TAXONOMY AND DISTRIBUTION OF THE FAMILY CANDACIIDAE IN INDONESIAN COASTAL WATERS

by

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ABSTRACT

Some species of calanoid copepods of the family Candaciidae inhabit surface or moderately deep waters, provide excellent materials for a zoogeographic investigation. Very few studies partaining to the taxonomy and biogeography of the members of the family Candaciidae in Indonesian waters have been previously carried out. The present paper deals with relevant informations on description and illustrations of 14 candaciid species from this region. All the previously known species have been found, one species Candacia ishimarui *is new to science, and one* C. guggenheimi *Grice and Jones, 1960 is new records. A catalogue of all the nominal species (both valid species and synonyms) hitherto described from the world oceans, the zoogeography and a key of these species is discussed.*

INTRODUCTION

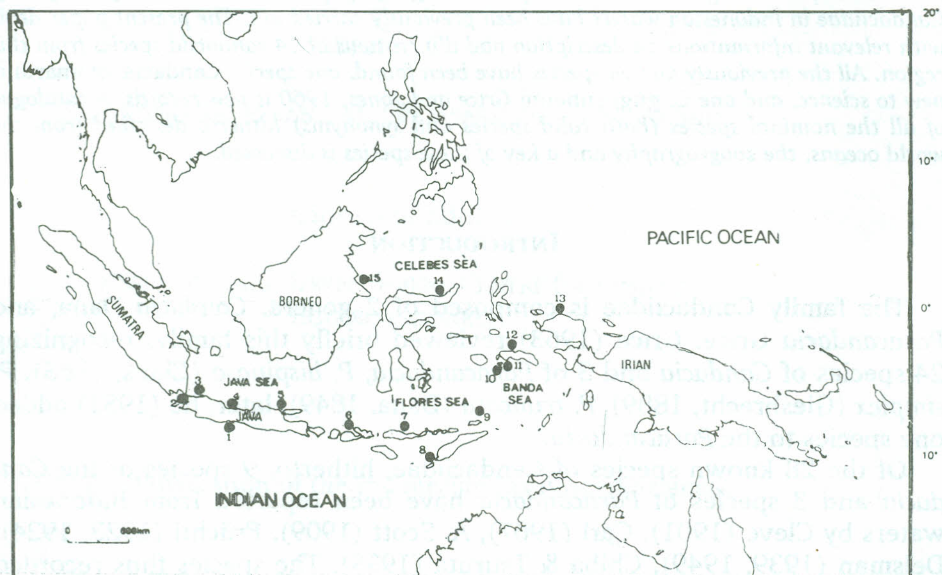
The family Candaciidae is composed of 2 genera, *Candacia* Dana, and *Paracandacia* Grice. Grice (1963) reviewed briefly this family, recognizing 24 species of *Candacia* and 3 of *Paracandacia, P. bispinosa* (Claus, 1863), *P. simplex* (Giesbrecht, 1889), *P. truncata* (Dana, 1849), later, he (1981) added one species to the *Paracandacia*.

Of the 28 known species of Candaciidae, hitherto, 9 species of the *Candacia* and 3 species of *Paracandacia* have been reported from Indonesian waters by Cleve (1901), Carl (1907), A. Scott (1909), Früchtl (1923, 1924), Delsman (1939, 1949), Chiba & Tsuruta (1955). The species thus recorded are : *C. bradyi* A. Scott, 1902, *C. bipinnata* (Giesbrecht, 1889), *C. catula* (Giesbrecht, 1889), *C. curta* (Dana, 1849), *C. discaudata* A. Scott, 1909, *C. ethiopica* (Dana, 1849), *C. longimana* (Claus, 1863), *C. pachydactyla* (Dana, 1849), *C. tenuimana* (Giesbrecht, 1889), *P. bispinosa* (Claus, 1863), *P. simplex* (Giesbrecht, 1889) and *P. truncata* (Dana, 1849).

During a study on pelagic Copepoda in Indonesian waters, 11 species of *Candacia* and 3 of *Paracandacia* including adults of both sexes and copepodid stages were identified in plankton samples. Among them 12 species reported in previous studies, one species, *C. ishimarui*, is new to science and one species, *C. guggenheimi* Grice & Jones, 1960 is the first record from Indonesian waters.

MATERIAL AND METHODS

The present plankton samples, many of which were kindly provided by collections of the Research and Development Center of Oceanography, Indonesian Institute of Sciences (LIPI), were collected at 15 sites in Indonesian waters during 1985-1995 (map.1). All stations except that in the Flores Sea were located near the coast. Samplings was done by surface and vertical tows (from 10 m, 100 m or 200 m deep to the surface) with plankton nets (0.3 m and 0.45 m diameter mouth aperture; 0.1 mm and 0.33 mm mesh size).



Map 1. Sampling sites in Indonesian waters.

1. Cilacap Bay, Central Java (07°10'S 109°00'E), 19 May 1993; 6 June 1994
2. Off Labuan, West Java (06°106°00'E), 18 June 1994; 11 May 1993
3. Jakarta Bay-Seribu Islands (06°00'S 106°45'E), 1-2 June 1994
4. Off Tegal, Central Java (06°40'S 109°10'E), 3-4 June 1994
5. Off Surabaya, East Java (07°10'S 109°10'E), 8-9 June 1994
6. Sumbawa Sea (08°40'S 112°45'E), 4 September 1993*
7. Flores Sea (07°29'S 121°05'E), 15 February 1985*
8. Kupang Sea (10°20'S 123°00'E), 15 December 1994*
9. Banda Sea (07°39'S 126°50'E), 29 July 1992*
10. Ambon Bay (03°40'S 128°10'E), 13-14 March 1995; 18 July, 12 December 1993+
11. Haruku Strait (03°41'S 128°00'E), 2 August 1983*
12. Ceram Sea (03°16'S 129°00'E), 23 July 1991*
13. Sorong Sea (00°20'S 132°10'E), 25 January 1995*
14. Off North Celebes (01°30'N 124°00'E), 6/9 October 1994*
15. Derawan Strait, East Kalimantan (02°12'N 118°17'E), 22 October 1994*

Notes : * = samples obtained from collection of LIPI, + = samples provided by Mr. T. Sidabutar

Abbreviations used in the text to describe morphological features are: A1, antennule; A2, antenna; Msl-Ms5, metasomal somites 1-5; Ur1-Ur2, 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 dan 2.

Family **Candaciidae** Giesbrecht, 1892

Diagnosis.- Cephalon without rostrum, truncate anteriorly, separated from Ms1, Ms5 and Ms4 fused, with pointed posterolateral ends, often asymmetrical in female, always asymmetrical in male, right corner longer than left one and bent hookwise downward.
Urosome consisting of 3 somites in female, 5 somites in male, caudal rami short. Genital complex of female often spinose or asymmetrically swollen, Ur2 sometimes asymmetrical. Genical somite of male almost always asymmetrical, right side bearing process sometimes with complex apex. First antenna 23- or 24-segmented, proximal 6 or 7 segments thickened in female, segments 2 and 3 fused or separated, right A1 geniculate in male. Female P5 uniramous, often symmetrical, 3-segmented. Male P5, right Rel produced into grasping organ or feather-like process.

List of species of the family Candaciidae and their synonyms
(after Grice, 1963 with additional data)

Genus *Candacia* Dana, 1894
Candacia armata (Boeck, 1873)
  [Syn: *Candace pectinata* Brady, 1878]
C. bipinnata (Giesbrecht, 1889)
C. bradyi A. Scott, 1902
  [Syn: *Candace tuberculata* Wolfenden, 1905; *Candacia curva* Mori, 1932]
C. catula (Giesbrecht, 1889)
  [Syn: *Candacia* catula var. *similis* Wolfenden, 1905]
C. cheirura Cleve, 1904
C. columbiae Campbell, 1929
  [Syn: *Candacia pacifica* Mori, 1937]
C. curta (Dana, 1894)
  [Syn: *Candace intermedia* T. Scott, 1894; *Candacia bicornuta* Mori, 1932]
C. discaudata A. Scott, 1909
  [Syn: as female *Candacia bradyi*, Carl, 1907]
C. elongata (Boeck, 1873)
  [Syn: *Candacia inermis* Cleve, 1904; *Candace rotunda* Wolfenden, 1904; *Candacia obtusa* Sars, 1905]

C. ethiopica (Dana, 1849)
[Syn: *Ifionyx orientalis* Kroyer, 1849; *Candace melanopus* Claus, 1863]
C. falcifera Farran, 1929
C. guggenheimi Grice & Jones, 1960
C. ketchumi Grice, 1961
C. longimana (Claus, 1863)
C. magna Sewell, 1932
C. maxima Vervoort, 1957
C. norvegica (Boeck, 1865)
[Syn: *Candacia norvegica* var. *tropica* Sewell, 1932]
C. pachydactyla (Dana, 1849)
[Syn: *Ifionyx typicus* Kroyer, 1849]
C. paenelongimana Fleminger & Bowman, 1956
C. parafalcifera Brodsky, 1950
C. pofi Grice & Jones, 1960
C. samassae Pesta, 1941
C. tenuimana (Giesbrecht, 1889)
[Syn: *Candacia gracilimana* Farran, 1908]
C. varicans (Giesbrecht, 1892)

Genus *Paracandacia* Grice, 1963
Paracandacia bispinosa (Claus, 1863)
[Syn: *Candace bispinosa* Claus, 1863]
P. simplex (Giesbrecht, 1889)
[Syn: *Candace simplex* Giesbrecht, 1889; *Candacia parasimplex* Brodsky, 1962]
P. truncata (Dana, 1849)
[Syn: *Candace truncata* Dana, 1849; *Candacia turgida* Wilson, 1950]
P. worthingtoni Grice, 1981.

Genus **Candacia** Dana, 1849

Diagnosis.- In both sexes basal tooth of mandible usually divided into one or more pointed cusps. Two spines on B2 of maxilla are variable in length and in thickness. Female P5, terminal segments ending in one or more spine-like processes, a finger-like process, or single long seta, inner margins with or without setae. Male first antenna, geniculate region of right A1 with teeth on one or more segments, right P5 chelate.

Key to the species of the genera *Candacia* and *Paracandacia* in Indonesian waters

Sex

1. A1 symmetrical, urosome composed of 3 somites, P5 symmetrical .... female
   A1 asymmetrical, urosome composed of 5 somites, P5 asymmetrical .... male

Female

1. Re of P5 ending in points or finger-like processes, inner margin without or with 2 or 3 setae; proximal spine on B2 of maxilla variable in thickness and length (*Candacia*) 2
   Re of P5 ending in long finger-like process, inner margin with 2 setae, proximal spine on B2 of maxilla slender and considerably shorter than distal spine (*Paracandacia*) 12

2. Ur2 with spine-like process arising from ventral surface .... *C. bradyi* A. Scott
   Ur2 without spine-like process arising from ventral surface 3

3. In dorsal view lateral margin of Url somewhat triangular and pointed, ventral surface of Ur2 with lamella .... *C. bipinnata* (Giesbrecht)
   In dorsal view lateral margin of Url not pointed 4

4. Proximal spine on B2 of maxilla considerably thicker than distal one .... *C. discaudata* A. Scott
   Proximal spine on B2 of maxilla not notably thicker than distal one 5

5. Inner margin of Re of P5 without setae 6
   Inner margin of Re of P5 with 2-3 setae 9

6. Url with ventral spine-like process .... *C. curta* (Dana)
   Url without ventral spine-like process 7

7. Url armed on each lateral margin with small protuberance, Re of P5 with 2 unequal coarse setae on inner margin, Ur2 with ventral protrusion .... *C. ethiopica* (Dana)
   Url and Ur2 without any processes, Re of P5 with 3 spines or teeth 8

8. Re of P5 terminating in 3 unequal large spine-like points, dorsal surface of Url not swollen .... *C. tenuimana* (Giesbrecht)
Re of P5 terminating in 3 small unequal teeth, dorsal surface of Url distinctly swollen medially .... *C. longimana* (Claus)

9. One small spine present on dorsal surface of each lateral swelling of Url .... *C. guggenheimi* Grice & Jones
No spines present on dorsal surface of Url 10

10. Url armed on each lateral margin with robust spine-like process .... *C. pachydactyla* (Dana)
Url without any processes on each lateral margin 11

11. In dorsal view Url with distinct protrusion, in lateral view Url with ventral knob-like protrusion directed posteriorly .... *C. catula* (Giesbrecht)
In dorsal view Url slightly asymmetrical, broader distally, in lateral view with 1 small ventral knob-like protrusion .... *C. ishimarui* n. sp

12. Url with spine-like protrusion on each side .... *P. bispinosa* (Claus)
Url without spine-like protrusion 13

13. Terminal finger-like process of P5 finely serrated in proximal 2/3 of outer margin and with distal seta on inner margin approximatelly twice as long as proximal one, points at posterior corners of Ms5 directed backwards .... *P. simplex* (Giesbrecht)
Terminal finger-like process of P5 finely serrated distally, setae on inner margin of P5 nearly equal in length, points at posterior corners of Ms5 directed ventrally, scarcely visible from above .... *P. truncata* (Dana)

Male

1. Right P5 ending in chela (*Candacia*) 2
Right P5 ending in long seta (*Paracandacia*)... 12

2. Url without a process or protrusion on dorsal surface .... *C. catula* (Giesbrecht)
Url with a process or protrusion on dorsal surface 3

3. Right A1 with segments 2 and 3 fused 4
Right A1 with segments 2 and 3 separated 8

4. Right A1 with segments 17 and 18 fused 5
Right A1 with segments 17 and 18 separated 6

5. In dorsal view process on right margin of Url is small, consisting of rounded knob in front of which is a pointed projection .... *C. ethiopica* (Dana)
In dorsal view process on right margin of Url is large, consisting of single broad and rounded projection .... *C. pachydactyla* (Dana)

6. Right A1 with segments 19 and 20 fused or partially fused 7
Right A1 with segments 19 and 20 separated, proximal spine on B2 of maxilla considerably thicker than distal one .... *C. discaudata* A. Scott

7. In lateral view apex of process on right corner of Ms5 truncate, tip of process reaching distal end of Url .... *C. bipinnata* (Giesbrecht)
In lateral view apex of process on right corner of Ms5 not truncate, tip of process turned upwards, not reaching distal end of Url .... *C. curta* (Dana)

8. In dorsal view genital process on right margin with 2 lobes .... *C. guggenheimi* Grice & Jones
In dorsal view genital process on right margin without lobes 9

9. Distal end of right Ms5 corner not reaching beyond mid-length of Url, genital process visible in dorsal view 10
Distal end of right Ms5 corner reaches to about mid-length of Url, genital process on right margin is scarcely visible in dorsal view .... *C. ishimarui* n. sp.

