

# THREE NEW SPECIES OF PONTELLIDAE (COPEPODA, CALANOIDA) FROM COASTAL WATERS OF JAVA, INDONESIA

BY

MULYADI

Department of Aquatic Biosciences, Tokyo University of Fisheries, 4-5-7 Konan, Minato-ku,  
Tokyo 108, Japan

## ABSTRACT

Three new species of the family Pontellidae, *Labidocera javaensis*, *L. muranoi* and *Pontella labuanensis*, are described and illustrated from specimens collected in coastal waters of Java, Indonesia, and their relationships to related species are discussed.

*Labidocera javaensis*, which belongs to the *Labidocera pectinata*-group, is distinguishable from other species of this group by a combination of characters of the genital complex and the fifth legs in the female and of the fifth metasomal somite, the first urosomal somite, and the fifth legs in the male. It seems to be a neritic species inhabiting coastal waters shallower than 15 m in depth, and within 1 km offshore. *Labidocera muranoi*, which was collected from Cilacap Bay, a mangrove estuary facing the Indian Ocean, belongs to the *Labidocera kroyeri*-group and is distinguished from other species of this group by the urosomal somites and the fifth legs in the female and by the fifth metasomal somite and the fifth legs in the male. This may be an endemic species which has a preference for low salinities. *Pontella labuanensis* does not belong to any of the known three species-groups of Indo-West Pacific *Pontella*, in having the symmetrical genital somite and the exopods of the fifth legs virtually naked in the female, and the rostrum with double convex lenses and the exopods of the fifth legs with two subequal thumbs, in the male. The establishment of a new species-group, the *P. labuanensis*-group, is proposed.

## RÉSUMÉ

Trois espèces nouvelles de la famille des Pontellidae, *Labidocera javaensis*, *L. muranoi* et *Pontella labuanensis*, sont décrites et figurées d'après des spécimens recueillis dans les eaux côtières de Java, Indonésie, et leurs relations avec des espèces apparentées sont discutées.

*Labidocera javaensis*, qui appartient au groupe *Labidocera pectinata*, se distingue des autres espèces de ce groupe par une combinaison de caractères du complexe génital et les cinquièmes pattes chez la femelle, et le cinquième somite du métasome, le premier somite de l'urosome et les cinquièmes pattes chez le mâle. Il semble que ce soit une espèce néritique habitant les eaux côtières à des profondeurs de moins de 15 m et dans 1 km au large de la côte. *Labidocera muranoi*, qui a été capturé dans la baie de Cilacap, une mangrove d'estuaire sur l'océan Indien, appartient au groupe *Labidocera kroyeri* et se distingue des autres espèces du groupe par les somites de l'urosome et les cinquièmes pattes chez la femelle, et par le cinquième somite du métasome et

les cinquièmes pattes chez le mâle. Il peut s'agir d'une espèce endémique préférant les faibles salinités. *Pontella labuanensis* n'appartient à aucun des trois groupes connus de *Pontella* indo-ouest pacifiques en ayant un somite génital symétrique et les exopodites des cinquièmes pattes virtuellement nus chez la femelle, et le rostre avec de doubles lentilles convexes et les exopodites des cinquièmes pattes dotés du pouces subégaux chez le mâle. L'établissement d'un nouveau groupe, le groupe *P. labuanensis*, est proposé.

## INTRODUCTION

In Indonesian waters, hitherto twelve species of *Labidocera* and seven species of *Pontella* have been reported by Cleve (1901), Carl (1907), Scott (1909), Früchtl (1923, 1924), Delsman (1939, 1949), Chiba & Tsuruta (1955), Fleminger et al. (1982), and Ohtsuka et al. (1987). The species thus recorded are: *Labidocera acuta* Dana, 1849, *L. acutifrons* Dana, 1849, *L. detruncata* Dana, 1849, *L. nerii* Krøyer, 1849, *L. kroyeri* (Brady, 1883), *L. laevidentata* (Brady, 1883), *L. euchaeta* Giesbrecht, 1889, *L. minuta* Giesbrecht, 1889, *L. pavo* Giesbrecht, 1889, *L. bataviae* A. Scott, 1909, *L. madurae* A. Scott, 1909, *L. papuensis* Fleminger, Othman & Greenwood, 1982, *Pontella fera* Dana, 1849, *P. princeps* Dana, 1849, *P. securifer* Brady, 1883, *P. danae* Giesbrecht, 1889, *P. alata* A. Scott, 1909, *P. denticauda* A. Scott, 1909, and *P. surrecta* Wilson, 1950.

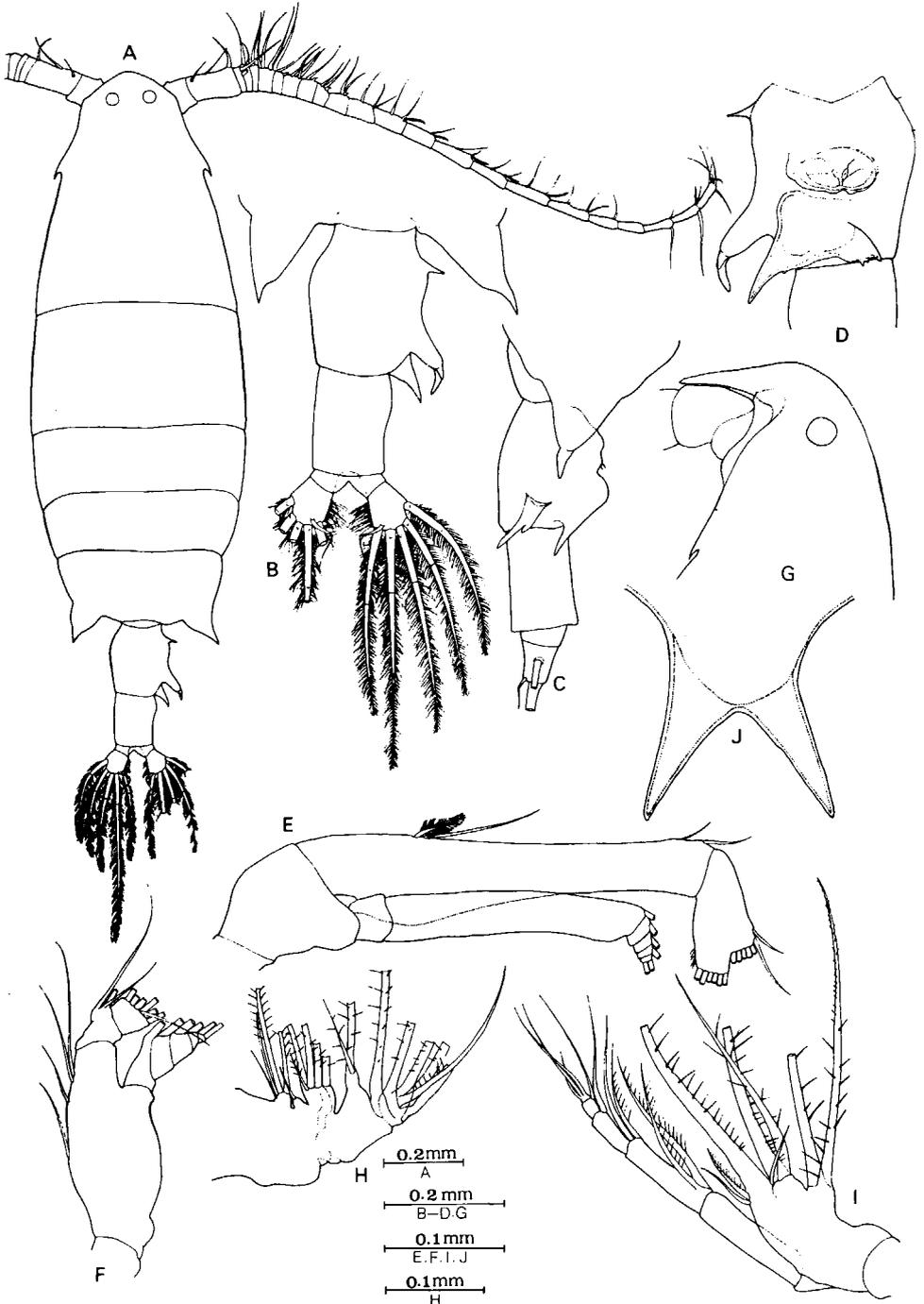
During a study on pelagic copepods in Indonesian seas, three new species of the family Pontellidae, two of *Labidocera* and one of *Pontella*, were found in plankton samples collected from shallow coastal waters of the Java Sea and Cilacap Bay. This paper deals with the description of these new species.

