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Vol. 41, pp. 1–90, December 2014

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VOL. 41, DECEMBER 2014

CONTENT

Nia Kurniawan, Tjong Hon Djong, Tesri Maideliza, Amir Hamidy, Mahmudul Hasan, Takeshi Igawa and Masayuki Sumida Genetic divergence and geographic distribution of frogs in genus <i>Fejervarya</i> from Indonesia inferred from mitochondrial 16S rRNA gene analysis	1–16
Djunijanti Peggie and Harmonis Butterflies of Gunung Halimun-Salak National Park, Java, Indonesia, with an overview of the area importance.....	17–30
Mulyadi Taxonomic problems on four species of <i>Pontella</i> (Copepoda, Calanoida) described by A. Scott (1909) in Indo-Malayan waters.....	31–50
Anang Setiawan Achmadi, Kevin C. Rowe and Jacob A. Esselstyn New records of two rarely encountered, endemic rats (Rodentia: Muridae: Murinae) from Gunung Gandangdewata, West Sulawesi Province.....	51–60
Frank E. Rheindt, Dewi M. Prawiradilaga, Suparno, Hidayat Ashari and Peter R. Wilton New and significant island records, range extensions and elevational extensions of birds in eastern Sulawesi, its nearby satellites, and Ternate	61–90

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Nia Kurniawan

Genetic divergence and geographic distribution of frogs in genus *Fejervarya* from Indonesia inferred from mitochondrial 16S rRNA gene analysis

TREUBIA, December 2014, Vol. 41, pp. 1–16.

The Indonesian archipelago is an ideal setting for the study of speciation and biogeography. This archipelago is divided into three island groups based on zoogeography: Sundaland, Wallacea and the Australian region. In this paper we used frogs in genus *Fejervarya* (Bolkay) to study biogeography and examine patterns of gene flow across proposed zoogeographic boundaries. Several molecular studies on *Fejervarya* species from Indonesia have been carried out, but comparative studies among members of the genus *Fejervarya* have yet to be performed. In order to elucidate genetic divergence and geographic distribution of these frogs, we conducted a molecular analysis of the mitochondrial 16S rRNA gene using 179 frogs from five *Fejervarya* species. In total we collected from 32 localities in Sumatra, Kalimantan (Indonesian part of Borneo), Java, Bali, Sulawesi and Lesser Sunda Islands in Indonesia. Molecular phylogenetic analysis recovered 35 haplotypes and showed that frogs in the genus *Fejervarya* were divided into two well-supported clades. The first group were of three species, *F. limnocharis*, *F. iskandari* and *F. cf. verruculosa* and the other group clade consisted of *Fejervarya cancrivora* and *Fejervarya* sp. (Sulawesi-type). The average sequence divergence among these four species ranged from 1.09 to 16.03% (mean = 11.29±2.83%). The present results clearly show that there are five *Fejervarya* species in the Indonesian archipelago. *Fejervarya limnocharis* and *F. cancrivora* are widely distributed and sympatric in Sumatra, Borneo and Java. *Fejervarya iskandari* is not endemic to Java and also occurs in the Lesser Sundas. *Fejervarya cf. verruculosa* and *Fejervarya* sp. (Sulawesi-type) are endemic to Lesser Sunda and Sulawesi Island, respectively.

(Nia Kurniawan, Tjong Hon Djong, Tesri Maideliza, Amir Hamidy, Mahmudul Hasan, Takeshi Igawa and Masayuki Sumida)

Key words: *Fejervarya*, genetic divergence, geographic distribution, 16S rRNA gene

UDC: 595.78(594.53)

Djunijanti Peggie

Butterflies of Gunung Halimun-Salak National Park, Java, Indonesia, with an overview of the area importance

TREUBIA, December 2014, Vol. 41, pp. 17–30.

Data on the occurrence of butterfly species at Gunung Halimun-Salak National Park is presented based on collections and observations obtained in 2004, 2007, 2009 and 2010. In total, 161 butterfly species (10 HesperIIDae, 23 Lycaenidae, 86 Nymphalidae, 17 Papilionidae, 21 Pieridae, and 4 Riodinidae) were recorded. Of the total number of species, 133 were recorded from Gunung Halimun and 82 were recorded from Gunung Salak. The occurrence of butterflies at this national park was compared with data known from other localities in Java. The significance of Gunung Halimun-Salak NP in terms of the butterfly diversity is discussed.

(Djunijanti Peggie and Harmonis)

Key words: butterflies, endemic species, Gunung Halimun-Salak National Park, Java, occurrence

UDC: 595.34

Mulyadi

Taxonomic problems on four species of *Pontella* (Copepoda, Calanoida) described by A. Scott (1909) in Indo-Malayan waters

TREUBIA, December 2014, Vol. 41, pp. 31–50.

Four species of *Pontella*, i.e., *P. alata*, *P. cerami*, *P. denticauda*, and *P. forficula*, which were originally described by A. Scott (1909) were found from Indo-Malayan waters. Some misidentifications resulting in wrong species identity were discovered on *P. cerami* and *P. forficula*. *Pontella cerami* A. Scott, 1909, described based on two male

specimens from the Banda Sea, Indonesia is here recognised as the male of *P. alata*. Similarly, *P. forficula*, also known from two male specimens from the Sulu Sea, Philippine must be reassigned as the male of *Ivelloopsis elephas* (Brady, 1883). Another Indo-Malayan *Pontella*, i.e., *P. denticauda* A. Scott, 1909 must also be moved to the genus *Ivelloopsis* Claus 1893, as *Ivelloopsis denticauda* (A. Scott, 1909) by its having posterior corners of Pdg5 produced into rounded lobes in both sexes; particularly in the female, by (1) the genital double-somite with a large lateral process, (2) the CR asymmetrical with the right ramus longer than the left, and (3) the Re of P5 with 3 apical spines and with an acuminate Ri. The male has, (1) the CR asymmetrical with right ramus slightly longer than the left, and (2) the thumb of Re2 of right P5 is elongated, and (3) the Re2 of the left P5 bifurcate at apex.