10. Edge of genital process with spines and Ur2 with patch of small spines near distal end .... *C. bradyi* A. Scott
Edge of genital process and Ur2 without spines 11

11. Genital process on right margin straight and narrow distally, process on right Ms5 corner notched in distal part .... *C. tenuimana* (Giesbrecht)
In dorsal view distal end of process on right margin of Ur1 knob-like shape .... *C. longimana* (Claus)

12. Segments 16 and 19-20 (fused) of right A1 without knob-like or elongate protrusions .... *P. simplex* (Giesbrecht)
One or both of these segments with rounded or elongate protrusion 13

13. Segment 16 with knob-like protrusion distally, segment 19-20 (fused) produced distally .... *P. bispinosa* (Claus)
Segment 16 with elongate protrusion distally, segment 19-20 not produced .... *P. truncata* (Dana)

DESCRIPTIONS

Candacia ishimarui n. sp

(figs. 1-2)

Holotype (MZB-Cr 00100), female (2.00 mm); paratypes (MZB-Cr 00101), 5 females (1.95-2.2 mm) and 2 males (1.85-1.90 mm); Flores Sea, plankton nets (0.45 m diameter; 0.33 mm mesh aperture); vertical tows (from 200 m deep to surface) in night time, 15 February 1985.

Female.- Cephalon truncate anteriorly, with antero-ventral extensions (fig. 1A). Ms5 fused with Ms4 and produced posteriorly into symmetrical short acuminate lobes.

Genital complex almost symmetrical, longer than wide broader distally, with 1 distoventral rounded protuberance, as long as Ur2, Ur3, and CR combined. Ur2 larger than Ur3, without any processes. Anal somite shorter and narrower than Ur2. Caudal rami with 5 plumose, 1 small naked setae and small tooth distally.

First antenna 24-segmented, reaching middle of Ur2, proximal 7 segments thickened, posterior margin of 1st segment with 1 small process; segments 2 to 11 provided with 1 short anterior marginal spine; segments 18, 19 and 24 about same in length; segment 23 with 1 very long seta. Other armature of A1 as shown in fig. 1F.

Second antenna with 2-segmented Re and 2-segmented Ri; Re2 divided into 6 segments with 6 long and 1 short setae; Ri2 bilobes, outer lobe with 6 large and 1 small terminal setae, inner lobe with 5 large, 1 small and 2 minute setae (fig. 1G).

Mandible well developed with large basal segment, Re with 5 setae; Ri with 6 setae; mandibular blade with 1 sharp tooth and 1 basal process tricuspidate apically, middle cusp being largest (fig. 1H, I).

Maxillule, gnathobase of probocis with 9 setae and 1 curved thick spine (fig. 1J).

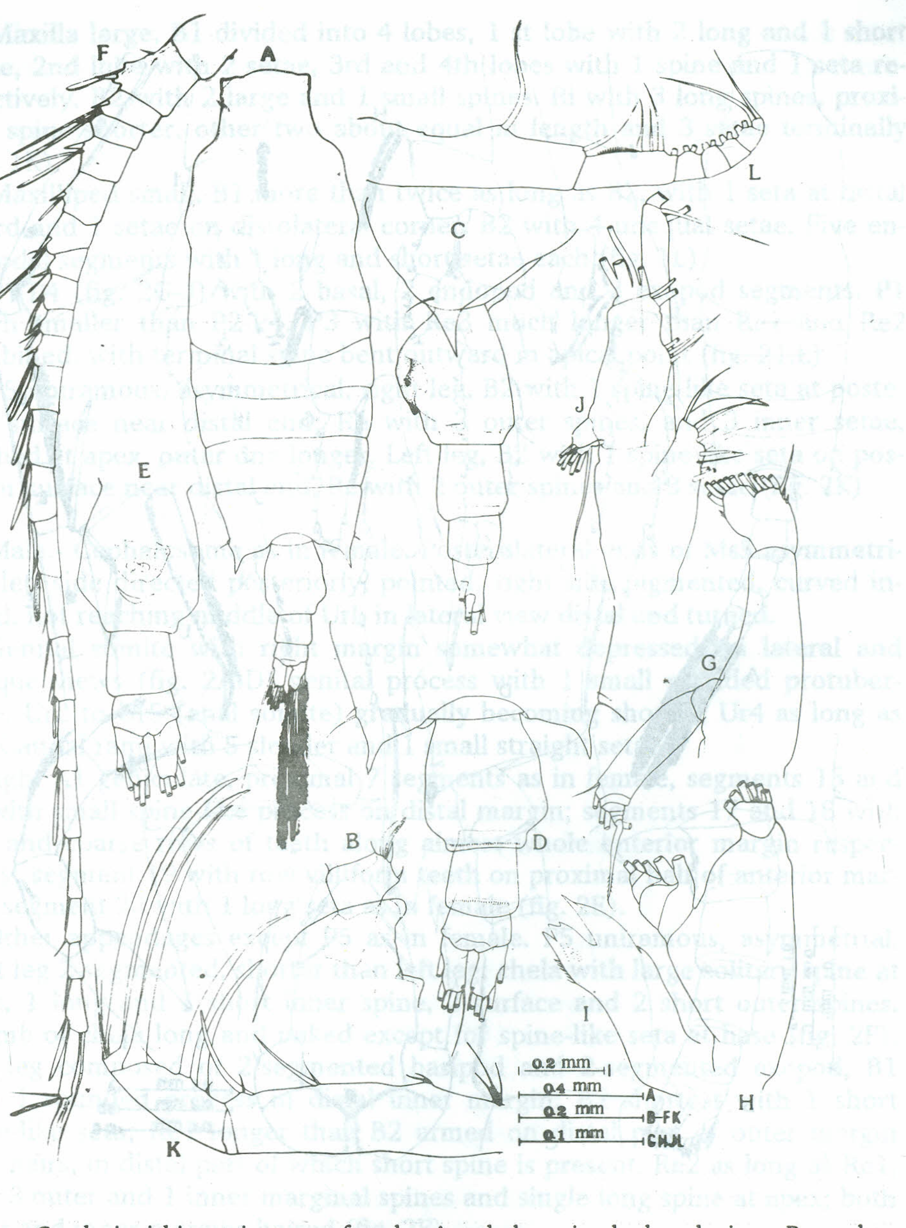


Fig. 1. *Candacia ishimarui* n. sp., female. A, whole animal, dorsal view; B, cephalosome, lateral view; C, 5th metasomal somite and urosome, lateral view; D, 5th metasomal somite and urosome, dorsal view; E. genital somite, ventral view; F, antennule; G, antenna; H, mandible; I, mandibular blade, J, maxillule; K, maxilla; L, maxilliped.

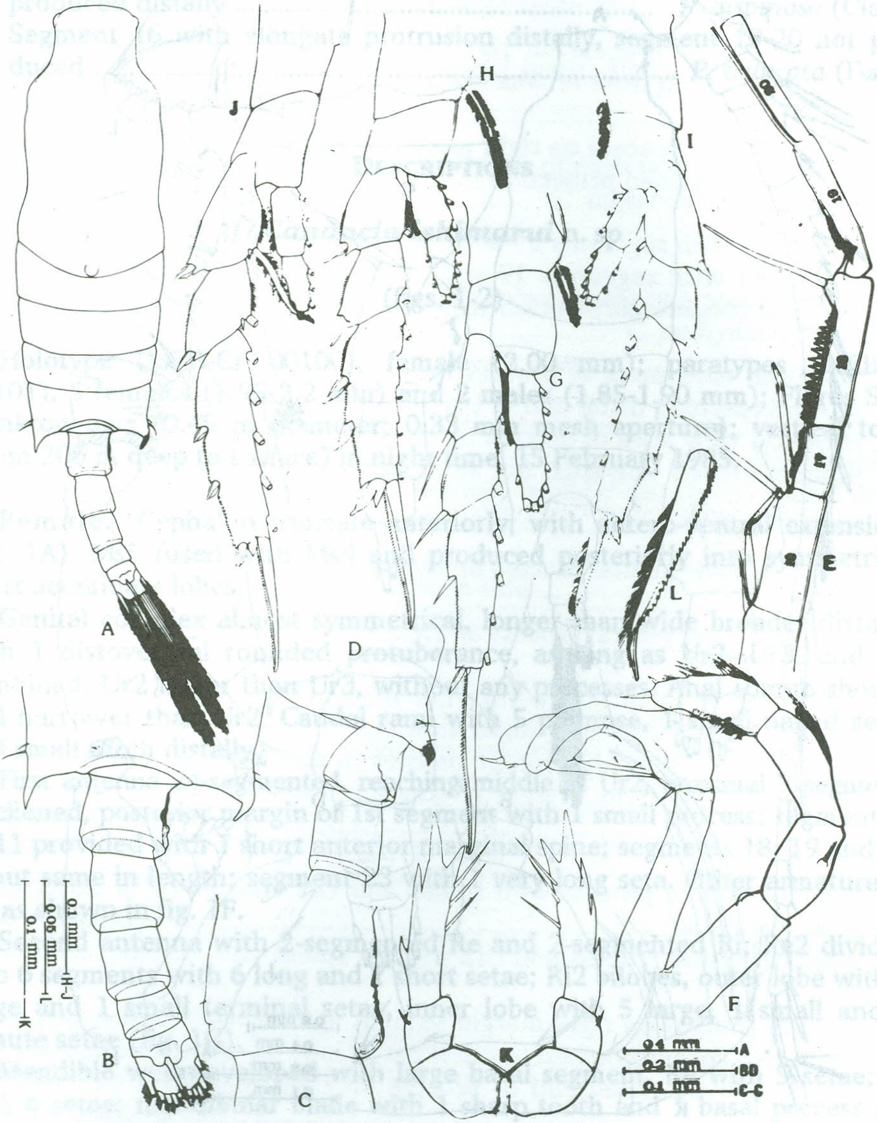


Fig. 2. *Candacia ishimarui* n. sp., male. A, whole animal, dorsal view; B, 5th meta-somal somite and urosome, dorsal view; C, genital somite, dorsal view; D, 5th metasomal somite and urosome, lateral view; E, 16th to 20th segments of right antennule; F, 5th legs, posterior view.
female. G-J, 1st to 4th legs; K, 5th legs.

Maxilla large, B1 divided into 4 lobes, 1 st lobe with 2 long and 1 short setae, 2nd lobe with 2 setae, 3rd and 4th lobes with 1 spine and 1 seta respectively. B2 with 2 large and 1 small spines. Ri with 3 long spines, proximal spine shorter, other two about equal in length and 3 setae terminally (fig. 1K).

Maxilliped small, B1 more than twice as long as B2, with 1 seta at distal 2/3rd and 1 setae on distolateral corner. B2 with 4 unequal setae. Five endopodal segments with 1 long and short setae each (fig. 1L)

P1-P4 (fig. 2G-J) with 2 basal, 2 endopod and 3 exopod segments. P1 much smaller than P2-P4. P3 with Re3 much longer than Re1 and Re2 combined, with terminal spine bent outward in apical point (fig. 21,L)

P5 uniramous, asymmetrical, right leg, B2 with 1 spine-like seta at posterior surface near distal end; Re with 3 outer spines, and 3 inner setae, bilobed at apex, outer one longer. Left leg, B2 with 1 spine-like seta on posterior surface near distal end, Re with 2 outer spines and 3 setae (fig. 2K).

Male.- Cephalosome as in female. Posterolateral ends of Ms5 asymmetrical, left side directed posteriorly, pointed; right side pigmented, curved inward, not reaching middle of Url, in lateral view distal end turned.

Genital somite with right margin somewhat depressed. In lateral and oblique views (fig. 2A-D) genital process with 1 small rounded protuberance. Ur2 to Ur5 (anal somite) gradually becoming shorter; Ur4 as long as CR. Caudal rami with 5 slender and 1 small straight setae.

Right A1 geniculate, proximal 7 segments as in female, segments 13 and 14 with small spine-like process on distal margin; segments 17 and 18 with fine and coarse rows of teeth along almost whole enterior margin respectively; segment 19 with row villiform teeth on proximal half of anterior margin; segment 23 with 1 long seta as in female (fig. 2E).

Other appendages except P5 as in female. P5 uniramous, asymmetrial, right leg 2-segmented, shorter than left leg; chela with large solitary spine at apex, 1 long and 1 short inner spine, 2 surface and 2 short outer spines. Thumb of chela long and naked except for spine-like seta at base (fig. 2F). Left leg composed of 2-segmented basipod and 2-segmented exopod, B1 with 1 rounded process in distal inner margin; B2 shortest with 1 short spine-like seta; Re1 longer than B2 armed on distal part of outer margin with hairs, in distal part of which short spine is present. Re2 as long as Re1, with 3 outer and 1 inner marginal spines and single long spine at apex; both outer and inner margins haired (fig. 2F).

Candacia ishimarui n. sp. forms a species-group, *norvegica-group*, together with *C. kechumi* Grice, 1962 and *C. norvegica* (Boeck, 1865) by having common characters such as (1) the shape of maxilla, (2) the basal mandibular tooth with 3 cusps, innermost one is the shortest, (3) Re3 of P3 with the terminal spine curved in distal apart, (4) the segments 13 and 14 of the male right A1 with a small spine-like process on the distal margin and segments 17 to 19 with a row of teeth or villiform teeth on the anterior margin, (5) the right distal process of Ms5 short, not extending posteriorly beyond the middle of Ur1, and (6) the structure of P5 in both sexes.

C. ishimarui is more closely related to *C. kechumi*, collected from the Sargasso Sea, than *C. norvegica* in the world oceans, but the female, it can distinguished from the later by (1) the asymmetrical P5, (2) the almost symmetrical Ur1, (3) the presence a thick distoventral knob-like protruberance on the Ur1, (4) the mandibular basal tooth with the innermost cusp very short and furnished with the surface denticles, and (5) somewhat larger size. In the male new species is distinguishable by (1) the short right distal process of Ms5, (2) the process on the right margin of Ur1, in *C. kechumi* this process is quite large and divided into 2 protrusions, whereas in the present species it is small, depressed and scarcely visible in dorsal view, (3) the shape of rows of segments 17 to 19 of right A1, and (4) the structure of P5.

Etymology.- The species is named in honor of Prof. Takashi Ishimaru of the Tokyo University of Fisheries.

Candacia bipinnata (Giesbrecht, 1889)

(fig. 3)

Candace bipinnata Giesbrecht, 1889: 5; 1892: 424, 439, pls. 20, 39.
Candacia bipinnata, Giesbrecht, 1898: 129; Esterly, 1905: 195, figs. 45a-c; A. Scott, 1909: 151; Sars, 1925: 351; Farran, 1929: 272; Tanaka, 1945 : 272; 1964 : 43; Mori, 1937: 86, p1. 58, figs. 6-12; Sewell, 1947: 246; Brodsky, 1950: 405, text-fig. 28g; Grice, 1963: 174; Decker & Mombeck, 1964: 1; Chen & Zhang, 1965, p1. 37, figs. 4-8; Park, 1968: 566-567, p1. 12, figs. 17-22.
Candacia pectinata, Brady, 1883: 67, p1. 30, figs. 1, 2.
Candacia truncata, Brady, 1883: 69, pl. 29, fig. 13.

Material examined : Two females (2.53 mm), two males (2.20 mm) collected from Kupang Sea (123°00'E 10°20'S) by vertical haul of 0.3 mm mesh plankton net from 100 m to surface at night on 15 December 1995.