Abbreviations used are as follows: A1, 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.

All the type-specimens are deposited in the National Science Museum, Tokyo (NSMT), Japan.

---

Fig. 1. *Labidocera javaensis* n. sp., female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, dorsal view; C, 5th metasomal somite and urosome, lateral view; D genital somite, ventral view; E, antenna; F, mandible; G, cephalosome, lateral view; H, maxilla; I, maxilliped; J, rostrum, frontal view.



## DESCRIPTIONS

**Labidocera javaensis** n. sp. (figs. 1-3)

Type series. — Holotype (NSMT-Cr 11741), female (1.95 mm); paratypes (NSMT-Cr 11742), 25 females (1.90-2.10 mm) and 25 males (1.75-1.80 mm); off Tegal, central Java (06°40'S 109°10'E), plankton nets (0.3 m and 0.45 m diameter; 0.33 mm mesh aperture), surface and vertical tows (from 8 m depth to surface) in day- and nighttime, 3 June 1994.

Other specimens examined. — 25 females and 25 males, same locality as type-specimens; 20 females and 20 males; off Labuan, west Java (06°10'S 106°00'E), surface and vertical tows (from 10 m depth to surface) in daytime, 18 June 1994; 10 females and 10 males; off Surabaya, east Java (07°10'S 112°45'E), surface and vertical tows (from 10 m depth to surface) in daytime, 9 June 1994.

Female. — Cephalosome rounded anteriorly with lateral hooks (fig. 1A). Dorsal eye lenses small (fig. 1A). Rostrum pronounced, directed ventrally, bifid in frontal view, each ramus robust and conical (fig. 1G, J). Ms1 separated from cephalon; Ms5 fused with Ms4, with slightly asymmetrical posterior ends, right side slightly longer than left and reaching middle of Ur1 (= genital complex) (fig. 1A, B).

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 (fig. 1B, C). Ur2 slightly asymmetrical, right margin with swelling in anterior part. Ur3 (anal somite) 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 (fig. 1B).

A1 23-segmented, reaching distal end of Ur1 when folded backwards (figs. 1A, 2G). A2, mandible, maxilla, maxilliped, and maxillule as shown in figs. 1E, F, H, I, and 2H, respectively.

Numbers of setae and spines on P1-P4 (fig. 2A-D) as shown in table I. P5 (fig. 2E, F) asymmetrical, consisting of 2 basal segments, 1 exopodal segment and 1 endopodal segment; right exopod (fig. 2E) with 2 minute prominences on outer margin and 2 processes on inner margin, of which the proximal one is much larger and stouter, distal end trifurcate but median process much smaller; right endopod with many denticles on terminal and external margins; left exopod (fig. 2F) with 2 minute prominences on outer margin and 1 stout process on inner margin, distal end terminating into 2 spine-like projections; left endopod very similar to right one (fig. 2F).



Fig. 2. *Labidocera javaensis* n. sp., female. A-D, 1st to 4th legs; E, right 5th leg, anterior view; F, left 5th leg, anterior view; G, antennule; H, maxillule.

TABLE I

Seta and spine formula of the four anterior pairs of legs in *Labidocera javaensis* n. sp. and *L. muranoi* n. sp.

| Legs      | Basipod |     | Exopod     |            |                | Endopod    |       |
|-----------|---------|-----|------------|------------|----------------|------------|-------|
|           | 1       | 2   | 1          | 2          | 3              | 1          | 2     |
| <b>P1</b> | 0-1     | 0-0 | <b>I-1</b> | <b>I-1</b> | <b>II,1,4</b>  | <b>0-3</b> | 1,2,3 |
| <b>P2</b> | 0-1     | 0-0 | <b>I-1</b> | <b>I-1</b> | <b>III,1,5</b> | <b>0-3</b> | 2,2,4 |
| <b>P3</b> | 0-1     | 0-0 | <b>I-1</b> | <b>I-1</b> | <b>III,1,5</b> | <b>0-3</b> | 2,2,4 |
| <b>P4</b> | 0-1     | 1-0 | <b>I-1</b> | <b>I-1</b> | <b>III,1,5</b> | <b>0-3</b> | 2,2,3 |

Roman numeral: spine, Arabic numeral: seta.

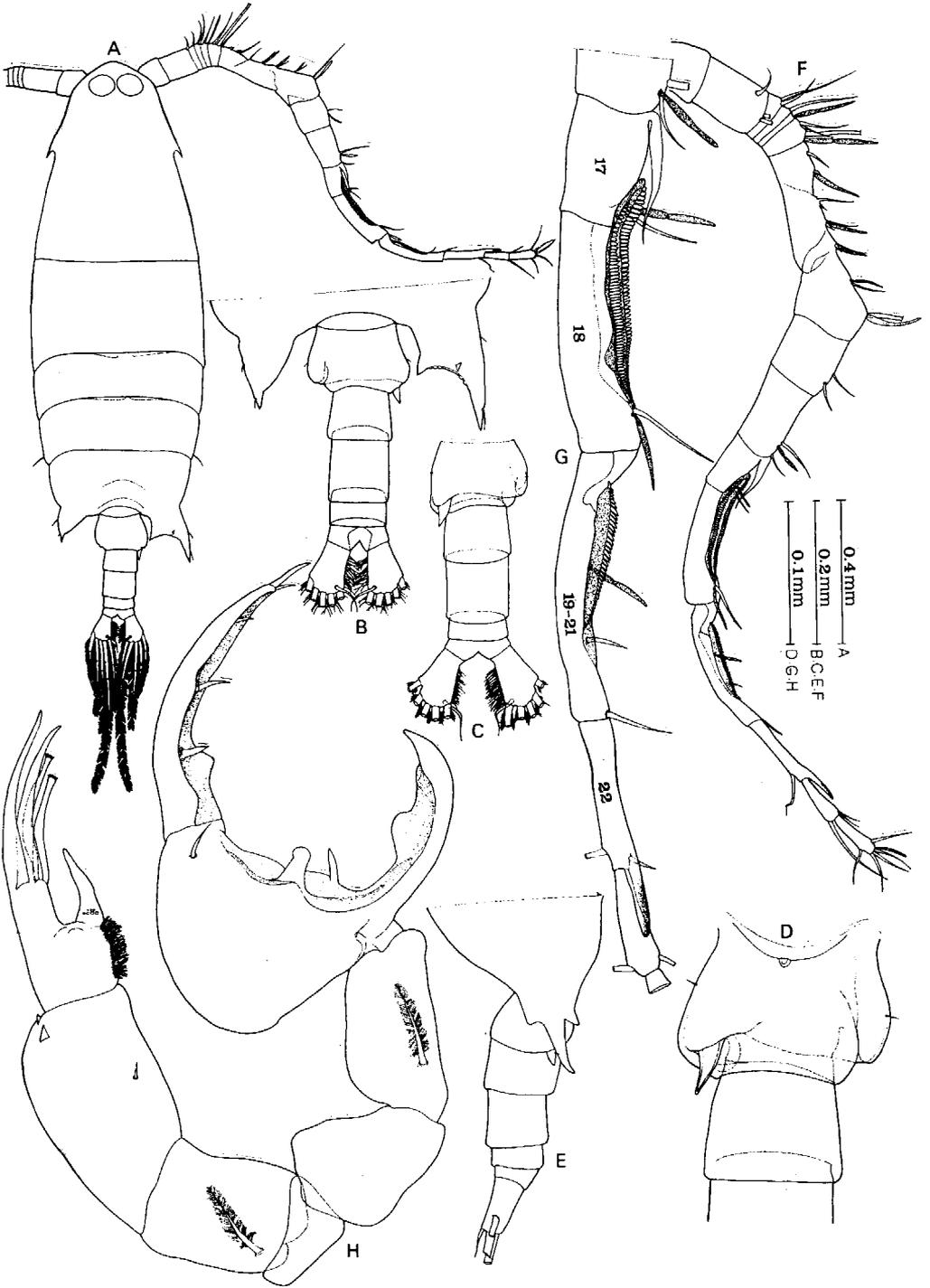
Male. — Prosome as in female except for posterior end of Ms5. Ms5 with left posterior side ending in posteriorly directed, sharp process, right side bifurcate in dorsal view, outer process reaching middle of Ur2, inner one reaching distal third of genital somite, many fine spinules present between inner and outer processes (fig. 3A, B), in lateral view right corner trifurcate (fig. 3E).