Descriptions, measurements and figures of the four species are given, along with a review of their distribution and that of their species groups over Indo-West Pacific waters, together with taxonomic remarks and synonymies in each case.

(Mulyadi)

Key words: Copepoda, Indo-Malayan, *Pontella*, small islands, taxonomy

UDC: 599.323.4(594.2)

Anang Setiawan Achmadi

New records of two rarely encountered, endemic rats (Rodentia: Muridae: Murinae) from Gunung Gandangdewata, West Sulawesi Province

TREUBIA, December 2014, Vol. 41, pp. 51–60.

We collected specimens of Sommer's Sulawesi shrew-rat, *Sommeromys macrorhinos*, at three sites (1600, 2200, and 2600 m) and the Sulawesi small-bodied shrew-rat, *Crunomys celebensis*, at one site (1600 m) on Gunung Gandangdewata in the western block of the central core of Sulawesi during November 2011 and May 2012. Prior to 2011, *S. macrorhinos* was known only from the holotype, which was taken on 2 August 1973 at 2400 m near the summit of Gunung Tokala (upper montane forest). Previously, *C. celebensis* was known only from tropical lowland evergreen rain forest in the Danau Lindu valley and nearby upper drainage of the Sungai Miu in the northern portion of the west-central mountain block in Sulawesi's central core. The new specimens of *S. macrorhinos* and *C. celebensis*

extend their known range of habitats to include the transition between lowland and montane forest. Because the original description of *S. macrorhinos* was based on a single specimen, we describe some external morphological features and provide measurements of new specimens as a supplement to the original description.

(Anang Setiawan Achmadi, Kevin C. Rowe and Jacob A. Esselstyn)

Key words: *Crunomys celebensis*, morphology, shrew-rat, *Sommeromys macrorhinos*

UDC: 598.2(594.25)

Frank E. Rheindt

New and significant island records, range extensions and elevational extensions of birds in eastern Sulawesi, its nearby satellites, and Ternate

TREUBIA, December 2014, Vol. 41, pp. 61-90.

The Wallacean Region continues to be widely unexplored even in such relatively well-known animal groups as birds (Aves). We report the results of an ornithological expedition from late Nov 2013 through early Jan 2014 to eastern Sulawesi and a number of satellite islands (Togian, Peleng, Taliabu) as well as Ternate, providing details on numerous first records of bird species outside their previously known geographic or elevational ranges observed or otherwise recorded during this expedition. We also document what appears to be a genuinely new taxon, possibly at the species level, of kingfisher from Sulawesi that has been overlooked by previous ornithologists. Our results underscore our fragmentary knowledge of the composition of the avifauna of eastern Indonesia, and demonstrate that there continues to be a high degree of cryptic, undescribed avian diversity on these islands.

(Frank E. Rheindt, Dewi M. Prawiradilaga, Suparno, Hidayat Ashari and Peter R. Wilton)

Key words: birds of eastern Sulawesi, elevational extensions, new island records, range extensions

**TAXONOMIC PROBLEMS ON FOUR SPECIES OF *PONTELLA*
(COPEPODA, CALANOIDA) DESCRIBED BY A. SCOTT (1909)
IN INDO-MALAYAN WATERS**

Mulyadi

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ABSTRACT

Four species of *Pontella*, i.e., *P. alata*, *P. cerami*, *P. denticauda*, and *P. forficula*, which were originally described by A. Scott (1909) were found from Indo-Malayan waters. Some misidentifications resulting in wrong species identity were discovered on *P. cerami* and *P. forficula*. *Pontella cerami* A. Scott, 1909, described based on two male specimens from the Banda Sea, Indonesia is here recognised as the male of *P. alata*. Similarly, *P. forficula*, also known from two male specimens from the Sulu Sea, Philippine must be reassigned as the male of *Ivelloopsis elephas* (Brady, 1883). Another Indo-Malayan *Pontella*, i.e., *P. denticauda* A. Scott, 1909 must also be moved to the genus *Ivelloopsis* Claus 1893, as *Ivelloopsis denticauda* (A. Scott, 1909) by its having posterior corners of Pdg5 produced into rounded lobes in both sexes; particularly in the female, by (1) the genital double-somite with a large lateral process, (2) the CR asymmetrical with the right ramus longer than the left, and (3) the Re of P5 with 3 apical spines and with an acuminate Ri. The male has, (1) the CR asymmetrical with right ramus slightly longer than the left, and (2) the thumb of Re2 of right P5 is elongated, and (3) the Re2 of the left P5 bifurcate at apex.

Descriptions, measurements and figures of the four species are given, along with a review of their distribution and that of their species groups over Indo-West Pacific waters, together with taxonomic remarks and synonymies in each case.

Key words : Copepoda, Indo-Malayan, *Pontella*, small islands, taxonomy

INTRODUCTION

The genus *Pontella* Dana, 1846 is known to be abundant and species rich, while *Ivelloopsis* Claus, 1893 is a monotypic genus in the Indo-Malayan region. The species of those genera occupy the upper layer of the ocean and are numerous in coastal areas, i.e., neritic habitats (Fleminger 1986).