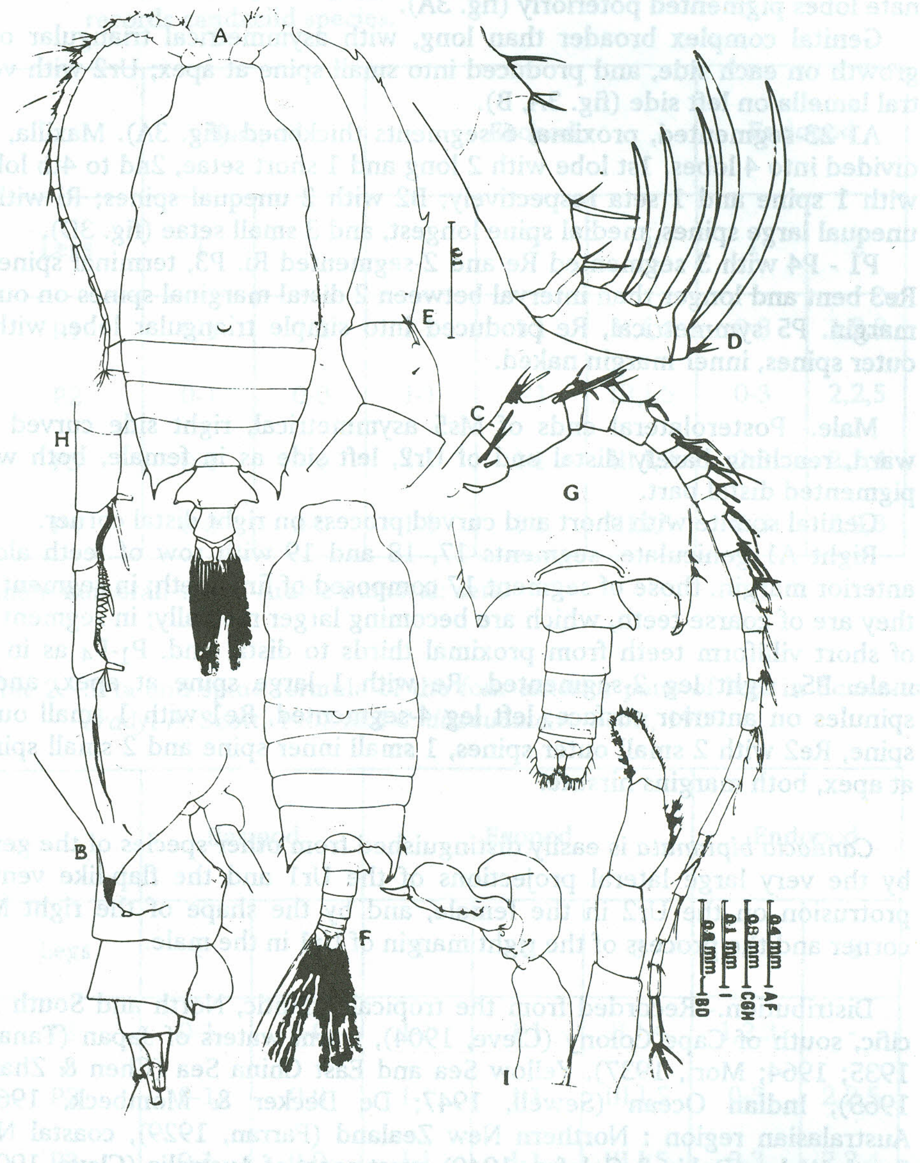


Fig. 3. *Candacia bipinnata* (Giesbrecht), female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, lateral view; C, antennule; D, maxilla; E, 5th leg. Male. F, whole animal, dorsal view; G, 5th metasomal somite and urosome, dorsal view; H, 16th to 19th segments of right antennule; I, 5th legs, posterior view.

Female.- Posterolateral ends of Ms5 produced into symmetrical acuminate lobes pigmented poteriorly (fig. 3A).

Genital complex broader than long, with asymmetrical triangular outgrowth on each side, and produced into small spine at apex; Ur2 with ventral lamella on left side (fig. 3A, B).

A1 23-segmented, proximal 6 segments thickened (fig. 3A). Maxilla, B1 divided into 4 lobes, 1st lobe with 2 long and 1 short setae, 2nd to 4th lobes with 1 spine and 1 seta respectively; B2 with 2 unequal spines; Ri with 3 unequal large spines, medial spine longest, and 3 small setae (fig. 3D).

P1 - P4 with 3 segmented Re and 2-segmented Ri. P3, terminal spine of Re3 bent and longer than interval between 2 distal marginal spines on outer margin. P5 symmetrical, Re produced into simple triangular lobe, with 3 outer spines, inner margin naked.

Male.- Posterolateral ends of Ms5 asymmetrical, right side curved inward, reaching barely distal end of Ur2, left side as in female, both with pigmented distal part.

Genital somite with short and curved process on right distal corner.

Right A1 geniculate, segments 17, 18 and 19 with row of teeth along anterior margin, those of segment 17 composed of fine teeth; in segment 18 they are of coarse teeth, which are becoming larger medially; in segment 19 of short villiform teeth from proximal thirds to distal end. P_1-P_4 as in female. P5, right leg 2-segmented, Re with 1 large spine at apex, and 4 spinules on anterior surface; left leg 4-segmented, Re1 with 1 small outer spine, Re2 with 2 small outer spines, 1 small inner spine and 2 small spines at apex, both margins hirsute.

Candacia bipinnata is easily distinguished from other species of the genus by the very large lateral projections of the Ur1 and the flap-like ventral protrusion on the Ur2 in the female, and by the shape of the right Ms5 corner and the process of the right margin of Ur1 in the male.

Distribution.- Recorded from the tropical Atlantic, North and South Pacific, south of Cape Colony (Cleve, 1904), warm waters of Japan (Tanaka, 1935; 1964; Mori, 1937), Yellow Sea and East China Sea (Chen & Zhang, 1965), Indian Ocean (Sewell, 1947; De Decker & Mombeck, 1964). Australasian region : Northern New Zealand (Farran, 1929), coastal New South Wales (Dakin & Colefax, 1940), west coast of Australia (Cleve, 1904). Eastern Indonesian waters (A. Scott, 1909), Kupang Sea (present records).

Table 1. Seta and spine formula of the four anterior pairs of legs in *Candacia ishimarui* n. sp., *C. guggenheimi* Grice & Jones, 1960 and Indonesian records candaciid species.

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

Roman numeral: spine, Arabic numeral: seta.

Table 2. Seta and spine formula of the four anterior pairs of legs in *Candacia bradyi* A. Scott, 1902 and *C. discaudata* A. Scott, 1909.

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

Roman numeral: spine, Arabic numeral: seta.

Candacia bradyi A. Scott, 1902
(fig. 4)

Candacia bradyi A. Scott, 1902: 406, pl. 4, figs. 5-17; 1909: 156, pl. 47, figs. 1-9; Thompson & Scott, 1903: 250; Pesta, 1912: 49, fig. 9; Sewell, 1912: 366, pl. 23, figs. 6,7; 1914: 229; 1932: 335; Tanaka, 1935: 212, pl. 4, figs 5-7; Mori, 1937: 80, pl. 53, figs. 8-12; Delsman, 1949: 129; Chiba & Tsuruta, 1955: 87; Chiba *et al.* 1955: 192; Yamazi, 1958: 151; Grice, 1963: 174; Fleminger, 1963: table 1; Kasturirangan, 1963: 5, 44, figs. 42a,b, 43a-e; Saraswathy, 1973: 81; Grice, 1963: 174, fig. 9; Greenwood, 1978: 7, fig. 3a-g.
Candacia pectinata Brady, 1883: 67, pl. 30, fig. 9.
Candacia tuberculata Wolfenden, 1905: 1013, pl. 96, figs. 40-44.
Candacia curva Mori, 1932: 171, 175, pl. 3, figs. 8-12 (female).

Material examined : Ten Females (1.85-1.93 mm), 10 males (1.74-1.80 mm), collected from Ambon Bay (128°10'E 03°40'S) by vertical (15 m deep to surface) and surface tows of 0.1 mm and 0.3 mm mesh plankton net at day- and nightime on 13 March 1995.

Female. - Posterolateral ends of Ms5 symmetrical and sharply pointed, reaching anterior third of Ur1. Genital complex asymmetrical, longer than wide, without any processes; Ur2 produced ventrally in the middle line into short spine; CR asymmetrical, right ramus wider than left, about twice as long as wide.

First antenna 23-segmented, proximal 6 segments thickened, extending to distal end of Ms5 when folded backwards. Maxilla, B2 with 2 short spines, proximal spine thicker than distal one; Ri with 3 stout spines, median spine much thicker than others (fig. 4C).

P1, Ri unsegmented, B2 without inner seta. P3, terminal spine of Re3 0.7 length of its own segment. Terminal spines of Re3 of P2-P4 same in shape. P5 almost symmetrical, consisting of 2-segmented basipods and unsegmented exopod; B2 with 1 short spine-like seta on posterior surface; Re slightly curved inwards, terminating in simple and stout spine, with 3 outer denticles and 2 inner setae near distal end.

Male.- Posterolateral ends of Ms5 symmetrical. Genital somite asymmetrical, right margin with toothed tubercle; right margin of Ur2 with patch of spines near distal end (fig.4I)

Right A_1 geniculate, anterior margin of segment 17 with row of teeth, which is becoming shorter distally, segment 18 with row of coarse teeth and segment 19 with row of short villiform teeth proximally (fig. 4J).

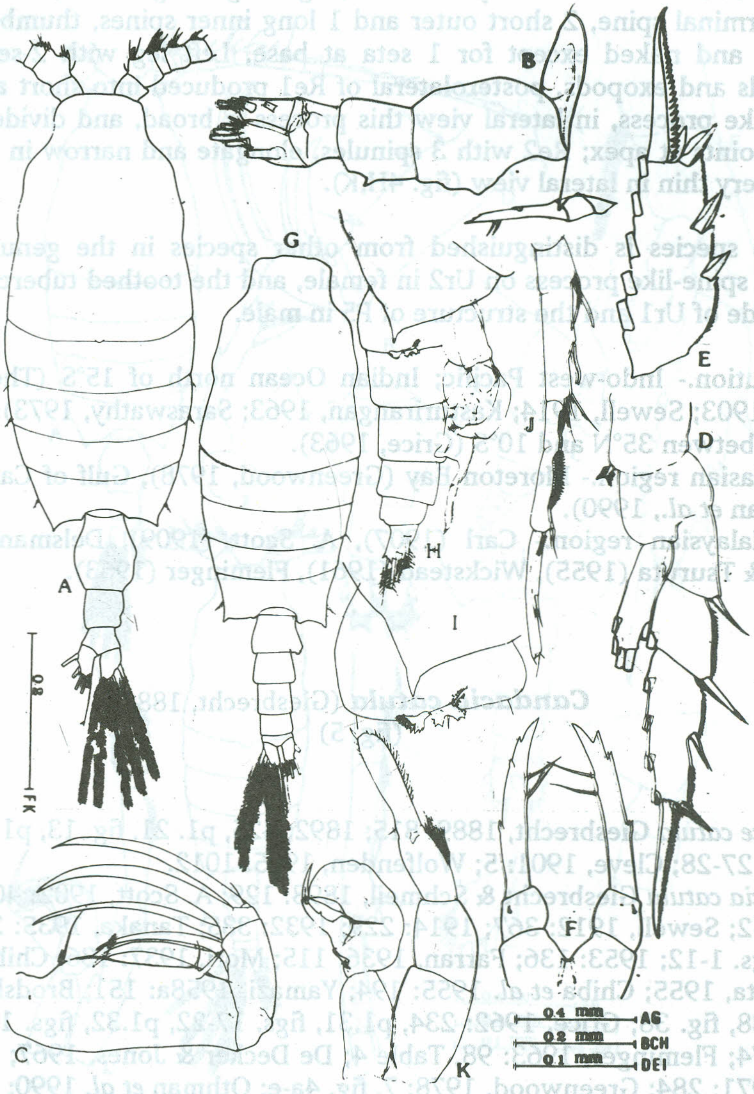


Fig. 4. *Candacia bradyi* A. Scott, female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, lateral view; C, maxilla; D, 1st leg; E, 3rd exopodal segment of 3rd leg; F, 5th legs, anterior view.
Male. G, whole animal, dorsal view; H, 5th metasomal somite and urosome, lateral view; I, 5th metasomal somite and genital somite, lateral view; J, 15th to 19th segments of right antennule; K, 5th legs, posterior view.

P1-P4 as in female. P5 asymmetrical, right leg 2-segmented, chela with 1 long terminal spine, 2 short outer and 1 long inner spines, thumb of chela stouter and naked except for 1 seta at base. Left leg with 2-segmented basipods and exopods, posterolateral of Re1 produced into short and stout tooth-like process, in lateral view this process is broad, and divided into 3 blunt points at apex; Re2 with 3 spinules, elongate and narrow in posterior view, very thin in lateral view (fig. 4H,K).

This species is distinguished from other species in the genus by the ventral spine-like process on Ur2 in female, and the toothed tubercle on the right side of Ur1 and the structure of P5 in male.

Distribution.- Indo-west Pacific; Indian Ocean north of 15°S (Thomson & Scott, 1903; Sewell, 1914; Kasturirangan, 1963; Saraswathy, 1973), western Pacific betwen 35°N and 10°S (Grice, 1963).
Australasian region.- Moreton Bay (Greenwood, 1978), Gulf of Carpentaria (Othman *et al.*, 1990).
Indo-Malaysian region.- Carl (1907), A. Scott (1909), Delsman (1949), Chiba & Tsuruta (1955), Wickstead (1961), Fleminger (1963).

Candacia catula (Giesbrecht, 1889)
(fig. 5)

Candace catula Giesbrecht, 1889: 815; 1892; 425, pl. 21, fig. 13, pl. 22, figs. 3, 27-28; Cleve, 1901: 5; Wolfenden, 1905: 1012.
Candacia catula Giesbrecht & Schmeil, 1898: 129; A. Scott, 1902: 405; 1909: 152; Sewell, 1912: 367; 1914: 229; 1932: 335; Tanaka, 1935: 213, pl.5, figs. 1-12; 1953: 136; Farran, 1936: 115; Mori, 1937: 136; Chiba & Tsuruta, 1955; Chiba *et al.* 1955: 194; Yamazi, 1958a: 151; Brodsky, 1962: 138, fig. 38; Grice, 1962: 234, pl.31, figs. 17-22, pl.32, figs. 1-6, 1963: 174; Fleminger, 1963: 98, Table 4; De Decker & Jones, 1967; Timonin, 1971: 284; Greenwood, 1978: 7, fig. 4a-e; Othman *et al.* 1990: 564.
Candacia truncata, Brady, 1883: 69, pl. 29, fig. 10.
Candacia catula var. similis Wolfenden, 1905.

Material examined: Ten females (1.55-1.60 mm), 10 males (1.32-1.38 mm), collected from Ambon Bay (128°10'E 03°40'S) by vertical (15 m deep to surface) and horizontal tows of 0.1 mm and 0.3 mm mesh plankton net at day-and nighttime on 13 March 1995.