Urosome consisting of 5 somites, Ur1 (genital somite, fig. 3B, C, D) 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 (anal somite) 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 (fig. 3B, C).

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 (fig. 3F, G). Other armature of right A1 as shown in fig. 3F, G. Left A1 as in female.

Other appendages, except P5, as in female. P5 uniramous, asymmetrical; right leg, Re1 (chela) broadened with convex inner margin, slightly longer than

Fig. 3. *Labidocera javaensis* n. sp., male. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, dorsal view; C, urosome, ventral view; D, 1st (genital somite) and 2nd urosomal somites, ventral view; E, 5th metasomal somite and urosome, lateral view; F, right antennule; G, 17th to 23rd segments of right antennule; H, 5th legs, anterior view.



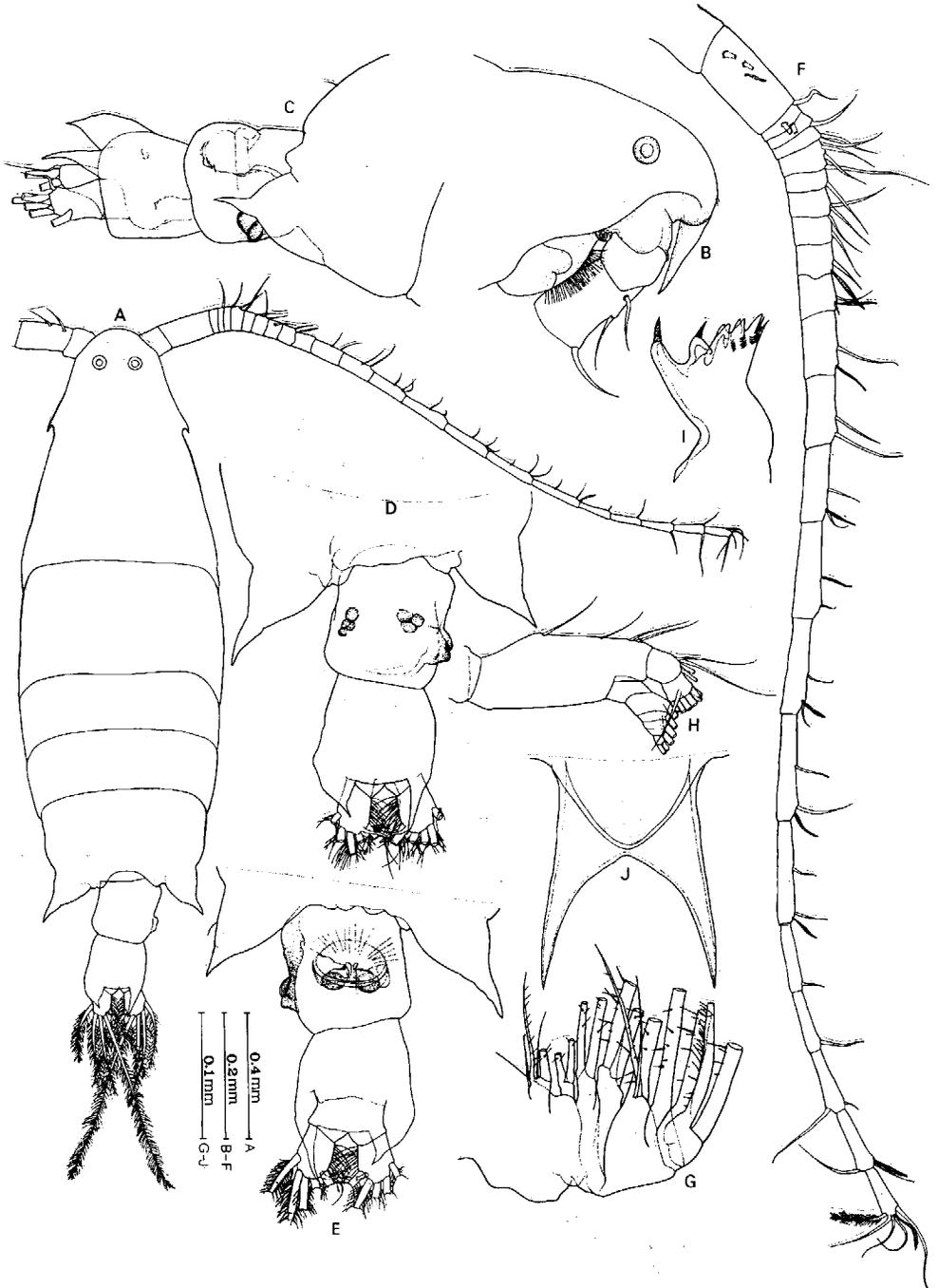
its maximum width (except thumb), thumb at proximal end terminating into inwardly curved, pointed hook, outer surface of chela between thumb and distal end of Re1 with 1 stout process near base and 1 large, anvil-shaped lamella just distal to process, single seta present on posterior surface near base 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 (fig. 3H).

Remarks. — The present new species belongs to the *Labidocera pectinata*-group which was hitherto composed of six species: *Labidocera pectinata* Thompson & Scott, 1903; *L. japonica* Mori, 1935; *L. rotunda* Mori, 1929; *L. moretoni* Greenwood, 1978; *L. carpentariensis* Fleminger, Othman & Greenwood, 1982; and *L. papuensis* Fleminger, Othman & Greenwood, 1982; it is distinguished by characteristics of the female P5 and the male right A1 and P5 (cf. Fleminger et al., 1982). The new species, 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 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 P5 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.