Currently, the genera *Pontella* and *Ivelloopsis* comprise 63 and 1 described species, respectively (Boxshall & Halsey 2004; Walter & Boxshall 2013). Of these, eight species of *Pontella* have been reported by A. Scott (1909) from the Malay Archipelago, i.e., *P. danae* Giesbrecht, 1889, *P. denticauda* A. Scott, 1909, *P. fera* Dana, 1849, *P. princeps* Dana, 1849, *P. securifer* Brady, 1883, *P. alata* A. Scott, 1909, *P. cerami* A. Scott, 1909 and *P. forficula* A. Scott, 1909. The last three species were described based on a single sex, collected during the Siboga Expedition (1899). *Pontella alata* has been described based on four female specimens collected from the North coast of Celebes, Indonesia, while the other two species

were described from males specimens from the Banda Sea, Indonesia and the Sulu Sea, southern Philippines, respectively.

During the Moro Expedition (A. Fleminger, unpubl. data) it was noted that females of *Pontella alata* and males of *P. cerami* always co-occurred in surface tows and usually in the absence of other species of *Pontella*. Subsequently, Ohtsuka *et al.* (1987) examined some samples collected from this expedition and suggested both species to be female and male of *P. alata* and included this species as a member of the *P. alata* species group. However, there was no any description or illustration of this species available from this expedition. During the E-Win Expedition of the Indonesian Institute of Sciences in June 2007, a large number of females of *P. alata* A. Scott, 1909 and males of *P. cerami* A. Scott, 1909 were collected at Manyilibit Bay in Raja Ampat, West Papua, Indonesia. Our comparative analyses of the characteristics of both species agreed with Ohtsuka *et al.* (1987).

A. Scott's (1909) account of the *Pontella* collected in Indo-Malayan waters during the Siboga Expedition (1899-1900), is undoubtedly the most important paper on the genus in the region. However, the author did not provide figures or adequate descriptions of most of the species caught. Also, there are some misidentifications, doubtful records, and synonyms, which need to be studied more accurately.

This contribution deals with redescriptions and illustrations of females and males of two species of *Pontella* Dana, 1849 and two of *Ivellopsiis* Claus, 1893 for Indonesian waters. The text further aims at clarifying some synonymies, and discusses the species groups and their regional distributional pattern.

MATERIALS AND METHODS

Zooplankton samples were collected from eight small islands, in the Indonesian Archipelago during 2001-2010 (Fig. 1, Table 1). Sampling was done by the author and included surface towing as well as vertical hauls from 10-25 m depth to the surface with a conical plankton net (0.33 mm mesh size and 0.45 m diameter mouth aperture) at day- and nighttime. Some plankton samples were provided from the collections of the E-WIN Expedition, Indonesian Institute of Sciences, in June 2007 at Raja Ampat Island, West Papua. These samples were collected by horizontal tows with a conical plankton net. All samples were fixed and preserved in 2% formaldehyde/seawater. Specimens of *Pontella* and *Ivellopsiis* were sorted from the original samples, stained with methylene blue, dissected with needles in 10% glycerol/distilled water, and the body and appendages observed under a

compound microscope equipped with a drawing tube. The morphological terminology follows Huys & Boxshall (1991). Prosome length (distance between the anterior to mid-posterior margin) and width, urosome length (distance between the mid-posterior margin of prosome to the posterior margin of the caudal ramus excluding the distal setae), and lengths and widths of urosomal somites were measured with a calibrated ocular micrometer.

Abbreviations used in the text to describe morphological features are: A1, antennule; A2, antenna; Pdg1-Pdg5, pedigerous somites 1-5; P1-P5, swimming legs 1-5; Ur1-Ur5, urosomal somites 1-5; CR, caudal ramus/i; B1, coxa; B2, basis; Re1-Re3, exopodal segments 1-3; Ri1-Ri3, endopodal segments 1-3; Se, outer spine; Si, inner spine; St, terminal spine.

Voucher specimens were deposited in the Museum Zoologicum Bogoriense (MZB), Research Center for Biology, Indonesian Institute of Sciences (LIPI), Cibinong, Indonesia.

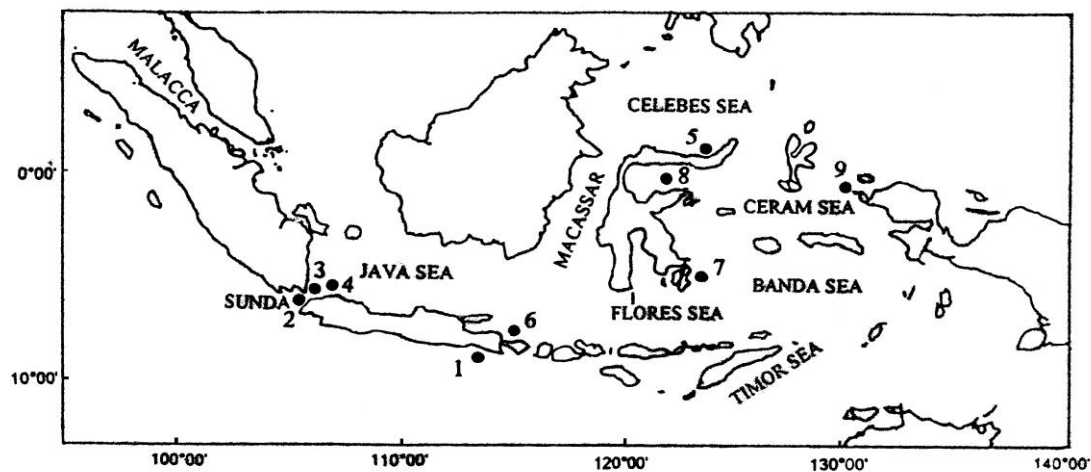


Figure 1. Map of Indonesian waters showing study sites 1-8.