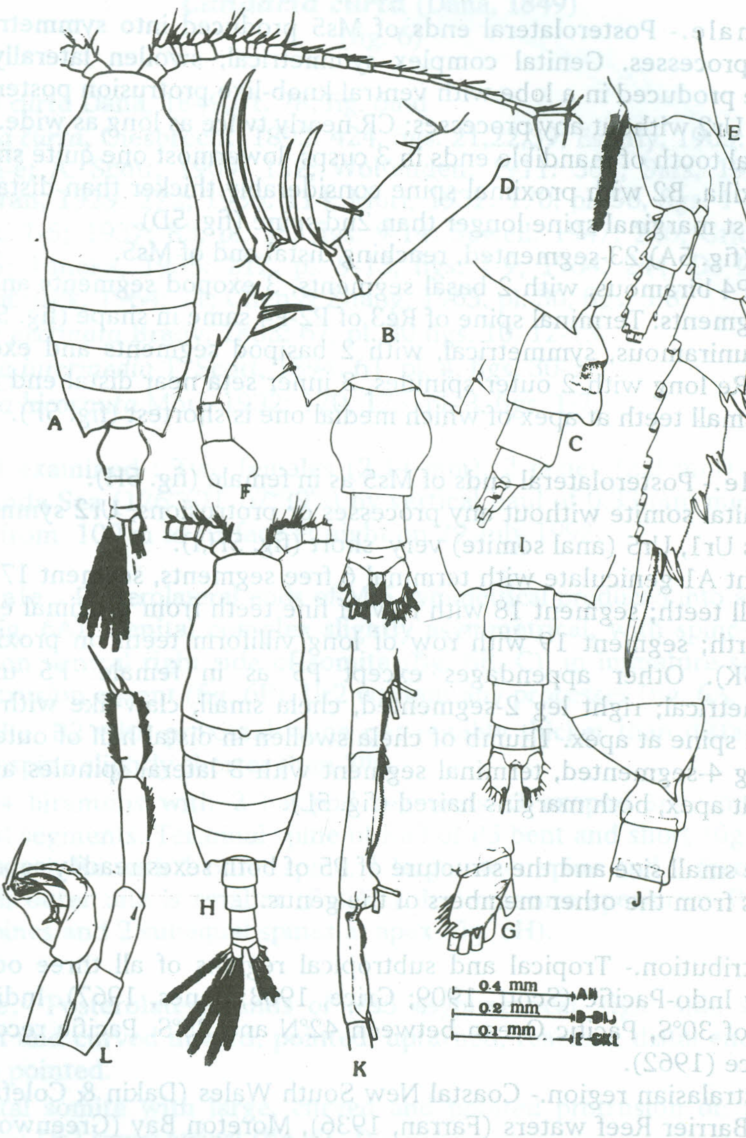


Fig. 5. *Candacia catula* (Giesbrecht), female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, dorsal view; C, 5th metasomal somite and urosome, lateral view; D, maxilla; E, 3rd leg; F, 5th leg; G, right caudal rami, dorsal view.
Male. H, whole animal, dorsal view; I, 5th metasomal somite and urosome, dorsal view; J, 5th metasomal somite and urosome, lateral view; K, 16th to 19th segments of right antennule; L, 5th legs, posterior view.

Female.- Posterolateral ends of Ms5 produced into symmetrical short acute processes. Genital complex symmetrical, swollen laterally, ventral surface produced in a lobe with ventral knob-like protrusion posteriorly (fig. 5A-C). Ur2 without any processes; CR nearly twice as long as wide.

Basal tooth of mandible ends in 3 cusps, lowermost one quite small.

Maxilla, B2 with proximal spine considerably thicker than distal one; R1 with 1 st marginal spine longer than 2nd spine (fig. 5D).

A1 (fig. 5A) 23-segmented, reaching distal end of Ms5.

P1-P4 biramous, with 2 basal segments, 3 exopod segments and 2 endopod segments. Terminal spine of Re3 of P2-P4 same in shape (fig. 5E).

P5 uniramous, symmetrical, with 2 basipod segments and exopod segment; Re long with 2 outer spinules, 3 inner seta near distal end and 3 unequal small teeth at apex of which medial one is shortest (fig. 5F).

Male.- Posterolateral ends of Ms5 as in female (fig. 5H).

Genital somite without any processes or protrusions, Ur2 symmetrical as long as Ur1, Ur5 (anal somite) very short (fig. 5H,I).

Right A1 geniculate with terminal 6 free segments, segment 17 with row of small teeth; segment 18 with row of fine teeth from proximal end to distal fourth; segment 19 with row of long villiform teeth on proximal third (fig. 5K). Other appendages except P5 as in female. P5 uniramous, asymmetrical; right leg 2-segmented, chela small, claw-like with long and curved spine at apex. Thumb of chela swollen in distal half of outer margin. Left leg 4-segmented, terminal segment with 3 lateral spinules and 1 long spine at apex, both margins haired (fig. 5L).

The small size and the structure of P5 of both sexes readily separates this species from the other members of the genus.

Distribution.- Tropical and subtropical regions of all three oceans, but mainly Indo-Pacific (Scott, 1909; Grice, 1963; Jones, 1967). Indian Ocean north of 30°S, Pacific Ocean between 42°N and 35°S. Pacific records given by Grice (1962).

Australasian region.- Coastal New South Wales (Dakin & Colefax, 1940), Great Barrier Reef waters (Farran, 1936), Moreton Bay (Greenwood, 1978) and Gulf of Carpentaria (Othman *et al.*, 1990)

Indo-Malaysian region - Indonesian waters (Cleve, 1901; A. Scott, 1909; Chiba & Tsuruta, 1955), Gulf of Thailand (Fleminger, 1963).

Candacia curta (Dana, 1849)
(fig. 6)

Candace curta Dana, 1849,pl. 78, fig. 6a-d
Candacia curta, Giesbrecht, 1892: 424, figs. 21,22,39; Esterly, 1905: 196, fig. 46a-e; A. Scott, 1909: 152; Wolfenden, 1911: 368; Sars, 1925: 230; Farran, 1929: 272; 1936: 114; Mori, 1932: 170, pl. 56, figs. 1-8, pl. 57, figs. 1-5; 1937: 83, pl. 56, figs. 9-14; Sewell, 1947: 246; Grice, 1963: 175; Tanaka, 1935: 212, pl. 9-13, figs. 1-9; 1964: 244; De Decker & Mombeck, 1964: 11; Chen & Zhang, 1965, pl. 36, figs. 3-8.
Candace pectinata Brady, 1883: 67, pl. 30 figs. 10, 12-13.
Candacia intermedia T. Scott, 1894: 61, pl. 4, figs. 30-37.
Candacia bicornuta Mori, 1932: 170, 175, pl. 3, figs. 1-7.

Material examined : Two females (2.14 mm), 2 males (2.2 mm) collected from Banda Sea (126°50'E 07°39'S) by vertical haul of 0.33 mm mesh plankton net from 100 m to surface at night on 29 July 1992.

Female.- Posterolateral ends of Ms5 symmetrical produced into acuminate lobes (fig. 6A). Genital complex slightly asymmetrical, with spine-like protrusion on ventral right side of somite (fig. 6B, C), in immature specimens this protrusion absent (fig. 6F). Ur2 without any processes (fig. 6A, B).

Maxilla, B2 with proximal spine not notably thicker than distal one; Ri with 1st spine slightly shorter than 2nd.

P1-P4 biramous with 2 basipod segments, 3 exopod segments and 2 endopod segments. Terminal spine of Re3 of P3 bent and short (fig. 6D). P5 symmetrical, Re with 1 outer spine, 1 large inner spine and 2 apical spines of which outer one is smaller (fig. 5E). In immature specimens P5 with 2 outer spines and 2 subequal spines at apex (fig. 6H).

Male.- Posterolateral ends of Ms5 asymmetrical, right side slenderer than left and curved inward, pointed, upturned, reaching distal end of Ur1; left side pointed.

Genital somite with large, curved and pointed protrusion on posterior right side; Ur2 symmetrical (fig. 6I, J).

Right A1 geniculate, segments 2-3 fused, segment 17 with row of teeth, segment 18 with row of coarse teeth, fused segment 19-20 with row of villiform teeth.

Other appendages except P5 as in female. P5 asymmetrical; right leg, chela with 1 long and short spines at apex. Left leg 4-segmented, Re1 with 1 proximal seta and distolateral spine, distal half of outer margin haired. Re2

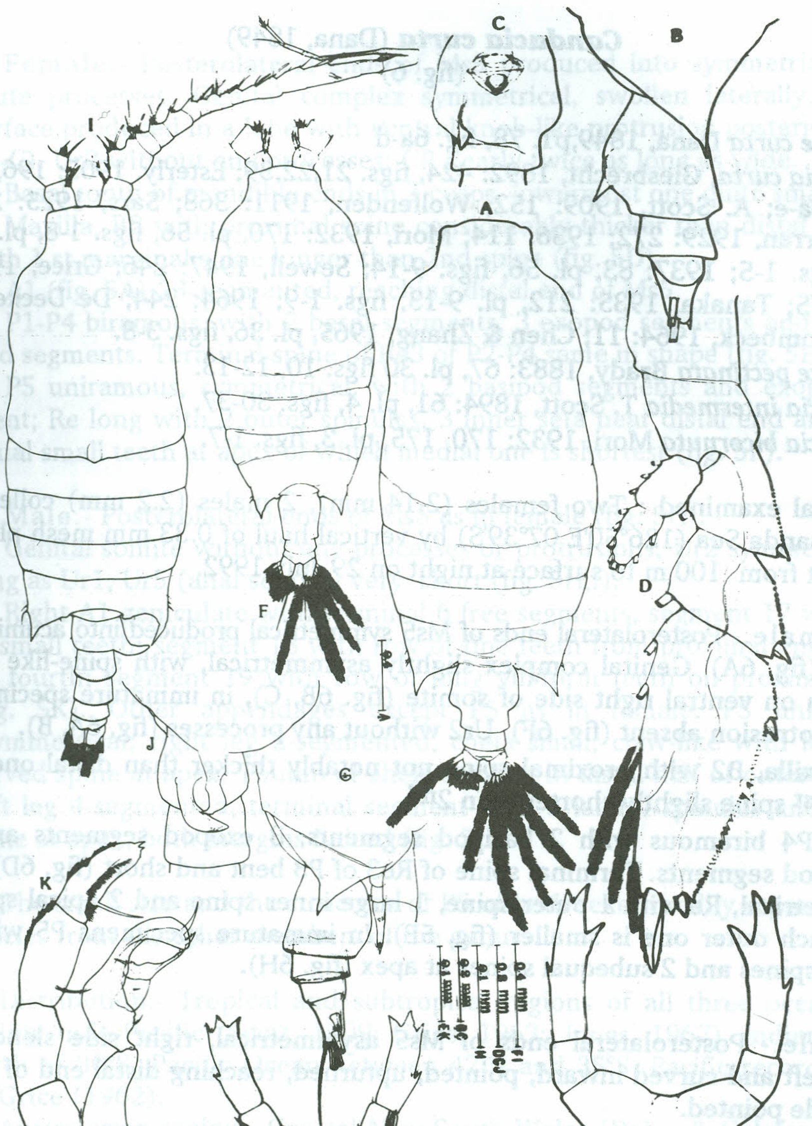


Fig. 6. *Candacia curta* (Dana), female. whole animal, dorsal view; B, 5th metasomal somite and urosome, lateral view; C, genital somite, ventral view; D, 3rd leg; E, 5th legs, anterior view.
Female (immature). F, whole animal, dorsal view; G, 5th metasomal somite and urosome, lateral view; H, 5th legs.
Male. I, whole animal, dorsal view; J, 5th metasomal somite and 1st and 2nd urosomal somite, lateral view; K, 5th legs, posterior view.

with 2 outer spinules, 1 long inner spine-like seta and 2 small apical spines, both margins haired (fig. 6K).

This species resembles *C. armata* (Boeck) but is distinguishable from the latter by the Ur1 with ventral spine and the Re with 3 strong apical teeth in female, and by the posterior process on right Ms5, the process on right margin of Ur1 and the structure of P5 in male.

Distribution.- The tropical and subtropical regions of the world oceans, from Arabian Sea and Red Sea (Scott, 1902), West Pacific (Brady, 1883), Japanese waters (Mori, 1932, Tanaka, 1964).
Australasian region.- Great Barrier Reef (Farran, 1936). No other Australian records.
Indo-Malaysian region.- Eastern Indonesian waters (A. Scott, 1909).

Candacia discaudata A. Scott, 1909
(fig. 7)

Candacia bradyi (female), Carl, 1907: 9, pl. 1, figs. 8-10, 12-13.
Candacia discaudata A. Scott, 1909: 157, pl. 47, figs. 10-12; Sewell, 1912: 367; 1914: 230; 1932: 335; Farran, 1936: 75, 114; Mori, 1937: 81, pl. 54, figs. 1-7; Tanaka, 1953: 136; Chiba & Tsuruta, 1955: 87; Chiba *et al.* 1955: 192; Brodsky, 1962: 140, fig. 41; Fleminger, 1963: table 1; Katurirangan, 1963: 44, fig. 41a-g; Chen & Zhang, 1965, pl. 37 figs. 9-14; Jones, 1967: 403; Grice, 1963: 175; Greenwood, 1978: 9, fig. 4f-k; Othman *et al.* 1990: 564.

Material examined : Ten females (1.60-1.70 mm), 10 males (1.54-1.60 mm) collected from Ambon Bay (128°10'E 03°40'S) by vertical (15 m deep to surface) and surface tows of 0.3 mm mesh plankton net at night on 13 March 1995.

Female.- Ms5 fused with Ms4 produced posteriorly into short spiniform processes (fig. 7A), in lateral view the spiniform process is directed ventrally (fig. 7C). Metasome less than 3 times length of urosome and CR combined. Genital complex slightly asymmetrical, with 1 short seta on each side. Ur2 less than half as long as Ur1, distal end of somite considerably expanded, much wider than proximal end of Ur3 (fig. 7C). Anal somite short and narrow, twice as long as wide; CR twice as long as wide (fig. 7A, C).
A1 23-segmented, reaching middle of Url when folded backwards(fig. 7D).