Fleminger (1986) mentioned an undescribed species belonging to the *L. pectinata*-group, *Labidocera* sp. #3, inhabiting coastal waters of the Indian Ocean side of the Greater Sunda Islands. There is a high probability that *L. javaensis* is identical with this undescribed species, so I asked several scientists for the

---

Fig. 4. *Labidocera muranoi* n. sp., female. A, whole animal, dorsal view; B, cephalosome, lateral view; C, 5th metasomal somite and urosome, lateral view; D, 5th metasomal somite and urosome, dorsal view; E, 5th metasomal somite and urosome, ventral view; F, antennule; G, maxilla; H, mandible; I, mandibular dentition; J, rostrum, frontal view.



whereabouts of his material, but I could not find out where this material is now kept (M. M. Mullin, J. G. Greenwood, T. S. Park, pers. comm.).

All the specimens of *L. javaensis* n. sp. were collected from inshore waters, shallower than 15 m in depth and within 1 km offshore.

Etymology. — The specific name *javaensis* refers to the Java Sea where the specimens were collected.

### ***Labidocera muranoi* n. sp. (figs. 4-6)**

Type series. — Holotype (NSMT-Cr 11743), female (2.24 mm); paratypes (NSMT-Cr 11744), 2 females (2.23-2.24 mm) and 6 males (2.12-2.16 mm); Cilacap Bay, Indian Ocean side of central Java (07°40'S 109°00'E), plankton nets (0.3 m and 0.45 m diameter; 0.33 mm mesh aperture), surface tows in day- and nighttime, 19 May 1993.

Female. — Body elongated, relative length of prosome to urosome 4:1. Cephalosome with lateral hooks. Posterior corners of Ms5 produced into asymmetrical, strong, spiniform processes, left side slightly longer than right one (fig. 4A).

Urosome composed of 3 somites, Ur1 (genital complex) 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 (fig. 4D, E). Ur3 (anal somite) 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 (fig. 4A, C, D, E).

A1 23-segmented, reaching base of Ur3 when folded backwards (fig. 4A, F). A2, mandible, mandibular dentition, maxilla, and maxilliped as shown in figs. 5G, 4H, I, G and 5F, respectively.

Numbers of setae and spines on P1-P4 (fig. 5A-D) are shown in table I. P5 asymmetrical, consisting of 2 basal segments, 1 exopodal and 1 endopodal segment, 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 with 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 (fig. 5E).

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

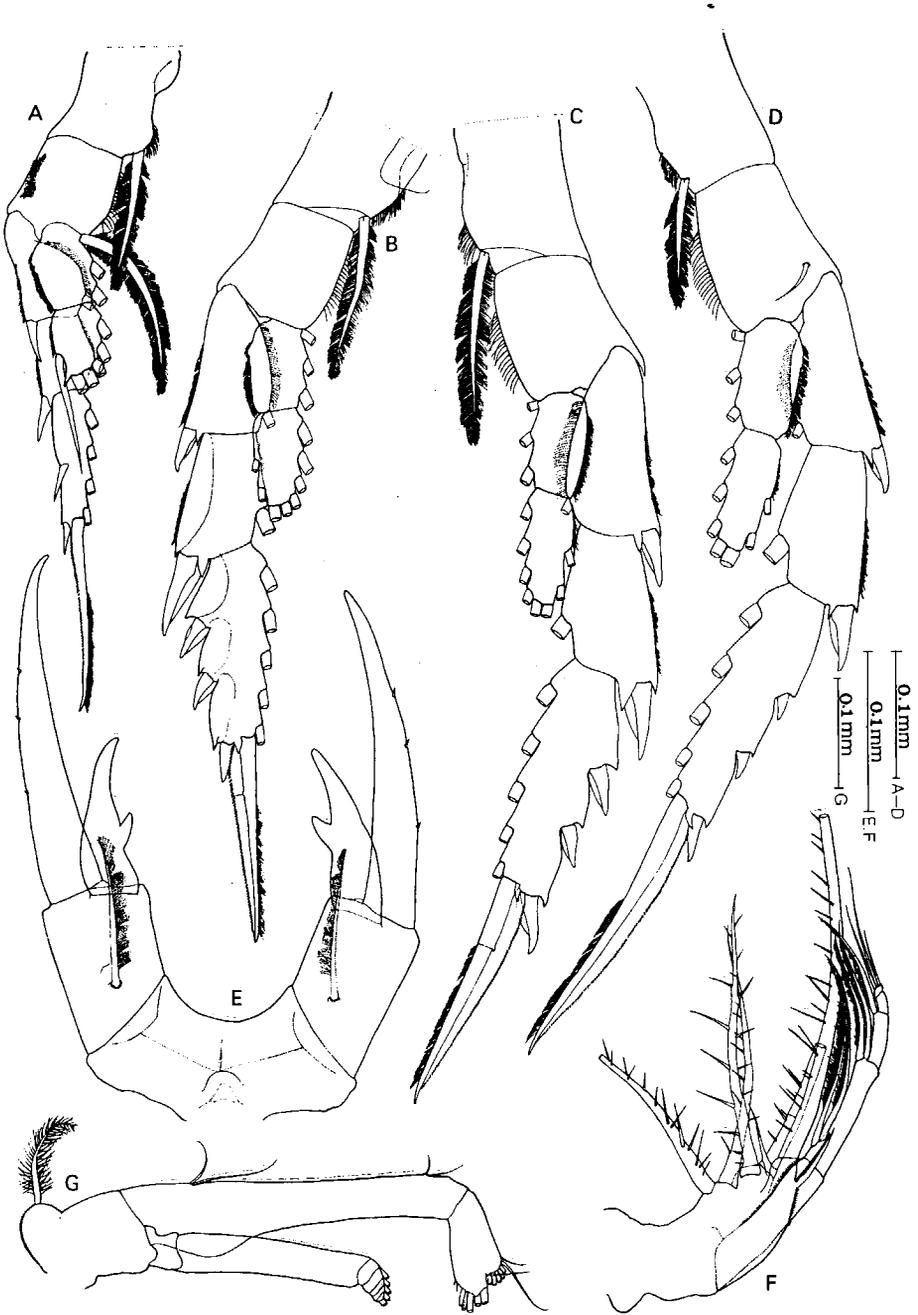


Fig. 5. *Labidocera muranoi* n. sp., female. A-D, 1st to 4th legs; E, 5th legs, anterior view; F, maxilliped; G, antenna.