RESULTS

A total four species of *Pontella* Dana, 1846 and two species of *Ivelloopsis* Claus, 1893 were found in this study. *Pontella cerami* A. Scott, 1909, described from two male specimens from the Banda Sea, Indonesia, must be recognised as the male of *P. alata* A. Scott, 1909. Similarly, *P. forficula* A. Scott, 1909 which was also described from two male specimens from the Sulu Sea, southern Philippines should be recognised as the male of *I. elephas* (Brady, 1883). Moreover, author's study on Pontellidae of Indonesian waters revealed that males of *Pontella forficula* A. Scott, 1909 always co-occurred with the females of *Ivelloopsis elephas* (Brady, 1883) at the islands surface tows at the islands Sempu, Panaitan, Damar, Bali, and Bunaken, in the absence of other species of *Pontella*. Hence, we herein

synonymise *P. forcicula* A. Scott, 1909 to *I. elephas* (Brady, 1883). Another Indo-Malayan *Pontella*, i.e., *P. denticauda* A. Scott, 1909 must also be included in the genus *Ivellopsis*, as *I. denticauda* (A. Scott, 1909), by having some similarities of the structure of the posterior corners of the last pedigerous somites, the genital double-somite, and the fifth legs forms of both sexes.

Table 1. Distribution of *Pontella alata* (= *P. cerami*), *Ivellopsis valida* (= *P. forcicula*) and *I. denticauda* (A. Scott, 1909) recorded in the present study

Species	Sites								Adjacent areas					Oceans			Remarks	
	1	2	3	4	5	6	7	8	A	B	C	D	E	I	P	At		
<i>Pontella alata</i> (= <i>P. cerami</i>)								o	•		•	•					N	
<i>I. elephas</i> (= <i>P. forcicula</i>)	o	o	o	o	o	o	o	o		•		•		•	•		N	
<i>I. denticauda</i>	o	o	o	o	o	o	o	o	•		•	•	•			•	•	N

Notes:

1=Sempu Island, East Java (28 June 2010); 2=Panaitan Island, Sunda Strait (7 Nov. 2008); 3= Off Bojonegara, Banten (16 Dec. 2009); 4=Damar Island, Jakarta Bay (6 Dec. 2009); 5= Bali Strait (17 July 2009); 6=Bunaken Island, Manado Bay (26 Sept. 2001); 7=Togean Island, Central Sulawesi (9 Sept. 2004); 8=Manyailibit, Raja Ampat, West Papua (8 June 2007); •=previous records; o= present records; A = Indonesian waters; B= Singapore Strait; C= China Sea; D=Philippine waters; E=Australian waters; I, P and At=Indian, Pacific and Atlantic Oceans; N=Neritic. Sources of data for the Southeast Asian and Indonesian areas : A = Scott (1909); Mulyadi (2002). B = Wickstead (1961); Wickstead & Krishnaswamy (1964); Othman & Toda (2006). C = Chen & Zhang (1965). D = Scott (1909); Brady (1883); Wilson (1950). E = Fleminger 1986. Sources of data for major oceanic areas: I = Sewell (1932), Silas & Pillai (1973), Madhupratap & Haridas (1986). P = Wilson (1950), Matsuo & Marumo (1982).

All the species mentioned above were morphologically analysed for the purpose of clarifying the geographical distribution patterns. The largest numbers of Indonesian pontellid species belong to SE Asian waters species comprising 66,7% (2 species, *P. alata* and *I. elephas*). The remaining species, *I. denticauda* (33.3%) belongs to the Indo-Pacific species. Based on their habitat distribution, all these species are listed as neritic forms.

DESCRIPTIONS

Family Pontellidae Dana, 1853

Genus *Pontella* Dana, 1846

Pontella alata A. Scott, 1909 (figs. 2-3)

Pontella alata A. Scott, 1909: 160, pl. 51, figs. 11-15 (female only), original description, holotype not designated, sampling locality 01°15'N, 123°37'E; Ohtsuka *et al.* 1987: 568.

Pontella cerami A. Scott, 1909: 163, pl. 53, figs. 8-15 (male only); Wilson, 1950: 291, pl. 27, figs. 402-403.

Material examined.- 20 adult females (3.55-3.65 mm), 20 adult males (3.43-3.47 mm) (MZB Cr. Cop. 131) collected from Manyailibit Bay, Raja Ampat, west Papua, Indonesia by surface towing of 0.33 mm mesh plankton net at daytime on 8 June 2007.

Female. - Body (Fig. 2a) robust, cephalon provided with distinct lateral hook on each side, articulation between cephalon and Pdg1, and that between Pdg4 and Pdg5 distinct; posterior corners of Pdg5 produced into asymmetrical short acuminate lobes with globular base, left side slightly more prominent than right side, reaching about 1/3 the length of genital double-somite. Dorsal eye lenses moderately developed, ventral eye lens absent. Rostrum bifid, asymmetrical, right ramus slightly wider than left (Fig. 3d). A1 (Fig. 3e) 24-segmented, symmetrical, extending to middle of Pdg3 when stretched backwards. A2, mandibles, maxillule, maxilla, and maxilliped of usual *Pontella* type.

Urosome (Fig. 2a-e) composed of 2 somites, asymmetrical; broad dorsal "shield" coverings genital double somite and extending backwards of left side, reaching posteriorly to distal end of somite. Operculum over genital opening extended to right side forming spiniform process. CR very asymmetrical, right ramus considerably longer and broader than left, each ramus with 5 swollen basally and 1 small setae, of which III, IV and V caudal setae thickened proximally, enlarged portion of seta distinctly shorter than ramus.