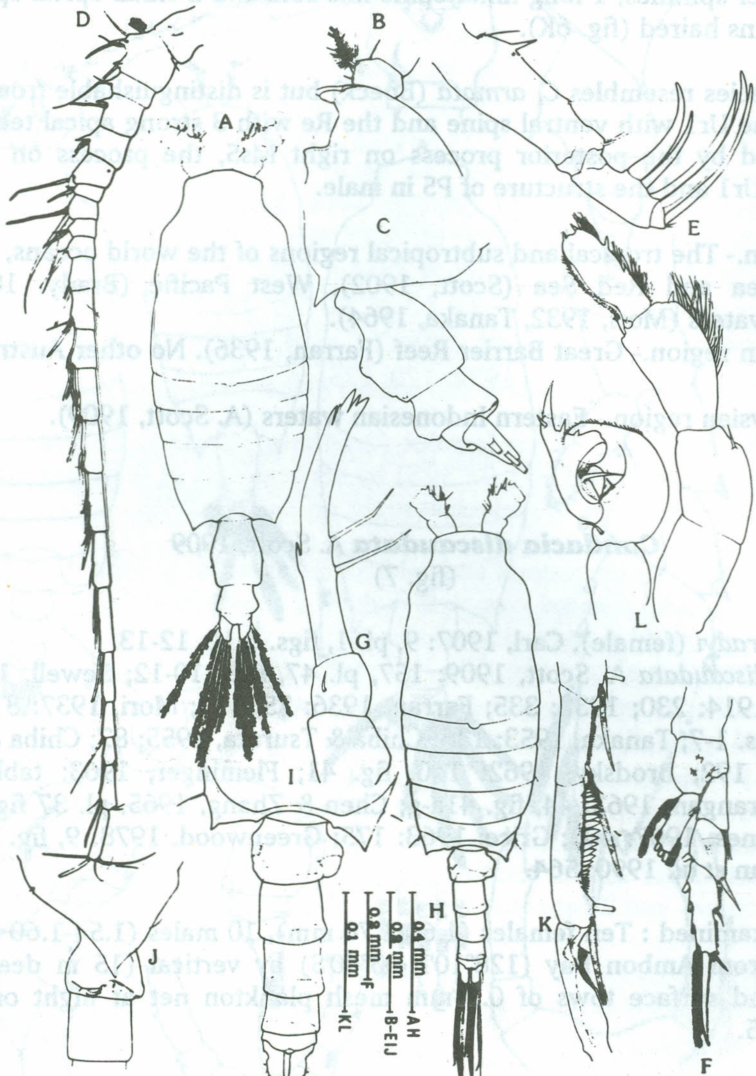


Fig. 7. *Candacia discaudata* A. Scott, female. A, whole animal, dorsal view; B, cephalosome, lateral view; C, 5th metasomal somite and urosome, lateral view; D, antennule; E, maxilla; F, 1st leg; G, 5th leg.
Male. H, whole animal, dorsal view; I, 5th metasomal somite and urosome, dorsal view; J, 5th metasomal somite and genital somite and Ur2, lateral view; K, 16th to 19th segments of right antennule; L, 5th legs, anterior view.

Maxilla, B1 divided into 4 lobes, 1st lobe with 2 slender setae, 2nd with 1 stout spine and 1 seta, 3rd and 4th lobes with 2 setae respectively. B2 with 2 spines, proximal spine much thicker distal ones; Ri with 3 large spines, medial spine is longer and thicker than others (fig 7E).

P1-P4 biramous, basipod 2-segmented, exopod 3-segmented, endopod 1-segmented in P1 and 2-segmented in P2-P4. Terminal spine of Re3 of P3 1.5 times longer than its segment. P5 long and slender, asymmetrical, left leg distinctly longer than right, with 2 basipod segments, and 1 exopod segment; Re long and slender with 2 small outer spines, 2 inner spine-like setae and 4 closely set of teeth at apex of which outermost spine is very small (fig. 7G).

Male.- Genital somite asymmetrical, distal end of right margin much inflated, in lateral view the inflated region bears small tooth; anal somite very short and narrow (fig. 7H, I).

Right A1 geniculate, segment 17 with coarse row of denticles, segment 18 with fine row of denticles, segment 19 with short of villiform teeth (fig. 7K).

Other appendages except P5 as in female. P5 (fig. 7L), left leg 4-segmented, moderately long and broad; Re1 with distolateral spine, outer margin haired; Re2 with 2 outer marginal and 2 apical spines, both margin hirsutes. Right leg short, 2-segmented, chela with inner large projection distally, 2 outer spines, 1 long inner seta and 2 short inner spines and 1 stout apical spine (fig. 7L)

The female of this species is identifiable by ventral protrusion on Ur2 and multiple apical teeth of the P5. The male is easily identifiable by the single lateral swelling on genital somite and the form of the P5.

The female of this species was first decribed by Carl (1907) from Ambon Bay as *C. bradyi* A. Scott, the female of which was at that time still unknown. The female of *C. bradyi* was described by Sewell (1912) based on the specimen from Indian Ocean. A. Scott (1909) redescribed the female and gave the first account of the male, giving the name *C. discaudata* to the species.

Distribution.- Tropical Indo-west Pacific, Indian Ocean north of 15°S, western Pacific between 51°N (Chiba, 1955-immature males).
Australasian region.- Great Barrier Reef (Farran, 1936), Moreton Bay (Greenwood, 1978) and Gulf of Carpentaria (Othman *et al.*, 1990).
Indo-Malaysian region.- Recorded over wide area from Indonesian waters by A. Scott (1909), also Chiba & Tsuruta (1955), Fleminger (1963), Othman *et al.* (1987).

The species is a characteristic inshore species throughout the region from India to Australia. It was commonest in the Malay Penninsula, and Sewell (1912,1914) found it numerous on the Burman coast and the Ceylon Pearl Banks, and also at the Great Barrier Reef (Farran, 1936). In Ambon Bay it was approximatelly co-equal with *C. bradyi*, but both are probaly migrants in this situation, being transported from breeding populations further southwards of offshore.

Candacia ethiopica (Dana, 1849)
(fig. 8)

Candace ethiopica Dana, 1849: 23, fig. 5a-f.
Candace aethiopica, Giesbrecht, 1893: 424, pls. 4, 21, 22, 39.
Candacia aethiopica, Giesbrecht & Schmeil, 1898: 128; Thompson, 1900: 281; A. Scott, 1902: 405; 1909: 150; Thompson & Scott, 1903: 250; Cleve, 1903: 358; Sars, 1905b: 405; 1925: 350; Esterly, 1905: 196, fig. 47; Sewell 1912: 366; 1914: 228; 1936: 334; 1947: 245; Farran, 1929: 537; 1936: 115; Tanaka, 1935: 212, p1.3, figs. 10-14; 1964: 44; Mori, 1937: 85, p1.57, figs. 6-10; De Decker & Mombeck, 1964: 11; Chen & Zhang, 1965, p1.38, figs, 1-6.
Ifionyx orientalis Kroyer, 1849.
Candace melanopus Claus, 1863: 191, p1.33.
Candacia ethiophica, Grice, 1963: 176, fig.32; Dakin & Colefax,1940: 105, fig. 155a-g.

Material examined: Five females (2.27 mm), 1 male (2.21 mm) collected from off North Celebes (124°00'E 01°30'N) by vertical haul of 0,3 mm mesh plankton net at night on 6 October 1994.

Female.- Posterolateral ends of Ms5 symmetrical, produced into acuminate lobes.

Genital complex with pair of spine-like protrusions laterally, right side more produced than left, with 1 distoventral process (fig. 8A-C).

Basal tooth of mandible with 3 cusps, of which middle one is larger (fig. 8D).

Maxilla, B1 divided into 4 lobes, 1st lobe with 1 large and 2 small setae, 2nd lobe with 2 small setae, 3rd and 4th lobes with 1 large spine and seta respectively. B2 with 2 unequal spines; Ri with 3 large spines, distal 2 spines about equal in length (fig. 8E)

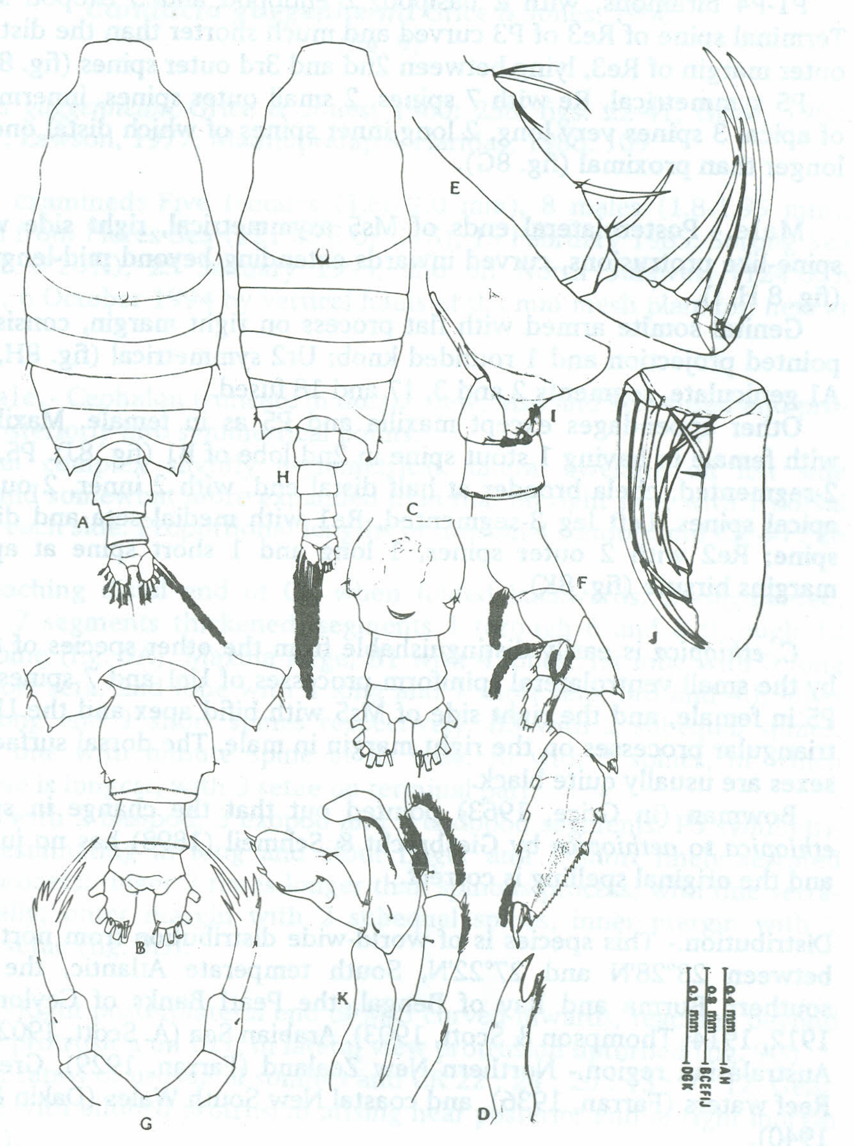


Fig. 8. *Candacia ethiopica* (Dana), female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, dorsal view, C, urosomal somite, ventral view; D, mandible blade; E, maxilla; F, 3rd leg; G, 5th legs, posterior view.
Male. H, whole animal, dorsal view; I, 5th metasomal somite and urosome, lateral view; J, maxilla; K, 5th legs, posterior view.

P1-P4 biramous, with 2 basipod, 2 endopod and 3 exopod segments. Terminal spine of Re3 of P3 curved and much shorter than the distal part of outer margin of Re3, lying between 2nd and 3rd outer spines (fig. 8F).

P5 symmetrical, Re with 7 spines, 2 small outer spines, innermost spine of apical 3 spines very long, 2 long inner spines of which distal one is twice longer than proximal (fig. 8G).

Male.- Posterolateral ends of Ms5 asymmetrical, right side with bifid spine-like protrusions, curved inwards extending beyond mid-length of Ur1 (fig. 8 H, I).

Genital somite armed with flat process on right margin, consisting of 1 pointed projection and 1 rounded knob; Ur2 symmetrical (fig. 8H, I). Right A1 geniculate, segments 2 and 3, 17 and 18 fused.

Other appendages except maxilla and P5 as in female. Maxilla differs with female in having 1 stout spine in 2nd lobe of B1 (fig. 8J). P5, right leg 2-segmented, chela broader at half distal end, with 2 inner, 2 outer and 2 apical spines. Left leg 3-segmented, Re1 with medial seta and distolateral spine; Re2 with 2 outer spines, 1 long and 1 short spine at apex, both margins hirsute (fig. 8K).

C. ethiopica is easily distinguishable from the other species of the genus by the small ventrolateral spiniform processes of Ur1 and 7 spines on Re of P5 in female, and the right side of Ms5 with bifid apex and the Ur1 with 2 triangular processes on the right margin in male. The dorsal surface of both sexes are usually quite black.

Bowman (in Grice, 1963) pointed out that the change in spelling of *ethiopica* to *aethiopica* by Giesbrecht & Schmeil (1898) has no justification and the original spelling is correct.

Distribution.- This species is of world-wide distribution from north Atlantic between 23°28'N and 27°22'N, South temperate Atlantic, the coast of southern Burma and Bay of Bengal, the Pearl Banks of Ceylon (Sewell, 1912, 1914; Thompson & Scott, 1903), Arabian Sea (A. Scott, 1902).
Australasian region.- Northern New Zealand (Farran, 1929), Great Barrier Reef waters (Farran, 1936), and coastal New South Wales (Dakin & Colefax, 1940).
Indo-Malaysian region. -Eastern Indonesian waters (A. Scott, 1909).

Candacia guggenheimi Grice & Jones, 1960
(fig. 9)

Candacia guggenheimi Grice & Jones, 1960: 258, figs. 22-41; Grice, 1963: 177; Lawson, 1977; Madhupratap & Haridas; 1986: 109.

Material examined: Five females (1.86-2.0 mm), 8 males (1.8-1.95 mm), collected from Flores Sea (121°05'E 07°29'S), 15 February 1985, Sorong Sea (132°10'E 0°20'N), 25 January 1995, and off North Sulawesi (124°00'E 01°30'N), 6 October 1994 by vertical hauls of 0.3 mm mesh plankton nets at night.

Female.- Cephalon truncate in dorsal view; Ms4 and Ms5 fused and produced posteriorly into symmetrical points.

Genital complex slightly asymmetrical, lateral swelling on left side smaller and somewhat more expanded than that on right side, with 1 dorsal spine on each side. Proportional lengths of urosomal somites and CR 40 : 26 : 19 : 15.

A1 reaching distal end of CR when folded backwards, 24-segmented, proximal 7 segments thickened, segments 1 through 6 and 8 through 12 with 1 spine (fig. 9A). Maxilla large, B1 with 4 lobes, 1st lobe with 3 long and 1 short seta, 2nd lobe with 1 long and 1 short seta, 3rd and 4th lobes with 1 long and 1 short spines respectively. B2 with 2 subequal spines, proximal one with minute spine at its base. Ri with 3 spines, of which middle one is longest, with 3 setae on terminal part.

P1-P4 with 2 basipod, 3 exopod and 2 endopod segments. P5 symmetrical, Re terminating in long and stout finger and 1 short finely serrated spinous process; finger 3 times longer than spinous process, with fine serration distally; outer margin with 2 subequal spines, inner margin with 2 subequal setae (fig. 9D).

Male.-Right posterolateral end of Ms5 curved inwards, reaching beyond middle of protrusion on Ur1, in lateral view protrusion upturned (fig. 9G).

Length ratios of urosomal somites and CR 22 : 24 : 20 : 13 : 9 : 12. Genital somite with bilobed protrusion arising near posterior end of right margin (fig. 9E-G).

Right A1 geniculate, segments 17 to 20 separated; segment 17 with row of uniform teeth, segment 18 with coarser teeth and segment 19 with row of short villiform teeth proximally. Left A1 as in female.