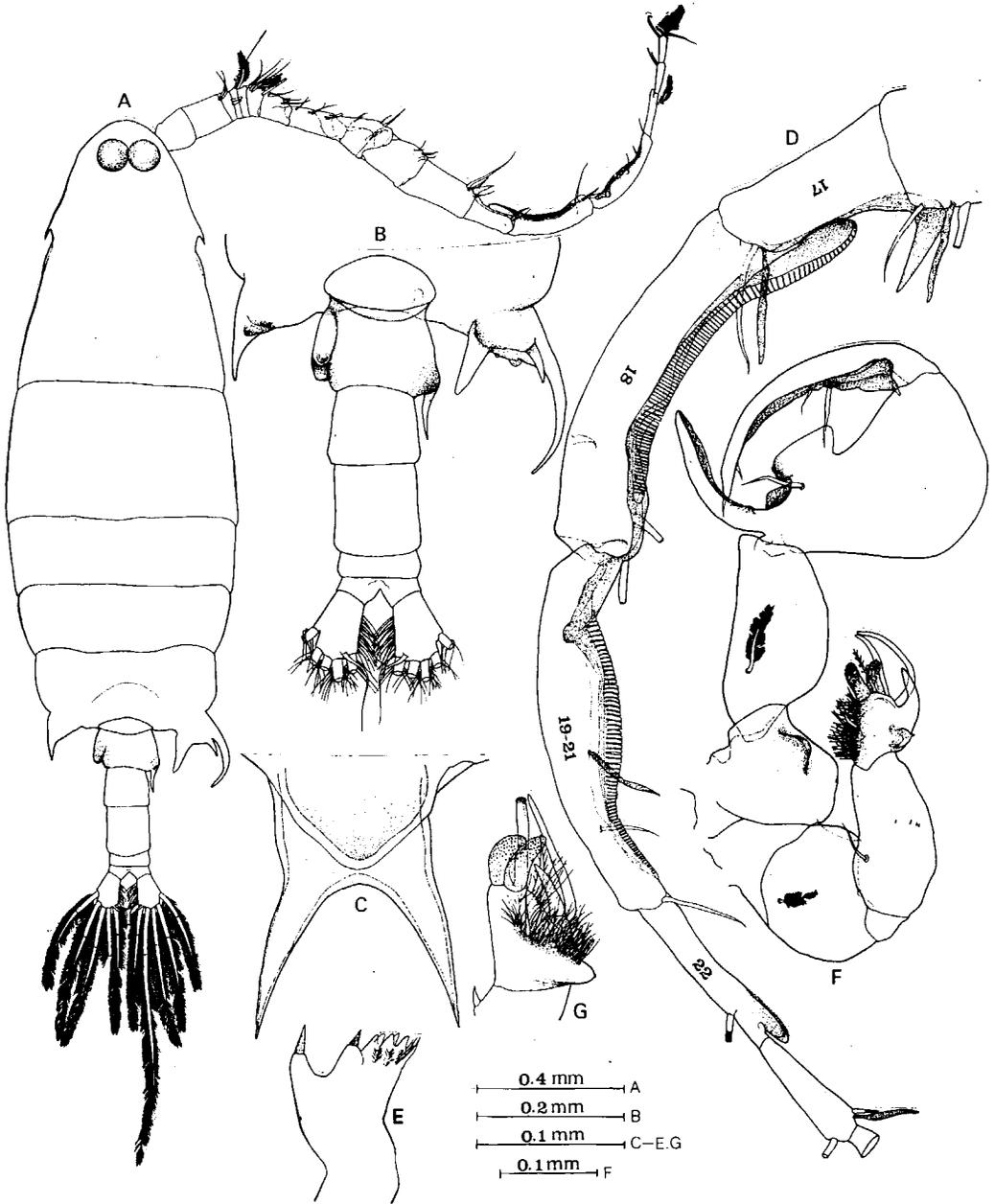


Fig. 6. *Labidocera muranoi* n. sp., male. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, dorsal view; C, rostrum, frontal view; D, 17th to 23rd segments of right 1st antenna; E, mandibular dentition; F, 5th legs; G, terminal segment of left 5th leg, lateral view.

dorsal view, outer process much longer, curved inwards, 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 (fig. 6A, B).

Urosome consisting of 5 somites; Ur1 (genital somite) 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 (anal somite) shorter than Ur4. CR symmetrical, about 1.46 times as long as wide and longer than Ur4 and Ur5 combined (fig. 6B).

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. Other armature of right A1 as shown in fig. 6A, D. 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 (finger) 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 (distal segment) 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 (fig. 6F, G).

Remarks. — Fleming et al. (1982) instituted the *Labidocera kroyeri* species-group for an intrageneric lineage consisting of *L. kroyeri* (Brady, 1883); *L. styli-fera* (Thompson & Scott, 1903); *L. gallensis* Thompson & Scott, 1903; *L. dakini* Greenwood, 1978; and two undescribed species. Although they did not give a definition for this species 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

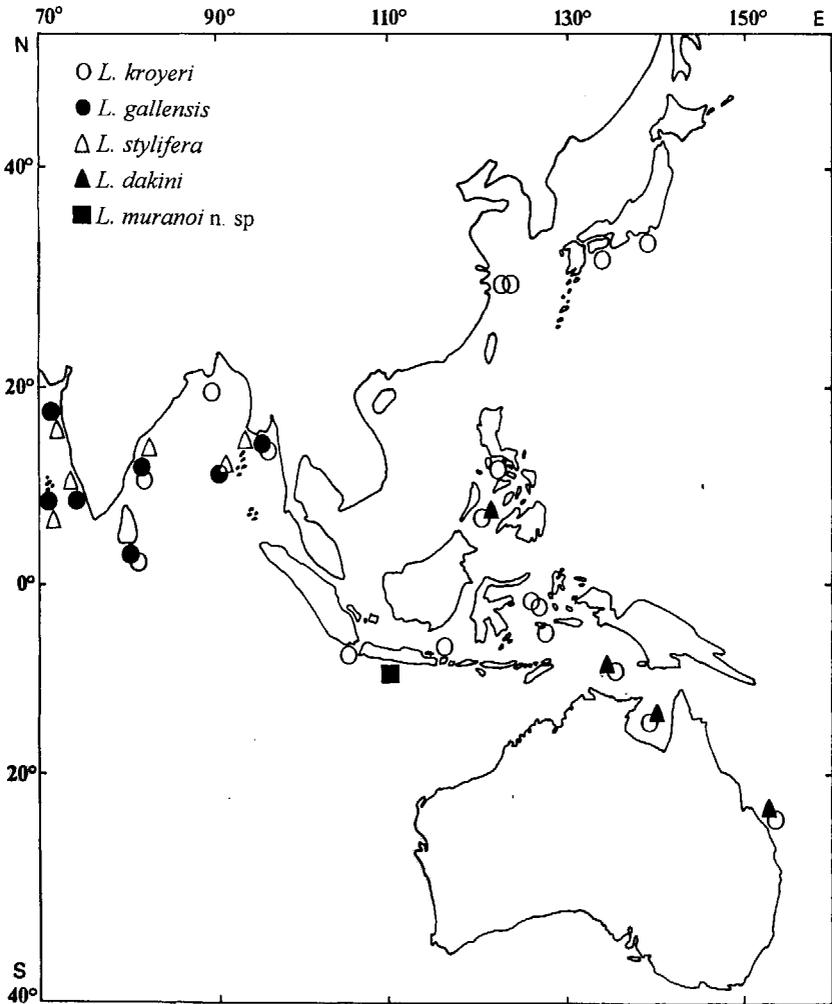


Fig. 7. Distribution of new and published records of the *Labidocera kroyeri*-group; *L. kroyeri* (Brady), *L. gallensis* Thompson & Scott, *L. stylifera* (Thompson & Scott), *L. dakini* Greenwood and *L. muranoi*, new species.

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.

*Labidocera muranoi* n. sp. clearly belongs to this species group in having these three characters, though the inner process of Ri in the female P5 is located at the middle of its own segment and not in the distal part.

The female of the new species is unique and readily distinguished from the four known species of the group by the following characters: (1) Ur1 provided

with a process with 2 rounded knobs at the apex, (2) Ur2 without spines except for a pair of posterior spine-like processes, and (3) the Ri of P5 bluntly pointed terminally and armed with a process at the middle of the inner margin. The male of the new species is similar to that of *L. gallensis*, which was redescribed by Silas & Pillai (1973), in having 3 processes on the right posterior angle of the Ms5 and a spine-like process at the right posterior angle of Ur1, but is clearly distinguished from the latter in the shape of the three processes of the Ms5 and the length of the thumb of the right P5, which is 0.63 times as long as the terminal claw in the new species, being 0.25 times this length in *L. gallensis*.