Swimming legs except for P1 with 2-segmented endopod and 3-segmented exopod. P1 (Fig. 2f) with both Ri and Re 3-segmented; terminal exopod segment ending in acute process, Re1 and Re2 segments with 4 or 5 minute spinules at base of outer spines. P2 and P3 (Fig. 2g, h) similar in structure and armature to each other, but P3 much larger than P2; each proximal Ri segment with small protuberance at point one-third length of outer margin. P4 (Fig. 2i) with basis having minute denticular process at base of large plumose seta. P5 (Fig. 2j) asymmetrical; each basis with plumose seta near base of posterior face; left Re 1.4 length of right, smoothly curved inward, tapering to distal point, with 2 minute processes along outer margin; left Ri also longer than right; right Re virtually naked, Ri short, about 0.35 length of Re; both Ri bifurcated.

Male.- Body (Fig. 3a) more compact than in female. Cephalosome and Pdg1 separated from each other; Pdg4 and Pdg5 also not fused, posterior corners of Pdg5 produced into asymmetrical, acuminate lobes. Cephalon with a pair of small dorsal eye lenses, rostrum with asymmetrical short rami bearing large double convex lens (Fig. 3a-c). Urosome composed of 5 somites, genital somite slightly asymmetrical, left side weakly produced; CR asymmetrical, rather elongated, with 5 plumose and 1 small setae (Fig.3a).

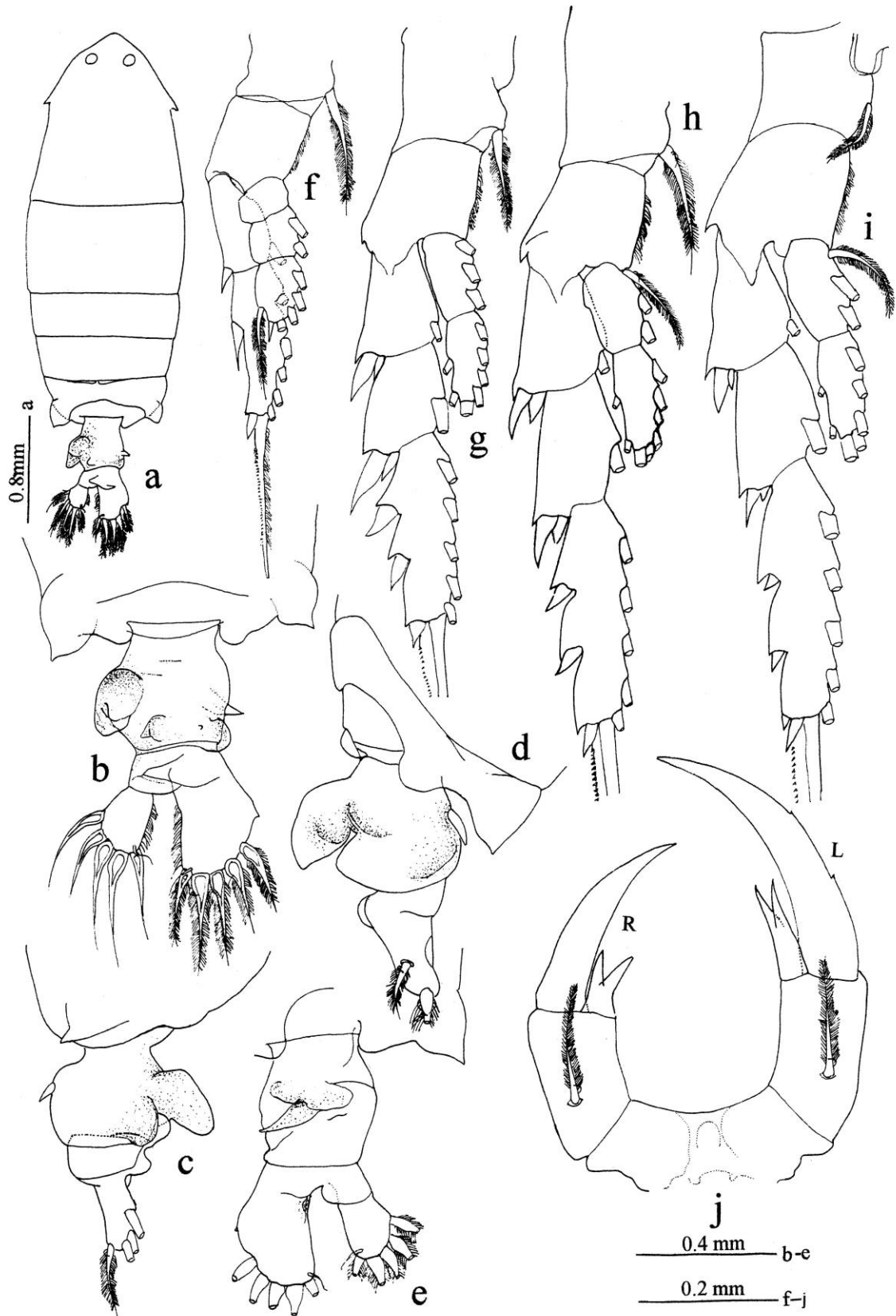


Figure 2. *Pontella alata* A. Scott, 1909. Female from Manyailbit Bay, West Papua. a, habitus, whole specimen, dorsal view; b, Pdg5 and urosome, dorsal view; c, Urosome, lateral view; d, Pdg5 and urosome, lateral view; e, Urosome, ventral view; f-j, P1-P5.