P1-P4 as in female. P5 (fig. 9H) asymmetrical, right leg 2-segmented, chelate and shorter than left leg, Re (finger) with 1 long and 1 short spines on inner margin, 2 surface spines, 1 short outer spine at base and 2 unequal

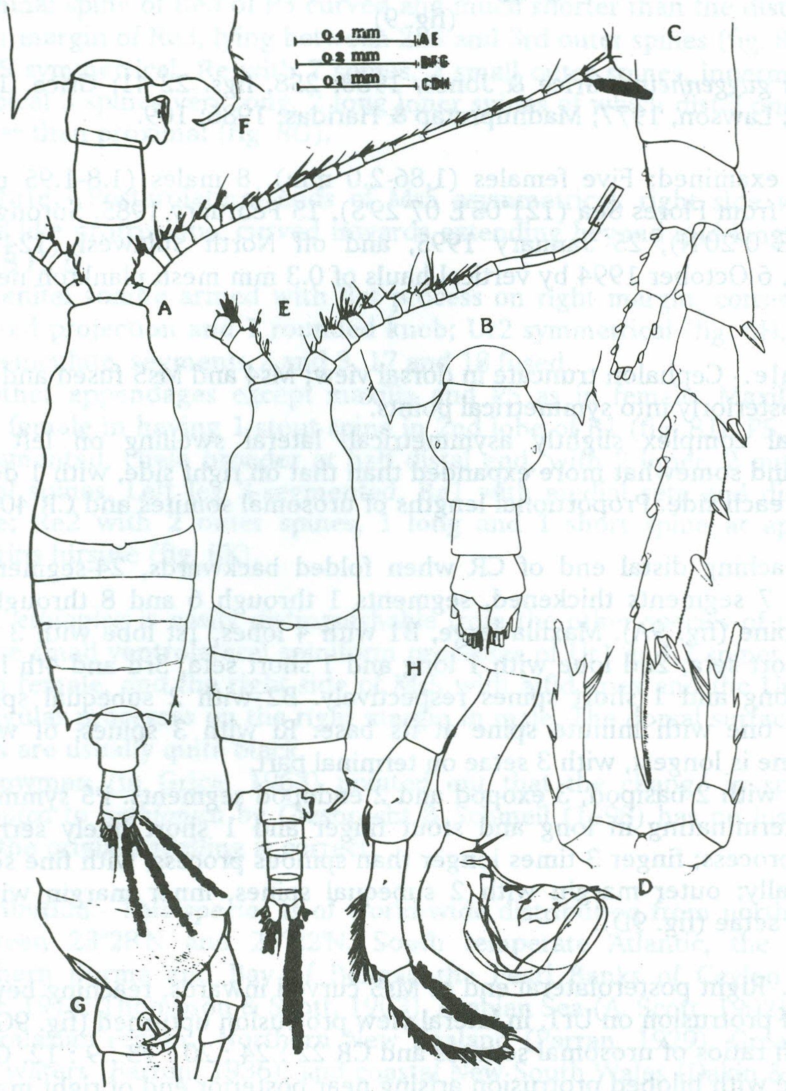


Fig. 9. *Candacia guggenheimi* Grice & Jones, female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, dorsal view; C, 3rd leg; D, 5th legs, anterior view.
Male. E, whole animal, dorsal view; F, 5th metasomal somite and genital somite, dorsal view; G, 5th metasomal somite and genital somite, lateral view; H, 5th legs, posterior view.

spines at apex. Thumb of chela long and naked except for 1 spine at base. Left leg, 4-segmented, B2 with 1 long outer and 1 short setae on posterior surface; Re with 1 distolateral spine and 1 seta on posterior surface, Re2 with 3 outer spinules, 1 surface spine and 2 unequal apical spines, both margins haired.

The female most resembles *C. longimana* Claus, but is distinguishable from the latter by the presence a pair of small spines on dorsal surface of Ur1, the form of P5 and the somewhat smaller size. In the male by the bilobed protrusion on the right side of Ur1 and the form of P5.

Distribution.- The first record of this species from the Central Pacific was by Grice and Jones (1960). Subsequently this species was listed from Indian Ocean (Lawson, 1977; Madhupratap & Haridas, 1986). *C. guggenheimi* appears to be Indo-Pacific form together with *C. catula, C. bradyi, C. discaudata*, and *P. truncata*.
Australasian region. - No records.

Candacia longimana (Claus, 1863)
(fig. 10)

Candacia longimana, Giesbrecht, 1892: 423, p1. 21, figs. 5, 18, p1. 22, figs. 5, 7, 15, 26, 34, 36, p1.39, figs. 4-6,18-19; A. Scott, 1909: 153; Sars, 1925: 349; Farran 1929: 280; 1936: 115; Mori, 1937: 79, p1.53, figs. 1-7; Sewell, 1947: 247; Grice, 1963: 177; Tanaka, 1964: 245, fig. 227a-e; De Decker & Mombeck, 1964: 11; Park, 1968: 567.

Material examined: Three females (2.7 mm) collected from Flores Sea (121°05'E 07°29'S), 15 February 1985, Sorong Sea (132°10'E 0°20'S), 25 January 1995 by vertical tows of 0.33 mm mesh plankton nets from 100 m and 200 m to surface at night.

Female.- Cephalosome 3.8 times longer than urosome (measured including CR). Proportional lengths of urosomal somites and CR 48 : 26 : 6 : 20. Genital complex symmetrical, onion-shaped; Ur2 without any processes.

A1 reaching distal end of Ms5 when folded backwards, 24-segmented, segments 2 and 3 separated.

Maxilla, B1 divided into 4 lobes, 1st lobe with 3 setae, 2nd lobe with 1 spine and 1 seta, 3rd and 4th lobes with 1 large spine and 1 short seta

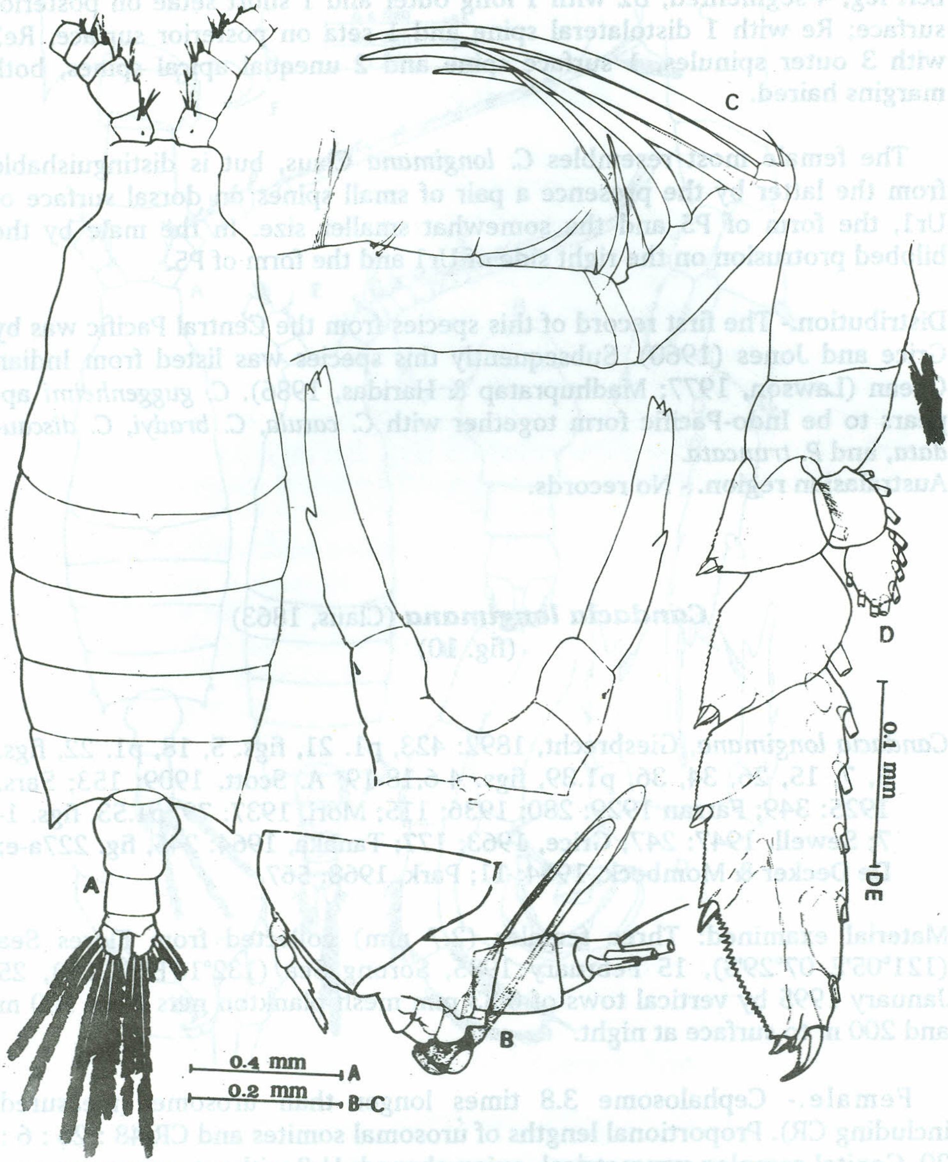


Fig. 10. *Candacia longimana* (Claus), female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, lateral view; C, maxilla; D, 3rd leg; E, 5th legs, anterior view.

respectively. B2 with 2 unequal spines, distal one longest; Ri with 3 large spines of which middle and distal spines about equal in length (fig. 10C). Basal tooth of mandible tricuspidate.

P1-P4 biramous, with 2 basal, 2 endopodal and 3 exopodal segments. P3, with small Ri, terminal spine of Re3 very short and curved (fig. 10D). P5 uniramous, symmetrical, with 2-segmented basipod, 1-segmented exopod, Re with single outer spine medially and 3 subequal very short teeth at apex.

Male.-Not found in the present collections.

C. longimana is identifiable in having 3 very short teeth at the apex of Re of P5 in female. An oceanic cognate of *C. longimana* has been recently described as *C. paenelongimana* by Fleminger & Bowman (1956).

Distribution.- This species previously been known from the Pacific Ocean and from the Mediterranean (Grice, 1963; Park, 1968).
Australasian region.- Northern New Zealand (Farran, 1929), Great Barrier Reef waters (Farran, 1936). No other Australian records.
Indo-Malaysian region.- Celebes Sea, Indonesia (A. Scott, 1909).

Candacia pachydactyla (Dana, 1849)
(fig. 11)

Candace pachydactyla Dana, 1849: 23.
Ifionyx typicus Kroyer, 1846?
Candacia pachydactyla, Brady, 1883: 68, p1. 31, figs. 2-9; Giesbrecht, 1892: 424, p1s. 21, 22, 39; T. Scott, 1893: 60; Giesbrecht & Schmeil, 1898: 128; Cleve, 1901: 5; 1903: 358; Thompson & Scott, 1903: 251; A. Scott, 1909: 153; Wolfenden, 1911: 368; Sars, 1925: 230; Farran, 1929:272; Wilson, 1932: 141, fig. 96; Tanaka, 1935: 211; 1964: 244; Mori, 1937: 85, p1. 58, figs. 1-5; Sewell, 1947: 247; Grice, 1963: 178; De Decker & Mombeck, 1965: 11; Chen & Zhang, 1965, p1. 36, figs. 11-13.

Material examined: Five females (2.38 mm), 5 males (2.52 mm) collected from Flores Sea (121°05'E 07°29'S) by vertical haul of 0.33 mm mesh plankton net from 200 m to surface at night on 15 February 1985.

Female.- Body robust, 4th and 5th metasomal somites separated; posterolateral ends of Ms5 almost symmetrical and not reaching middle of genital complex.

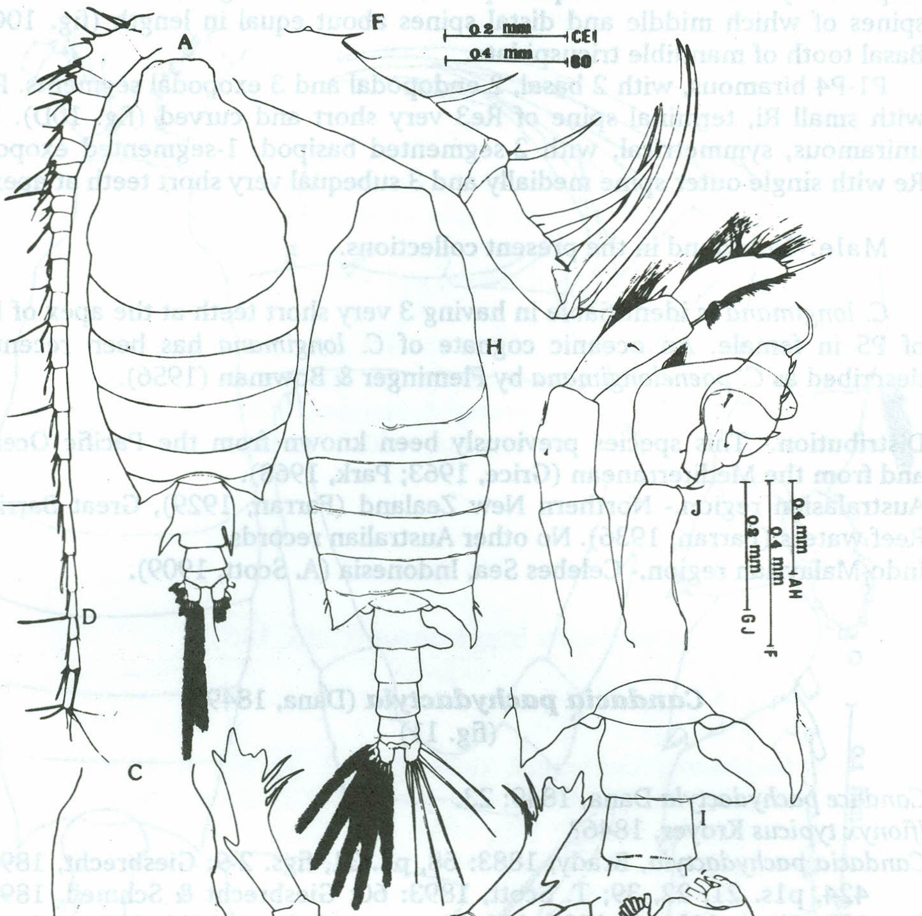


Fig. 11. *Candacia pachydactyla* (Dana), female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, lateral view; C, urosome, ventral view; D, antennule; E, mandible; F, maxilla; G, 5th legs, anterior view.
Male. H, whole animal, dorsal view; I, 5th metasomal somite, genital somite and Ur2, dorsal view; J, 5th legs, posterior view.

Genital complex (fig. 11A-C) with 1 robust spine-like process extending obliquete posteriorly from left side, and 1 robust spine extending posteriorly from right side, both surpass distal end of its somite,and 1 triangular ventral protrusion on posterior margin. Posterior margins of Ur1 and Ur2 with row of denticles (fig. 11A-C). Ur2 narrower proximally; anal somite short; CR almost symmetrical, with 5 large plumose and 1 small setae.