Published records of the *Labidocera kroyeri*-group are restricted to inshore regions of the tropical and subtropical oceans between 35°N and 25°S and 70°E and 141°E. *L. kroyeri* is widely distributed within this area (Brady, 1883; Cleve, 1901; Scott, 1909; Sewell, 1932; Dakin & Colefax, 1933; Mori, 1937; Delsman, 1949; Tanaka, 1964; Greenwood, 1979), but the other three species seem to have a relatively narrow distribution range, i.e., *L. gallensis* and *L. stylifera* have only been recorded from India, Sri Lanka, and the Andaman Islands (Thompson & Scott, 1903; Silas & Pillai, 1973), all located on the Indian Ocean side, and *L. dakini* from eastern Australia (Greenwood, 1978, 1979), the Gulf of Carpentaria (Othman et al., 1990), the Arafura Sea, and the Philippines (Brady, 1883), located on the Pacific side (fig. 7). The present new species was collected from the surface water in Cilacap Bay, central Java, a mangrove estuary facing the Indian Ocean, with a salinity of about 32. It may be an endemic species which has a preference for low salinities.

Etymology. — The species is named in honour of Prof. Masaaki Murano of the Tokyo University of Fisheries.

### ***Pontella labuanensis* n. sp. (figs. 8-10)**

Type series. — Holotype (NSMT-Cr 11745), female (2.93 mm); paratypes (NSMT-Cr 11746), 20 females (2.90-3.10 mm) and 20 males (2.50-2.60 mm); coastal waters of Labuan, west Java (06°10'S 106°00'E), plankton nets (0.3 m and 0.45 m diameter; 0.33 mm mesh aperture), surface and vertical tows (from 14 m deep to surface) in nighttime, 18 June 1994.

Female. — Body robust, cephalon provided with distinct lateral hook on each side, articulations between cephalon and Ms1, and between Ms4 and Ms5 distinct; posterior corners of Ms5 produced into symmetrical, acuminate lobes reaching middle of urosome, lobe as long as broad with globular base in dorsal view (fig. 8A, E). Rostrum bifid, thickened basally and tapering distally, directed ventrally, without lense (fig. 8B, C). Dorsal eye lenses distinct and rounded (fig. 8A).

Urosome composed of 2 somites, Ur1 (genital complex) onion-shaped, asymmetrical, right margin more swollen than left, dorso-lateral surface bearing sev-

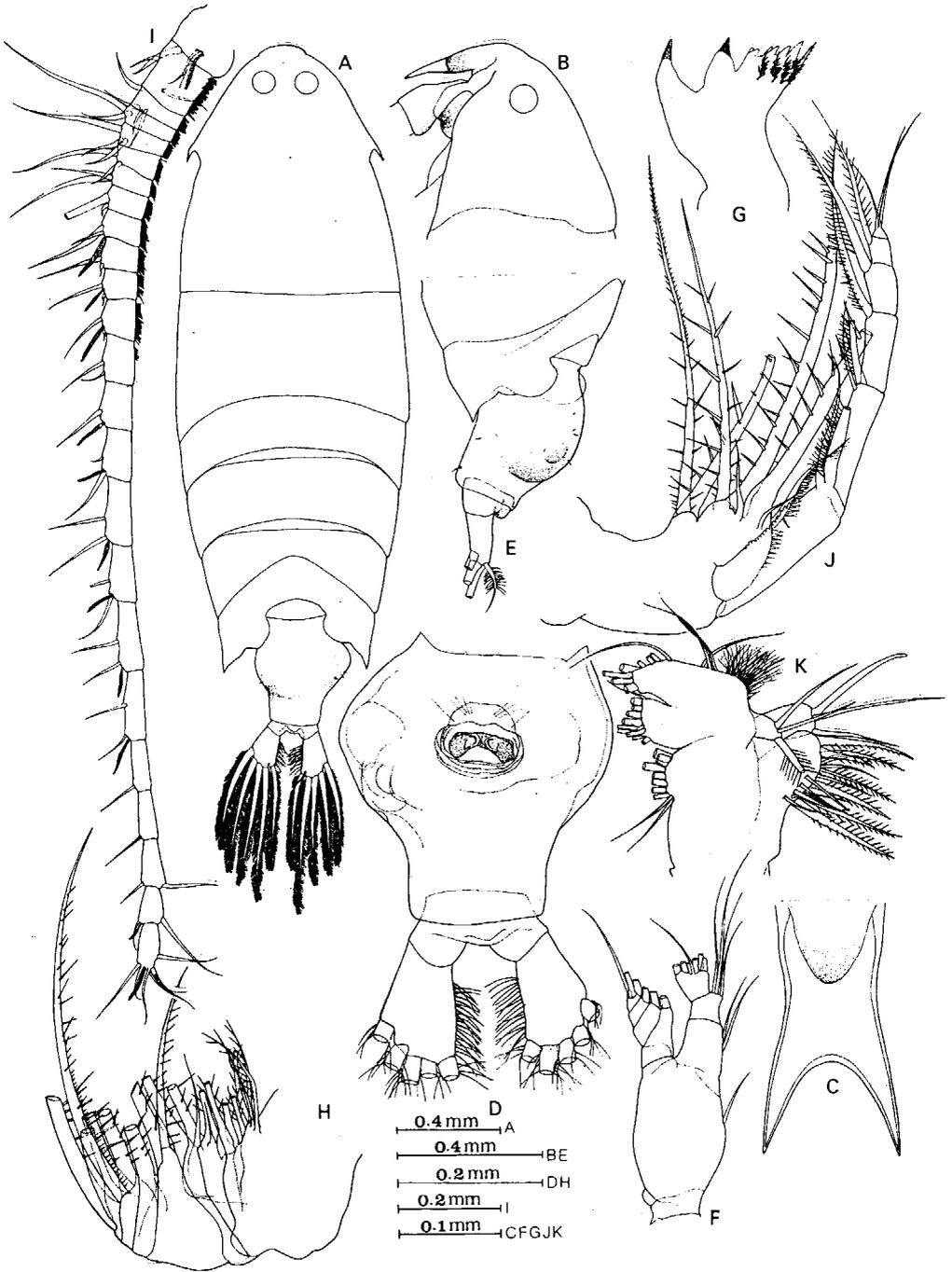


TABLE II

Seta and spine formula of the four anterior pairs of legs in *Pontella labuanensis* n. sp.

| Legs | Basipod |     | Exopod |     |         | Endopod |       |       |
|------|---------|-----|--------|-----|---------|---------|-------|-------|
|      | 1       | 2   | 1      | 2   | 3       | 1       | 2     | 3     |
| P1   | 0-1     | 0-1 | I-1    | I-1 | II,I,4  | 0-1     | 0-2   | 1,2,3 |
| P2   | 0-1     | 0-0 | I-1    | I-1 | III,I,5 | 0-3     | 2,2,4 | —     |
| P3   | 0-1     | 0-0 | I-1    | I-1 | III,I,5 | 0-3     | 2,2,4 | —     |
| P4   | 0-1     | 1-0 | I-1    | I-1 | III,I,5 | 0-3     | 2,2,3 | —     |

Roman numeral: spine, Arabic numeral: seta.

eral small sensilla, Ur2 (anal somite) small and short (fig. 8A, D). CR slightly asymmetrical, right side slightly longer than left, each bearing 5 plumose and 1 small setae, the latter arising from dorsal surface between 2 inner plumose setae (fig. 8A, D).

A1 24-segmented, not extending beyond Ms3, number of setae and proportional length of segments as shown in fig. 8I. A2, mandible, mandible dentition, maxillule, maxilla, and maxilliped as shown in figs. 9A, 8F, G, K, H, J, respectively.

P1-P4 (fig. 9B-E) biramous, basipod 2-segmented, B1 with 1 plumose seta on inner side; Re3-segmented, Ri3-segmented in P1 and 2-segmented in P2-P4. Numbers of setae and spines on P1-P4 shown in table II.