Right A1 (Fig. 3f, g) geniculate, 25-segmented, 1st to 12th segments proximal to expanded 4 (13th to 16th) segments incompletely fused; last 4 segments fused. Segment 14 stout with elongated spine at apex; anterior margin from proximal of segment 17 to distal third of segment 18 with toothed ridge of triangular denticles, of which 2nd and 3rd teeth much longer than the rest; fused segments 19-21 with 2 toothed plates, with distal falcate spur, proximal plate with double rows of denticles, distal one with lamelliform teeth (Fig. 3f, g).

P5 (Fig. 3i) asymmetrical; right leg with Re1 (chela) with a slender and elongated thumb, curved inwards with 1 short spine on proximal corner externally; concave surface with 1 stout digitiform process and 1 long seta on third length; Re2 (finger) slender, elongate, pointed, with 3 inner setae and 1 seta on posterior surface. Left leg, basis with 1 plumose seta on posterior surface; Re1 naked; Re2 with 2 unequal spines and 1 flagelliform process at apex and 2 patches of fine setae on inner margin (Fig. 3i).

Remarks.- *Pontella alata* (= *P. cerami*) belongs to the *P. alata* species-group established by Fleminger (1967), which was hitherto composed of three species: *P. alata* A. Scott, 1909, *P. surrecta* C.B. Wilson, 1950, and *P. rostraticauda* Ohtsuka *et al.*, 1987. Females of the *alata* group are identified by the genital double-somite bearing a large process extending posteriorly over part to all of CR, the operculum over genital opening extended to right forming a spiniform process, the right CR is considerably larger than the left ramus, the rostrum is large but lacking distinctive lens. The P5 are asymmetrical, the right leg being shorter than the left leg, the Re is virtually naked, lateral processes, when present are minute. The male's rostrum bears a large double convex lens. The chela of right P5 is large, its overall width roughly equals the length of urosome less CR, the proximal segment has a slender elongated thumb and proximally a slender digitiform process straight or bent and paralleling thumb. The distal segment of the chela is slender and elongate. Also, the terminal segment of P5 has a robust spiniform process and one large aesthete-like seta, its inner margin ribbed.

The present female specimens slightly differ from A. Scott's (1909) figures by (1) the genital double-somite with a small wing-like projection on dorsal surface (vs. a large wing-like projection), (2) the posterior corners of Pdg5 produced into asymmetrical short acuminate lobes (vs. produced into long acuminate lobes), (3) CR asymmetrical, right ramus much longer and wider than left (vs. right ramus slightly longer and wider than left).