First antenna 23-segmented, segment 2 and 3 fused, reaching posteriorly about distal end of Ms5 when folded backwards (fig. 11D). Basal tooth of mandible ending in 3 very unequal cusps (fig. 11E).

P1-P4 with 2 basal, 2 endopodal and 3 exopodal segments. P5 symmetrical, with 2 basal and 1-exopodal segments; B2 with seta on posterior margin; Re much longer than B1 and B2 combined, with outer spine medially, 3 inner seta-like spines close together near distal end, and 3 thick and 1 short spines at apex (fig. 11G).

Male.- Body robust, Ms4 and Ms5 separated; posterolateral ends of Ms5 asymmetrical, left side pointed, right side elongated, curved inward and reaching about distal end of Ur1. (fig. 11H, I).

Genital somite with 1 very large process on right side, consisting of single broad and rounded projection (fig. 11H, I).

Right A1 geniculate, segments 2 and 3, 17 and 18, 19 and 20 fused, segment 5 with spine; anterior margin of fused segment 17-18 with row of denticles almost along of its segment, fused segment 19-20 with short row of denticles proximally.

Other appendages except P5 as in female. P5 uniramous, right leg 2-segmented, Re with 3 outer spines and 1 long and curved apical spine; thumb of chela claw-like with outer hairs, 1 small spine on posterior surface distally, and 1 seta at base (fig. 11J). Left leg 4-segmented, B2 with 1 seta and 1 small spine on posterior surface; Re1 with distolateral spine, 1 seta on posterior margin medially, distal half of outer margin haired; Re2 with 3 outer spines, 1 inner spine and 1 long spine apical spine, both margins haired (fig. 11J).

This species is identifiable by the 2 large spinous processes of Ur1 in the female, and by the bifurcate prolongation of right posterolateral end of Ms5 and the great process of the right side of Ur1 in the male.

Distribution.- This is of world wide distributed species, from tropical Atlantic 6°N southwards (Farran, 1929), widely distributed in Indian Ocean 15°S (Sewell, 1912; 1924; Thompson & Scott, 1903; Wolfenden, 1905), the Arabian Sea (Scott, 1902), Pacific Ocean, Fiji and Philippines (Wilson, 1950), the east of Cape Colony (Cleve, 1904), and adjacent Seas of Japan (Tanaka, 1935; Mori, 1937).

Australasian region.- Coast New South Wales (Dakin & Colefax, 1940). No other Australian records.
Indo-Malaysian region.- East Indonesian waters (A. Scott, 1909).

Candacia tenuimana (Giesbrecht, 1889)
(fig. 12)

Candace tenuimana Giesbrecht, 1889: 814; 1893: 424, pls. 21, 22; Giesbrecht & Schmeil, 1898: 128; Cleve, 1904: 187.
Candacia tenuimana, A. Scott, 1909: 155; Bradford, 1970: 362, figs. 75-77.
Candacia gracilimana Farran, 1908.

Material examined: Two males (2.07 mm) collected from Flores Sea (121°05'E 07°29'S) by vertical haul of 0.3 mm mesh plankton net from 200 m to surface at night on 15 February 1985.

Male.- Body slender, 4th and 5th metasomal somites fused, posterolateral ends asymmetrical and reaching middle of genital somite; tip of process on right side notched (fig. 12A, B).

Genital process directed outwards with distal end curved posteriorly (fig. 12B).

Right A1 geniculate, segments 2 and 3 separated; segments 17, 18 and 19 toothed. Basal tooth of mandible with 2 unequal cusps. Maxilla small and slender, B2 with 2 unequal spines, Ri with 3 spines, medial spine longest (fig. 12C).

P1-P4 with 2 basal, 2 endopodal and 3 exopodal segments. P5 asymmetrical, right leg 2-segmented, Re very simple with 1 large apical spine and 1 seta on posterior surface, thumb of chela naked except for 1 seta at base. Left leg 4-segmented, B1, B2 and Re1 naked; Re2 shorter than Re1, with 3 outer spines and 1 apical spine, inner margin hirsute (fig. 12F).

Female.- Not found in the present study.

Male of this species resembles that of *C. longimana* Claus, but is distinguishable by the right posterolateral end of Ms5 and process on right margin of Ur1.

Distribution.- *C. tenuimana* is a rare species, has been recorded from the Agulhas Current (Cleve, 1904), east Pacific (Farran, 1908).

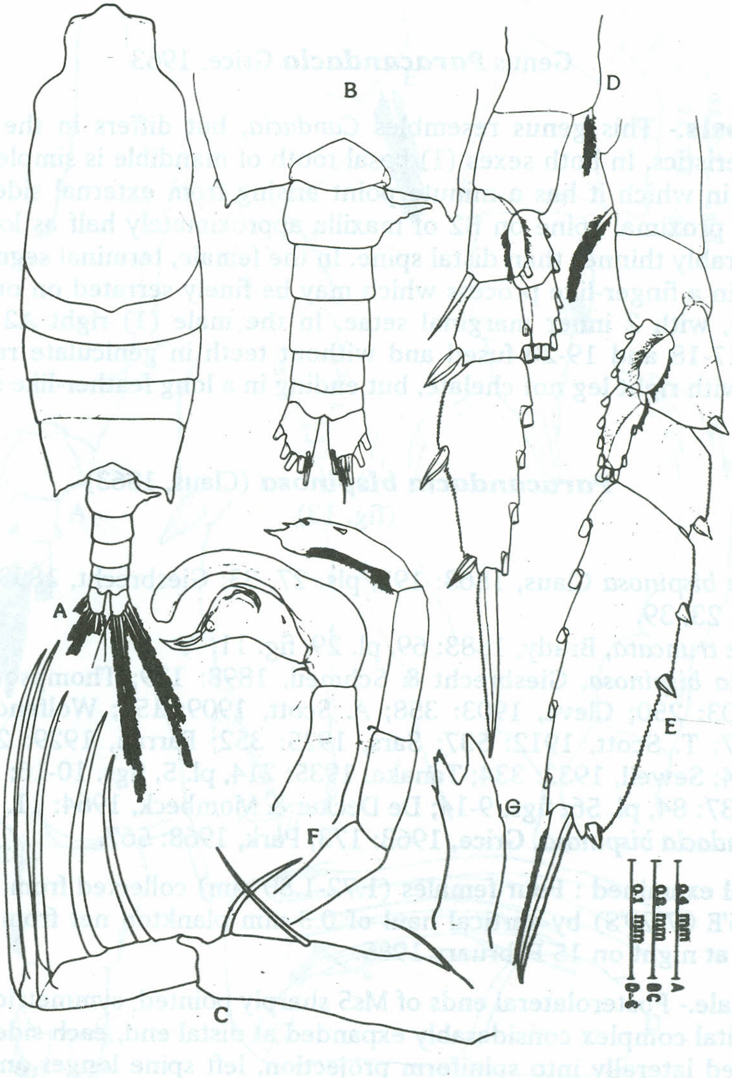


Fig. 12. *Candacia tenuimana* (Giesbrecht), male. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, dorsal view; C, maxilla; D, 1st leg; E, 3rd leg; F, 5th legs, posterior view; G, mandible blade.

Australasian region.- Central east coast of New Zealand (Bradford, 1979). No other Australian records.
Indo-Malaysian region.- Molucca Passage, Indonesia (A. Scott, 1909).

Genus ***Paracandacia*** Grice, 1963

Diagnosis.- This genus resembles *Candacia*, but differs in the following characteristics. In both sexes (1) basal tooth of mandible is simple except *P. simplex* in which it has a minute point arising from external side near tip, and (2) proximal spine on B2 of maxilla approximately half as long as and considerably thinner than distal spine. In the female, terminal segment of P5 ending in a finger-like process which may be finely serrated on one or both margins, with 2 inner marginal setae. In the male (1) right A2 with segments 17-18 and 19-20 fused and without teeth in geniculate region, and (2) P5 with right leg not chelate, but ending in a long feather-like seta.

Paracandacia bispinosa (Claus, 1863)
(fig. 13)

Candace bispinosa Claus, 1863: 191, pls. 27, 33; Giesbrecht, 1893: 424, pls. 21, 23, 39.
Candace truncata, Brady, 1883: 69, pl. 29, fig. 11.
Candacia bispinosa, Giesbrecht & Schmeil, 1898: 129; Thompson & Scott, 1903: 250; Cleve, 1903: 358; A. Scott, 1909: 151; Wolfenden, 1911: 357; T. Scott, 1912: 537; Sars, 1925: 352; Farran, 1929: 272; 1936: 114; Sewell, 1932: 334; Tanaka, 1935: 214, pl. 5, figs. 10-16; 245; Mori, 1937: 84, pl. 56, figs. 9-14; De Decker & Mombeck, 1964: 11.
Paracandacia bispinosa, Grice, 1963: 173; Park, 1968: 567.

Material examined : Four females (1.72-1.80 mm) collected from Flores Sea (121°05'E 07°29'S) by vertical haul of 0.3 mm plankton net from 200 m to surface at night on 15 February 1985.

Female.- Posterolateral ends of Ms5 sharply pointed, symmetrical.
Genital complex considerably expanded at distal end, each side of somite produced laterally into spiniform projection, left spine longer and directed backward, right spine short and straight; 1 small rounded knob arising from ventral side near posterior end; posterior margin of somite with row of denticles. Ur2 asymmetrical, left side dilated near anterior end, ventral surface with row of fine setae arising from near distal end (fig. 13A-C).

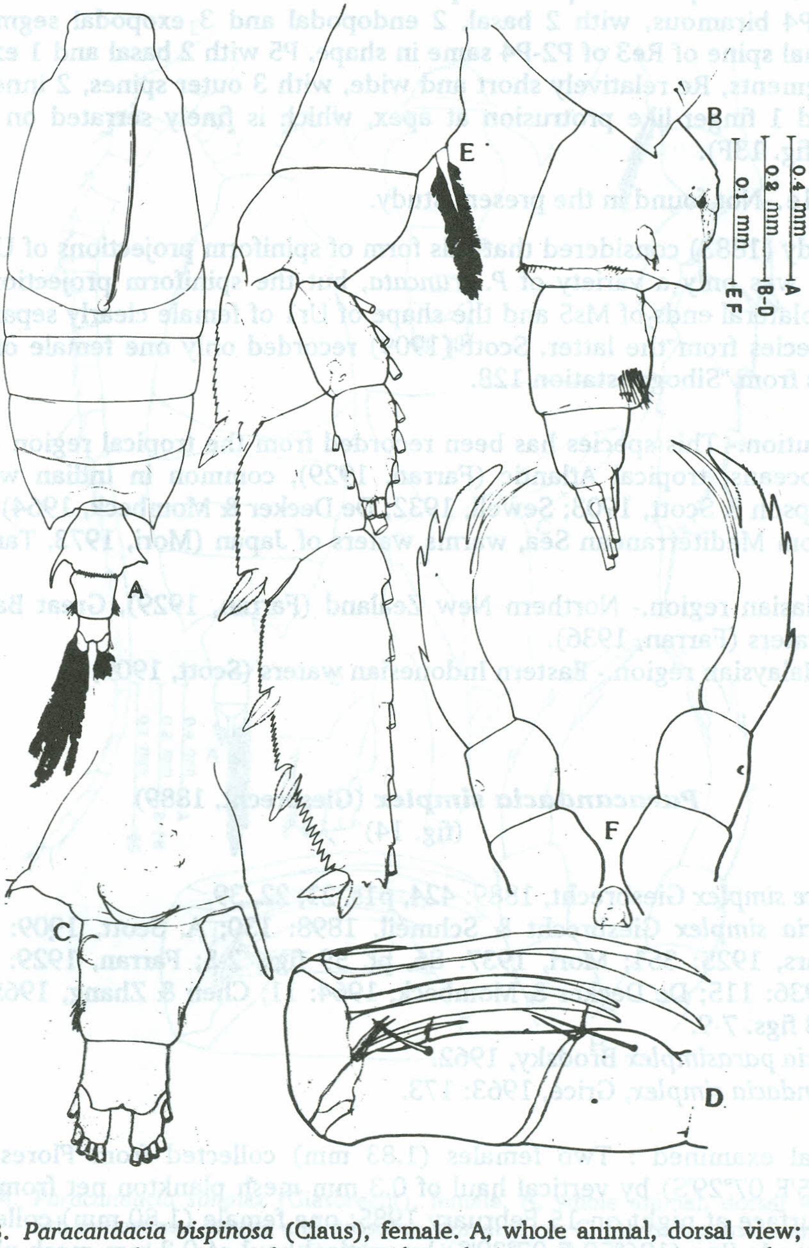


Fig. 13. *Paracandacia bispinosa* (Claus), female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, lateral view; C, urosome, ventral view; D, maxilla; E, 3rd leg; F, 5th legs, anterior view.

A1 23-segmented, proximal 6 segments thickened. Basal tooth of mandible is simple with spine-like processes.

P1-P4 biramous, with 2 basal, 2 endopodal and 3 exopodal segments. Terminal spine of Re3 of P2-P4 same in shape. P5 with 2 basal and 1 exopodal segments, Re relatively short and wide, with 3 outer spines, 2 inner setae and 1 finger-like protrusion at apex, which is finely serrated on both sides (fig. 13F).

Male.-Not found in the present study.

Brady (1883) considered that this form of spiniform projections of Ur1 of female was only a variety of *P. truncata*, but the spiniform projections of posterolateral ends of Ms5 and the shape of Ur1 of female clearly separated this species from the latter. Scott (1909) recorded only one female of this species from "Siboga" station 128.

Distribution.- This species has been recorded from the tropical region of all great oceans, tropical Atlantic (Farran, 1929), common in Indian waters (Thompson & Scott, 1903; Sewell, 1932; De Decker & Mombeck, 1964), and also from Mediterranean Sea, warms waters of Japan (Mori, 1973, Tanaka, 1964).
Australasian region.- Northern New Zealand (Farran, 1929), Great Barrier Reef waters (Farran, 1936).
Indo-Malaysian region.- Eastern Indonesian waters (Scott, 1909).

Paracandacia simplex (Giesbrecht, 1889)
(fig. 14)

Candace simplex Giesbrecht, 1889: 424, pls. 21, 22, 39.
Candacia simplex Giesbrecht & Schmeil, 1898: 130; A. Scott, 1909: 154; Sars, 1925: 351; Mori, 1937: 86, pl. 59 figs. 2-5; Farran, 1929: 272; 1936: 115; De Decker & Mombeck, 1964: 11; Chen & Zhang, 1965, pl. 38 figs. 7-9.
Candacia parasimplex Brodsky, 1962.
Paracandacia simplex, Grice, 1963: 173.

Material examined : Two females (1.83 mm) collected from Flores Sea (121°05'E 07°29'S) by vertical haul of 0.3 mm mesh plankton net from 200 m to surface at night on 15 February 1985; one female (1.80 mm) collected from Banda Sea (126°50 E 07°39'S) by vertical haul of 0.3 mm mesh plankton net from 100 m to surface at night on 29 July 1992.