P5 slightly asymmetrical, B2 with long, plumose seta reaching middle of Re, in one of the paratypes 2 unequal setae were found on right B2 (fig. 9G); Re unjointed, horn-shaped, twice as long as Ri, right leg bearing 4 minute spinules on lateral margin, left leg longer than right and more strongly curved, with 4 minute spinules on lateral margin; Ri bifid at tip (fig. 9F).

Male. — Rostrum bulbous with bifid, short conical projections (fig. 10E). Dorsal eye lenses small and rostral eye lenses well developed (fig. 10A, B, E). Ms5 produced posteriorly into asymmetrical short and pointed lobes reaching distal end of Ur1 (fig. 10A).

Urosome composed of 5 somites, Ur1 widest, somewhat asymmetrical, left side more swollen than right; Ur3 longer than following 2 somites combined (fig. 10C).

Fig. 8. *Pontella labuanensis* n. sp., female. A, whole animal, dorsal view; B, cephalosome, lateral view; C, rostrum, frontal view; D, urosome, ventral view; E, 5th metasomal somite and urosome, lateral view; F, mandible; G, mandibular dentition; H, maxilla; I, right antennule; J, maxilliped; K, maxillule.



Fig. 9. *Pontella labuanensis* n. sp., female. A, antenna; B-E, 1st to 4th legs; F, 5th legs, anterior view; G, 5th legs with 2 plumose setae on right second basipod, anterior view.

Right A1 geniculate, segment 14 with long spine; anterior margin from middle of segment 17 to distal fourth of segment 18 with toothed ridge provided with coarse denticles in proximal half and fine denticles in distal half; fused segments 19-21 provided with strong spur distally and two toothed plates, proximal plate with acuminate teeth and distal one with lamelliform teeth (fig. 10F, H); arrangement of setae and proportional length of segments as shown in fig. 10F. Left A1 as in female.

P5 uniramous, asymmetrical, right Re1 (chela) more or less rectangular, with bilobed thumb at proximal end of outer margin, both lobes subequal, stout, proximal one slightly curved proximally, outer margin distal to thumb concave, with 2 minute setae, one at base of thumb and another on anterior surface near base of Re2. Right Re2 (finger) elongated, turned outwards about  $180^\circ$  at distal third and ending in spatulate structure with small spine at apex, outer margin with 3 setae, 2 near base of finger and 1 near distal end. B1 of left P5 short; B2 with 1 plumose seta; Re1 with 1 small spine at distal end of outer margin and 1 small spine in center of posterior surface; Re2 (terminal segment) bulb-shaped, outer margin armed with short, pointed spine medially, apex with 3 round-tipped spines which are becoming shorter outwards, innermost one ribbed in distal half, 1 small spine present on proximal posterior surface, inner margin hirsute (fig. 10G).

Remarks. — Fleminger (1986) instituted three species groups within the Indo-West Pacific *Pontella*: the *P. alata*-group, the *P. fera*-group, and the *P. andersoni*-group, but he did not give any definition for these groups. Ohtsuka et al. (1987) subsequently described the *P. alata*-group at the time of the establishment of their new species, *P. rostraticauda*. Characteristic features of these three groups have been summarized in table III. The present new species is more similar to the *P. alata*-group than to the other two groups in having the female rostrum without lens, the female P5 with the exopod virtually naked, the male rostrum with double convex lenses and the male left P5 with the terminal segment armed with a large aesthete-like seta, but it cannot be included in this group because of the genital opening without any operculum and the male right P5 with the proximal segment without a slender and elongated thumb.

*P. labuanensis* is easily distinguished from other species of *Pontella*, not belonging to these three groups, by the following combination of characteristics. In the female, (1) Ur1 does not bear any process, including a genital operculum, except for several small sensilla on the dorso-lateral surface, (2) the CR are slightly asymmetrical, the right ramus being slightly longer, and (3) the terminal segment of the P5 is virtually naked and that of the left P5 is slightly longer and more strongly curved than that of the right P5. In the male, (1) the ros-

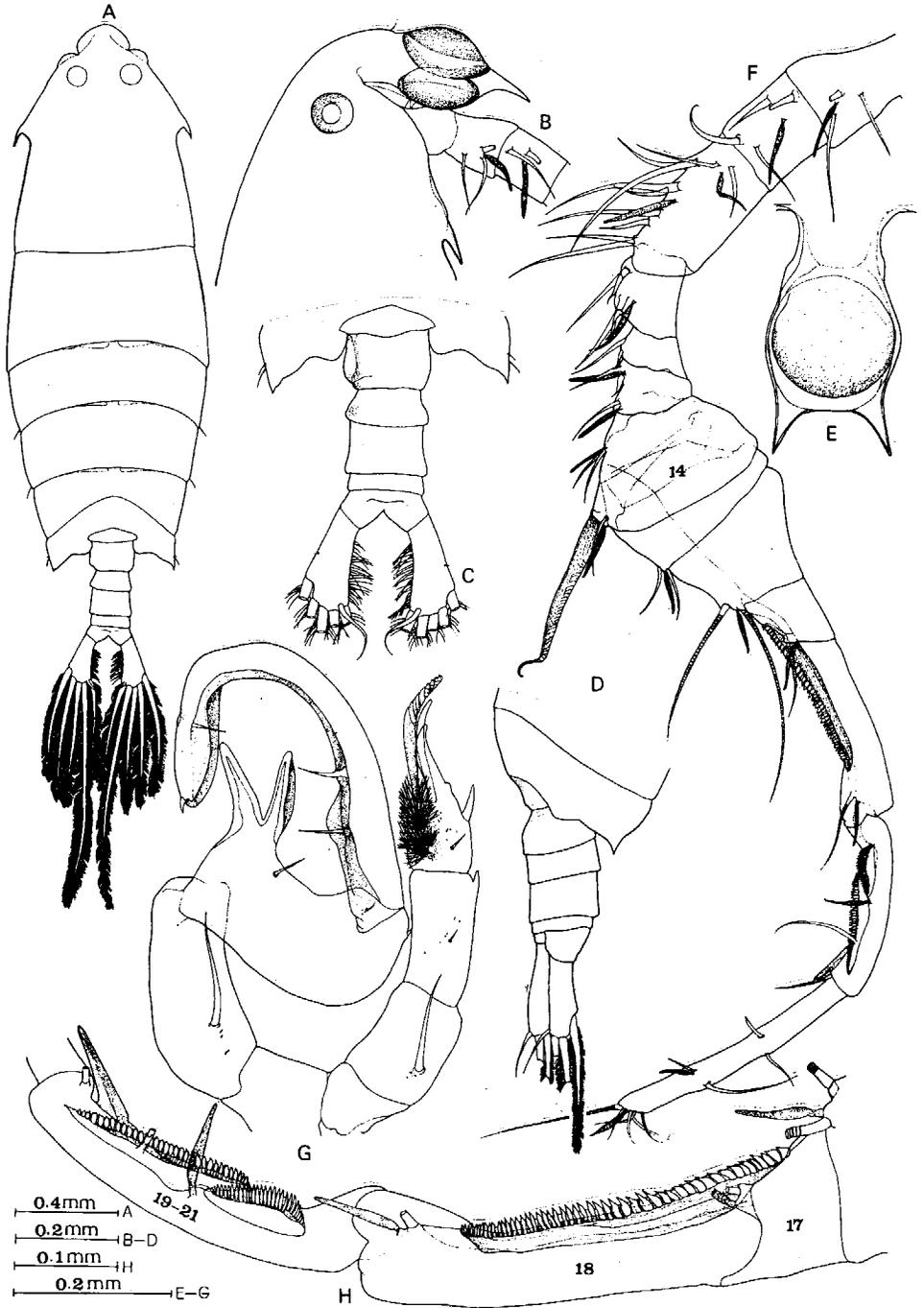


TABLE III

Characteristic features of four *Pontella* species groups in the Indo-West Pacific.