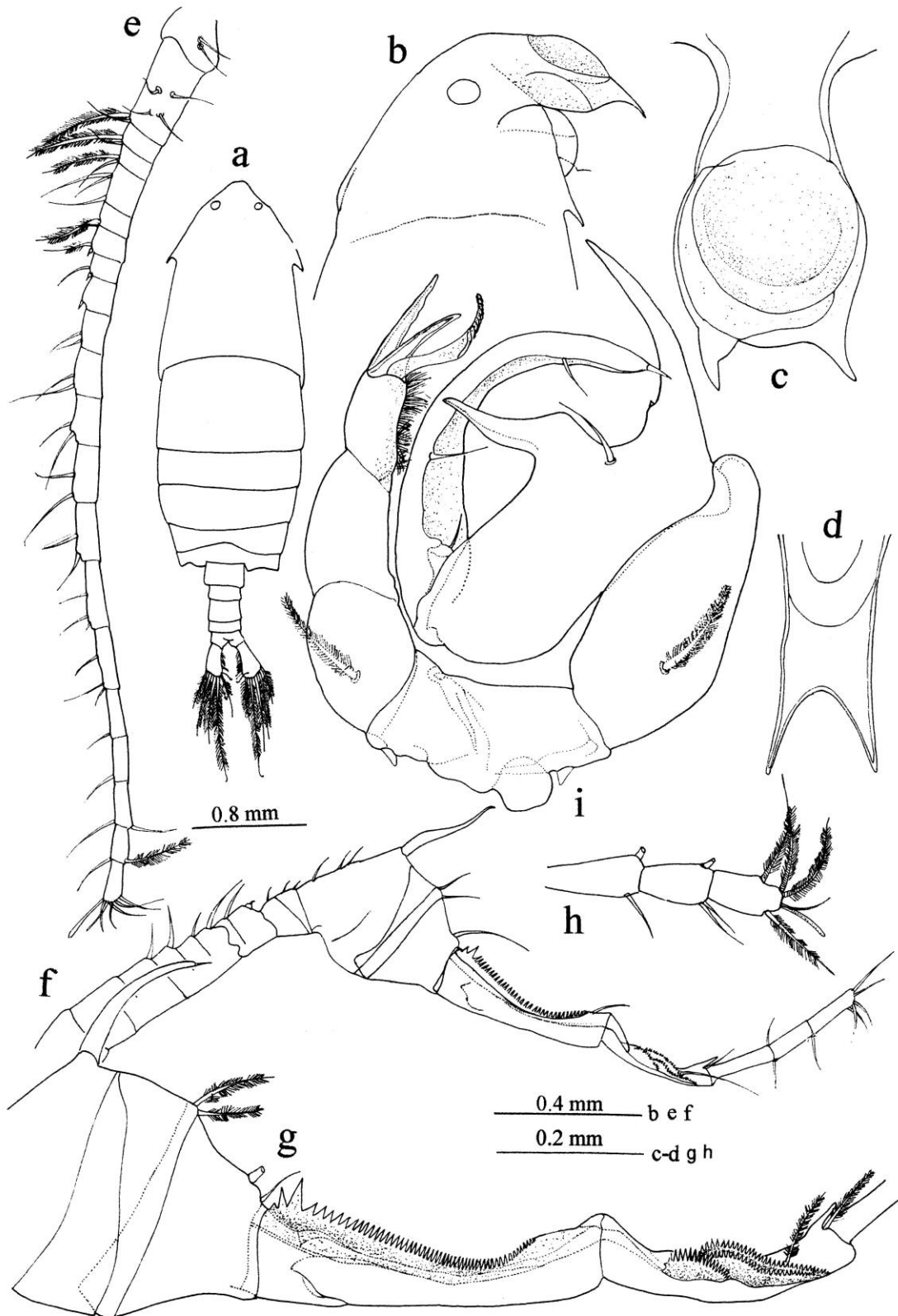


Figure 3. *Pontella alata* A. Scott, 1909. Male from Manyailibit Bay, West Papua. a, habitus, whole specimen, dorsal view; b, cephalon, lateral view; c, rostrum, anterior view. Female. d, rostrum, anterior view; e, antennule. Male. f, right antennules; g, geniculate region of right A1; h, three terminal segments of right A1.

Distribution.- Collectively, the records of the three species currently comprising the *P. alata* group form a narrow but distinctive band crossing the broadly tropical latitudes from eastern Australia to southern Japan. Most of the records occur at the oceanic islands forming the westernmost rim of the Pacific (Fig. 8). *Pontella surrecta* tends to occur in coastal waters on the Pacific Ocean side of these islands, whereas *P. alata* predominates west of these same islands along the coasts facing the eastern seas of the Indo-Malayan region. *Pontella rostracticauda* is known at present only from the Inland Sea of Japan. It may also occur south in the Ryukyus and possibly as far as Taiwan (Ohtsuka *et al.*, 1987). All three species have been found in or very near the sea surface in nearshore coastal waters, i.e., typically inshore of the 100-m isobath, where they commonly appear in relatively small numbers.

Most of the species were collected nearshore and inshore up to 20 m depth. Voucher specimens have been deposited in National Museum of Natural History, Smithsonian Institution, Washington (USNM 232024), the Faculty of Applied Biological Science of Hiroshima University, Japan, and the Museum Zoologicum Bogoriense, Indonesian Institute of Sciences, Indonesia (MZB Cr. Cop. 131).

Genus *Ivelloopsis* Claus, 1893

Ivelloopsis elephas (Brady, 1883) (figs. 4-5)

Pontella elephas Brady, 1883: 87, pl. 38, figs. 7-14 (type locality: off Sibago Island, Philippines); Giesbrecht, 1892: 462.

Pontella (Ivelloopsis) elephas, Claus, 1893: 274.

Ivelloopsis elephas, Giesbrecht & Schmeil, 1898: 139; Wickstead, 1961: 60, 73; Wickstead & Krishnaswamy, 1964: 27-32, figs. 1-15; Silas & Pillai, 1973: 852.

Pontella forficula A. Scott, 1909 (male): 162, pl. 53, figs. 1-7, St. 93 Sulu Sea; Mulyadi, 2002: 98-99, fig. 33; Othman & Toda, 2006: 315-316, fig. 19.

Pontella valida Dana, 1852: 1171(1853); Wilson, 1950: 301-303, pl. 29, figs. 432-434; Mulyadi, 2002: 117-118, fig. 43.

Pontella surrecta Wilson, 1950 (male): 300, figs. 428-430.

Material examined.- 10 females (2.97-3.00 mm), 10 males (2.58-2.61 mm) (MZB Cr. Cop. 132) collected by the author from Damar Besar Island, Jakarta Bay, by surface tow of 0.33 mm plankton net at daytime on 16 December 2009.

Female.- Body robust; cephalon triangular and rather sharply pointed in front, but without median crest, with distinct lateral hooks on each side; articulations between cephalon and Pdg1, and between Pdg4 and Pdg5 distinct, and not fused as reported by Wickstead & Krishnaswamy (1964), posterior corners of Pdg5 produced into slightly asymmetrical, rounded processes, left side wider than right. Rostrum bifid, symmetrical, thickened basally, stout and pointed, directed downward, without a visible lens structure. Dorsal eye lenses distinct and rounded and more or less concealed by their opaque covering, rostral lenses absent.

