	o		o	o	o	o	o	o	o	o		o	o		•	•		•	•	•	•	•	
<i>L. bataviae</i>										o							•				•		•	•	
<i>L. bengalensis</i>		o	o	o	o					o			o				nr	•		•			•	•	
<i>L. detruncata</i>										o							•				•		•	•	
<i>L. javaensis</i>		o	o	o	o												n								
<i>L. kroyeri</i>		o	o	o	o		o			o							•	•	•	•	•	•	•	•	•
<i>L. laevidentata</i>									o		o	o			o		•	•		•	•	•	•	•	
<i>L. minuta</i>		o	o	o	o	o		o		o				o	o		•	•	•	•	•	•	•	•	•
<i>L. muranoi</i>		o															n								
<i>L. pavo</i>	o	o	o	o	o	o											•	•	•	•	•	•	•	•	
<i>L. sinilobata</i>					o												nr		•						

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