|                                     | <i>P. alata</i> -group   | <i>P. fera</i> -group   | <i>P. andersoni</i> -group   | <i>P. labuanensis</i> -group                                   |
|-------------------------------------|--|---|--|--|
| Female:                             |  |   |  |  |
| 1st urosomal somite                 | Left side with large process extending posteriorly. Genital opening with spiniform operculum | Left margin swollen. 2 ventral processes present                  | Symmetrical, not produced ventrally  | Symmetrical, not produced                                      |
| Caudal rami                         | Asymmetrical, right ramus larger   | Asymmetrical, left ramus larger                                   | Symmetrical  | Asymmetrical, right ramus slightly longer                      |
| Rostral lens                        | Absent   | Present   | Absent   | Absent   |
| 5th legs                            | Asymmetrical, right exopod shorter. Exopod virtually naked                                   | Symmetrical, exopod with 3 spines each on inner and outer margins | Symmetrical, exopod with 3 spines on outer margin and 1 spine on inner one | Asymmetrical, right exopod shorter. Exopod virtually naked     |
| Male:                               |  |   |  |  |
| Rostrum                             | With large, double convex lenses   | Without lens  | With small single lens   | With large, double convex lenses                               |
| 1st exopod segment of right 5th leg | With 1 slender elongated thumb and 1 slender digitiform process                              | With 3 digitiform processes of unequal length                     | With 3 spiniform processes, but without digitiform ones                    | With 2 subequal digitiform processes                           |
| 2nd exopod segment of left 5th leg  | Short, with 1 large aesthete-like seta besides robust spines at apex                         | Short, without aesthete-like seta                                 | Elongated, without aesthete-like seta                                      | Short, with 1 aesthete-like seta besides robust spines at apex |

trum has large, double convex lenses, (2) the right P5 has a proximally forked process on Re1 instead of a slender thumb.

I herewith establish as a fourth species group, the *P. labuanensis*-group, at present consisting of a single species. Characteristics of this group are shown in table III together with those of the three known groups.

Fig. 10. *Pontella labuanensis* n. sp., male. A, whole animal, dorsal view; B, cephalosome, lateral view; C, 5th metasomal somite and urosome, dorsal view; D, 5th metasomal somite and urosome, lateral view; E, rostrum, frontal view; F, right antennule; G, 5th legs, posterior view; H, 17th to 22nd segments of right antennule.

Etymology. — The specific name *labuanensis* refers to Labuan, where the species was collected.

#### ACKNOWLEDGEMENTS

I would like to thank Prof. Fumio Takashima and Prof. Takashi Ishimaru, Tokyo University of Fisheries, for the encouragement during this study. Thanks are also due to Prof. Masaaki Murano, Tokyo University of Fisheries, for his valuable advices and for reviewing the manuscript.

#### REFERENCES

- BRADY, G. S., 1883. Report on the Copepoda obtained by H.M.S. "Challenger" during the years 1873-1876. Rep. Sci. Res. H.M.S. "Challenger", (Zool.) **8**: 1-142.
- CARL, J., 1907. Copépodes d'Amboine. Rev. Suisse Zool., **15**: 7-18.
- CHIBA, T. & A. TSURUTA, 1955. On the plankton in the western sea regions of Sunda Islands. Journ. Shimonoseki Coll. Fish., **4** (1): 127-132.
- CLEVE, P. T., 1901. Plankton from the Indian Ocean and Malay Archipelago. Kongl. Svenska Vetenskaps-Akademiens Handlingar, **35** (5): 1-58.
- DAKIN, W. J. & A. N. COLEFAX, 1933. The marine plankton of the coastal waters of New South Wales. I. The chief coastal forms and their seasonal distribution. Proc. Linnean Soc. New South Wales, **58**: 186-222.
- DELSMAN, H. C., 1939. Preliminary plankton investigations in the Java Sea. Treubia, **17**: 139-181.
- —, 1949. Copepods in Sunda Strait. Bijdr. Dierk., **28**: 127-132.
- FLEMINGER, A., 1986. The Pleistocene equatorial barrier between the Indian and Pacific Oceans and a likely cause for Wallace's line. UNESCO techn. Pap. mar. Sci., **49**: 84-97.
- FLEMINGER, A., B. H. R. OTHMAN & J. G. GREENWOOD, 1982. The *Labidocera pectinata* group: an Indo-West Pacific lineage of planktonic copepods with descriptions of two new species. Journ. Plankt. Res., **4** (2): 245-269.
- FRÜCHTL, F., 1923. Cladocera und Copepoda der Aru-Inseln (vorläufige Mitteilung: Artenliste und kurze Beschreibung der neuen Formen). Abh. Senckenb. Naturforsch. Ges., **35**: 449-457.
- —, 1924. Die Cladoceren- und Copepoden-Fauna des Aru-Archipels. Arb. zool. Inst. Univ. Innsbruck, **2** (2): 1-114.
- GIESBRECHT, W., 1892. Systematik und Faunistik der pelagischen Copepoden des Golfes von Neapel. Fauna und Flora des Golfes von Neapel und der angrenzenden Meeresabschnitte, **19**: i-ix, 1-831, pls. 1-54.
- GREENWOOD, J. G., 1978. Two new species of *Labidocera* (Copepoda: Calanoida) from Queensland. Journ. nat. Hist., London, **12**: 535-543.
- —, 1979. Calanoid copepods of Moreton Bay (Queensland) IV. Family Pontellidae. Proc. R. Soc. Queensland, **90**: 93-111.
- MORI, T., 1937. The pelagic Copepoda from the neighbouring waters of Japan: 1-150. (Komiya Printing Co., Tokyo; reprinted in 1964 by Soyo Co. Inc., Tokyo).
- OHTSUKA, S., A. FLEMINGER & T. ONBÉ, 1987. A new species of *Pontella* (Copepoda: Calanoida) from the Inland Sea of Japan with notes on its feeding habits and related species. Journ. Crust. Biol., **7** (3): 554-571.

- OTHMAN, B. H. R., J. G. GREENWOOD & P. C. ROTHLSBERG, 1990. The copepod fauna of the Gulf of Carpentaria and its Indo-West Pacific affinities. *Netherlands Journ. Sea Res.*, **25** (4): 561-572.
- SCOTT, A., 1909. Copepoda of the Siboga Expedition. Part I. Free swimming, littoral and semi-parasitic Copepoda. *Siboga Expeditie Monografieën*, **29a**: 1-323, pls. 1-69.
- SEWELL, R. B. S., 1932. The Copepoda of Indian Seas. Calanoida. *Mem. Indian Mus.*, **10**: 1-407.
- SILAS, E. G. & P. P. PILLAI, 1973. The calanoid copepod family Pontellidae from the Indian Ocean. *Journ. mar. biol. Ass. India*, **15** (2): 771-858.
- TANAKA, O., 1964. The pelagic copepods of the Izu region, middle Japan. Systematic account. XII. Families Arietellidae, Pseudocyclopidae, Candacidae and Pontellidae. *Publs Seto mar. biol. Lab.*, **12**: 231-271.
- THOMPSON, I. C. & A. SCOTT, 1903. Report on the Copepoda collected by Prof. Herdman at Ceylon. *Ceylon Pearl Oyster Fisheries, (Suppl. Rept.)* **7**: 227-307.