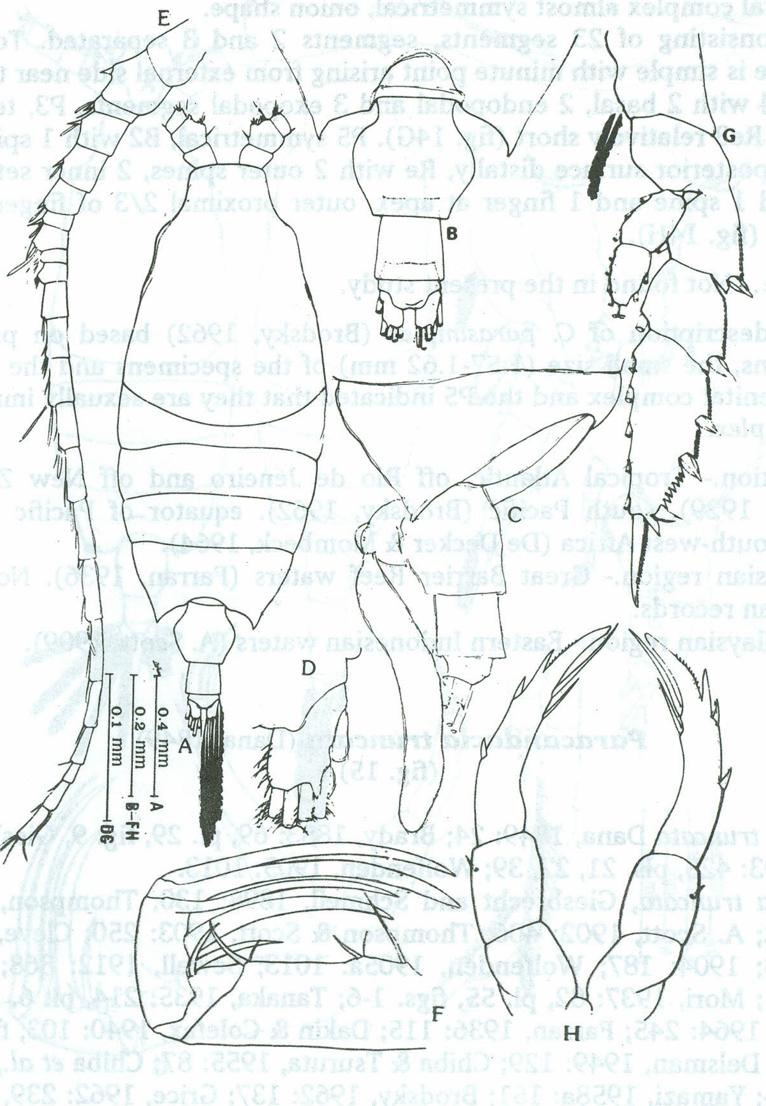


Fig. 14. *Paracandacia simplex* (Giesbrecht), female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, dorsal view; C, 5th metasomal somite and urosome, lateral view; D, right caudal ramus, dorsal view; E, antennule; F, maxilla; G, 3rd leg; H, 5th leg, anterior view.

Female.- Posterolateral ends of Ms5 symmetrical, produced into acute spine, curved inwards, not reaching middle of Ur1.

Genital complex almost symmetrical, onion shape.

A1 consisting of 23 segments, segments 2 and 3 separated. Tooth of mandible is simple with minute point arising from external side near tip.

P1-P4 with 2 basal, 2 endopodal and 3 exopodal segments. P3, terminal spine of Re3 relatively short (fig. 14G). P5 symmetrical, B2 with 1 spine-like seta on posterior surface distally, Re with 2 outer spines, 2 inner setae distally and 1 spine and 1 finger at apex, outer proximal 2/3 of finger finely serrated (fig. 14H).

Male.- Not found in the present study.

The description of *C. parasimplex* (Brodsky, 1962) based on preadult specimens, the small size (1.57-1.62 mm) of the specimens and the figures of the genital complex and the P5 indicated that they are sexually immature of *P. simplex*.

Distribution.- Tropical Atlantic, off Rio de Jeneiro and off New Zealand (Farran, 1929), south Pacific (Brodsky, 1962). equator of Pacific (Grice, 1963), south-west Africa (De Decker & Mombeck, 1964).
Australasian region.- Great Barrier Reef waters (Farran, 1936). No other Australian records.
Indo-Malaysian region.- Eastern Indonesian waters (A. Scott, 1909).

Paracandacia truncata (Dana, 1849)
(fig. 15)

Candace truncata Dana, 1849: 24; Brady, 1883: 69, pl. 29, fig. 9, Giesbrecht, 1893: 425, pls. 21, 22, 39; Wolfenden, 1905: 1013.

Candacia truncata, Giesbrecht and Schmeil, 1898: 130; Thompson, 1900: 282; A. Scott, 1902: 406; Thompson & Scott, 1903: 250; Cleve, 1903: 358; 1904: 187; Wolfenden, 1905a: 1013; Sewell, 1912: 368; 1914: 231; Mori, 1937: 82, pl. 55, figs. 1-6; Tanaka, 1935: 214, pl. 6, figs. 1-16; 1964: 245; Farran, 1936: 115; Dakin & Colefax, 1940: 103, fig. 150 a-f; Delsman, 1949: 129; Chiba & Tsuruta, 1955: 87; Chiba *et al.*, 1955: 194; Yamazi, 1958a: 151; Brodsky, 1962: 137; Grice, 1962: 239, pl. 33, figs. 6-14; Fleminger, 1963, table 1; De Decker & Mombeck, 1964: 11; Chen & Zhang, 1964, pl. 36 figs. 1-3; Grice & Jones, 1960: 288, figs. 42-45; Saraswathy, 1967: 81.

Candacia turgida Wilson, 1950: 183, pl. 22, figs. 305-308.

Paracandacia truncata, Grice, 1963: 173, figs. 4, 42, 73; Greenwood, 1978: 11, fig 5a-f; Grice & Hulsemann, 1967: 19; Othman *et al.*, 1990: 564.

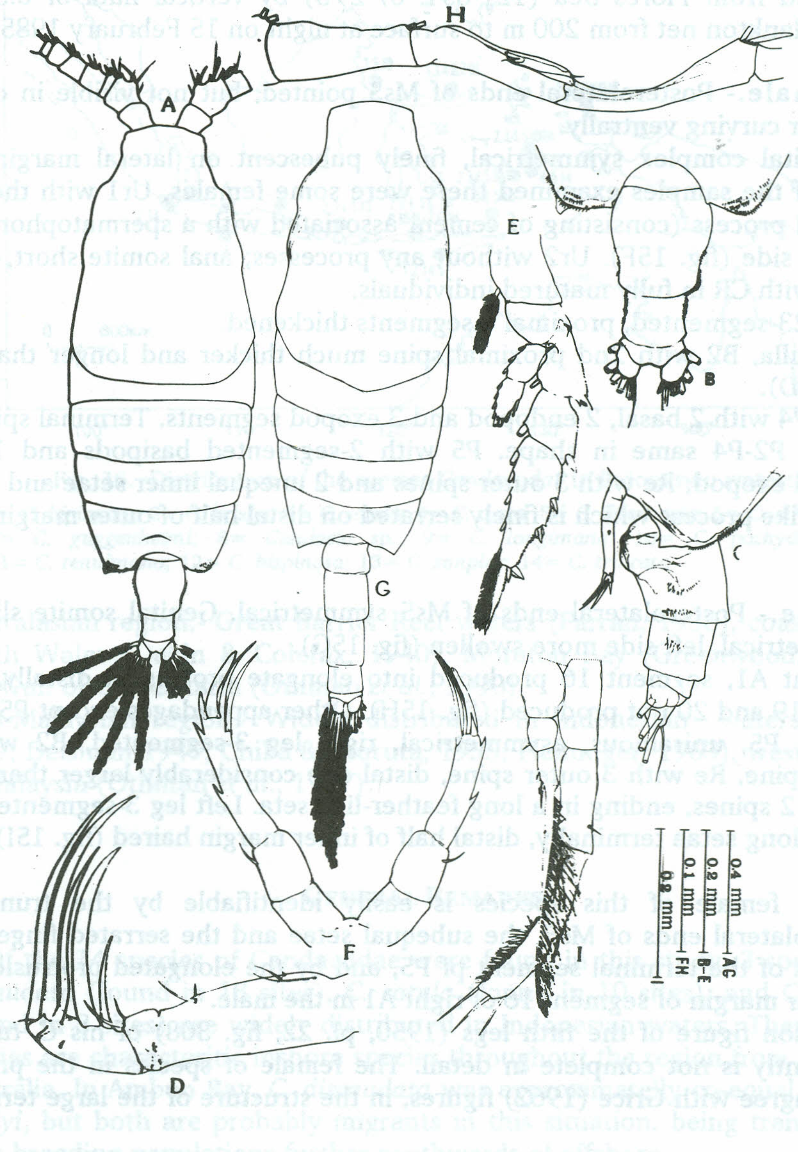


Fig. 15. *Paracandacia truncata* (Dana), female. A, whole animal, dorsal view; B, 5th metasomal somite and urosome, dorsal view; C, 5th metasomal somite and urosome, lateral view; D, maxilla; E, 3rd leg; F, 5th legs, anterior view. Male. G, whole animal, dorsal view; H, 16th to 18th segments of right antennule; I, 5th legs, posterior view.

Material examined : Fifty females (1.75-1.82 mm), 50 males (1.95-2.0 mm) collected from Flores Sea (121°05'E 07°29'S) by vertical haul of 0.3 mm mesh plankton net from 200 m to surface at night on 15 February 1985.

Female.- Posterolateral ends of Ms5 pointed, but not visible in dorsal view for curving ventrally.

Genital complex symmetrical, finely pubescent on lateral margins. In most of the samples examined there were some females, Ur1 with the pigmented process (consisting of cement associated with a spermatophore) on ventral side (fig. 15F). Ur2 without any processes; anal somite short, often fused with CR in fully matured individuals.

A1 23-segmented, proximal 6 segments thickened.

Maxilla, B2 with 2nd proximal spine much thicker and longer than 1st (fig. 15D).

P1-P4 with 2 basal, 2 endopod and 3 exopod segments. Terminal spine of Re3 of P2-P4 same in shape. P5 with 2-segmented basipods and 1-segmented exopod; Re with 3 outer spines and 2 unequal inner setae and distal finger-like process which is finely serrated on distal half of outer margin (fig. 15F).

Male.- Posterolateral ends of Ms5 symmetrical. Genital somite slightly asymmetrical, left side more swollen (fig. 15G).

Right A1, segment 16 produced into elongate protrusion distally, segments 19 and 20 not produced (fig. 15H). Other appendages except P5 as in female. P5, uniramous, asymmetrical, right leg 3-segmented, B2 with 1 outer spine, Re with 3 outer spine, distal one considerably larger than preceding 2 spines, ending in a long feather-like seta. Left leg 3-segmented, Re with 3 long setae terminally, distal half of inner margin haired (fig. 15I).

The female of this species is easily identifiable by the truncated posterolateral ends of Ms5, the subequal setae and the serrated finger-like process of the terminal segment pf P5, and by the elongated protrusion on anterior margin of segment 16 of right A1 in the male.

Wilson figure of the fifth legs (1950, pl. 22, fig. 308) of his *C. turgida* apparently is not complete in detail. The female of species in the present study agree with Grice (1962) figures, in the structure of the large terminal finger.

Distribution.- Indo-Pacific. Some Atlantic records but these in doubt (see Grice, 1963). Brady's (1883) record from 65°S in Indian Ocean is also doubtful. Pacific Ocean between 40°N and 35°S (Grice, 1962; 1963).

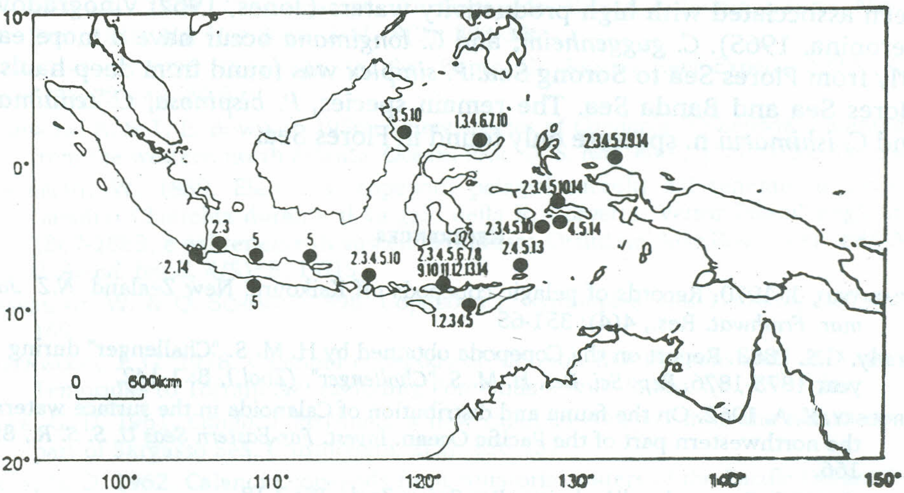


Fig. 16. Distribution of the species *Candaciidae* in Indonesian waters

1= *C. bipinnata*; 2= *C. bradyi*; 3= *C. catula*; 4= *C. curta*; 5= *C. discaudata*; 6= *C. ethiopica*; 7= *C. guggenheimi*; 8= *Candacia sp.*; 9= *C. longimana*; 10= *C. pachydactyla*; 11= *C. tenuimana*; 12= *C. bispinosa*; 13= *C. simplex*; 14= *C. trincata*

Australasian region.- Great Barrier Reef waters (Farran, 1936), coastal New South Wales (Dakin & Colefax, 1940), Moreton Bay (Greenwood, 1978), and Gulf of Carpentaria (Othman *et al.*, 1990).

Indo-Malaysian region.- Widely distributed in Indonesian waters (Scott, 1909; Delsman 1949; Chiba & Tsuruta, 1955; Fleminger, 1963), west coastal of Malaysia (Othman *et al.*, 1987).

GENERAL REMARKS

Of the 14 species of Candaciidae were found in this study, 3 species, *C. discaudata* (found in 13 sites), *C. catula* (found in 10 sites), and *C. bradyi* (found in 8 sites) are widely distributed in Indonesian waters. These three species are characteritic inshore species throughout the region from India to Australia. In Ambon Bay, *C. discaudata* was approximatelly co-equal with *C. bradyi*, but both are probably migrants in this situation, being transported from breeding populations further southwards of offshore.

Other species were found in common are *C. curta*, *C. pachydactyla* and *P. truncata*. *P. truncata* only found in location which is has correlation with Indian or Pacific Oceans, it is absent in Java Sea. *C. pachydactyla* was found from Flores Sea to southermost region, and in particular, *C. pachydactyla* has been assocciated with high productivity waters (Jones, 1962; Vinogradov & Veronina, 1965). *C. guggenheimi* and *C. longimana* occur have a more easterly from Flores Sea to Sorong Sea. *P. simplex* was found from deep hauls of Flores Sea and Banda Sea. The remain species, *P. bispinosa, C. tenuimana* and *C. ishimarui* n. sp. were only found in Flores Sea.

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