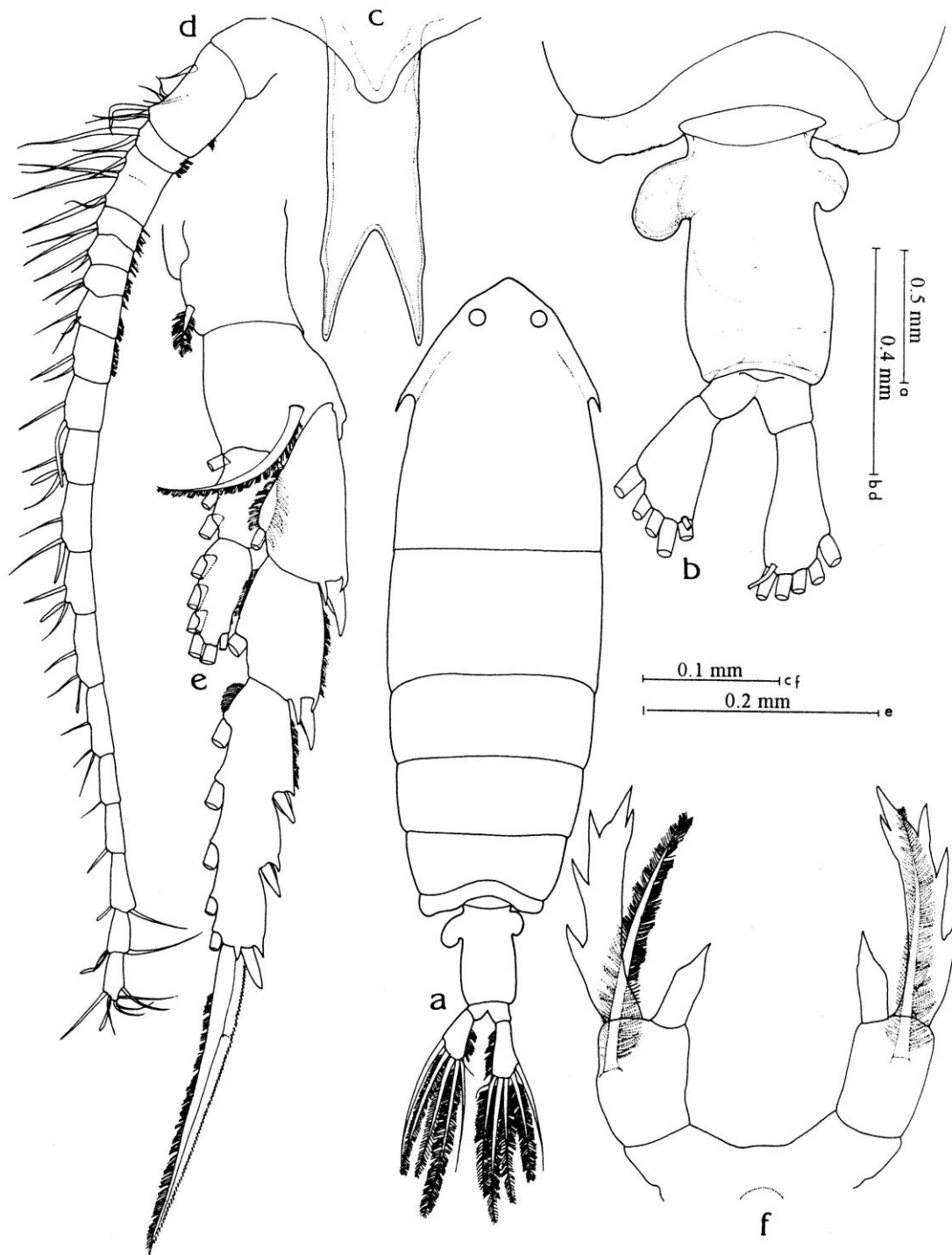


Figure 4. *Ivellopsis elephas* (Brady1883). Female collected from Damar Besar Island, Jakarta Bay. a, habitus, whole specimen, dorsal view; b, Pdg5 and urosome, dorsal view; c, rostrum, anterior view; d, antennule; e, 4th leg; f, 5th legs.

Urosome composed of 2 somites, genital double somite rectangular, asymmetrical, longer than lengths of anal somite and CR combined, right margin with large thumb-like protuberance near base, left margin smoothly curving ending with angular indentation posteriorly, each joined to somite by narrow neck. Brady (1883: pl. 38) shows these processes to be fringed with hair-like setules; these elements were not seen in the Indonesian

and Singapore specimens. Ur2 (anal somite) asymmetrical, small, short. CR asymmetrical, right ramus wider than left, enlarged distally, more than twice as long as wide, inner margins hirsute (Fig. 4a, b).

A1 with 22 segments as mentioned by Claus (1893) and Wickstead & Krishnaswamy (1964), not 23 as reported by Brady (1883). P5 symmetrical, with coxa, basis, and 1-segmented Re and Ri; basis with 1 plumose seta on posterior surface; Re with 3 outer and 2 apical spines; Ri spiniform.

Male.- Prosome elongate, Pdg4 and Pdg5 distinct and not fused as reported by Brady (1883) and Wickstead & Krishnaswamy (1964), posterior corners of Pdg5 produced into rounded lobes, somewhat symmetrical, lateral cephalic hooks prominent. Rostrum bifurcate, asymmetrical, left side shorter and broader than right, without visible lens structure, rostral lenses absent. Urosome composed of 5 somites, naked, genital somite asymmetrical, left side inflated posteriorly; Ur3 longest, anal somite shortest, CR asymmetrical, right ramus being longer. Left A1 19-segmented, reaching distal end of Pdg2 when stretched backwards. Right A1 inflated medially, without processes, proximal hinge of segment with 1 large saucer-like process ornamented with blunt teeth, dorsal hinge of segment short, anterior margin with 2 simple denticulated ridges (Fig. 5d).

P5 rather small, asymmetrical, right leg with short coxa, basis with 1 plumose seta on posterior surface, thumb of Re1 (chela) massive with elongate thumb, curved inwards distally, with 1 seta on base, without process on middle segment. Re2 long and curved inwards (90°) with 1 apical and 2 unequal marginal spines. Left leg with short coxa, basis with 1 plumose seta, Re1 with 1 distolateral spine, Re2 curved and slender, bifurcate at apex and with 3 outer spinules, inner margin hirsute.

Remarks.—Brady (1883) described *Pontella elephas* based on specimens collected from off Sibago Island, Philippines. Subsequently, the species was recorded from off Singapore and the Indian Ocean (Wickstead 1961, Wickstead & Krishnaswamy 1964, Silas & Pillai, 1973). The species was transferred to the genus *Ivellopsis* by Giesbrecht & Schmeil (1898) based on the antennules consist of 22-segmented, the posterior corners of Pdg5 produced into rounded processes, the rostral lenses are absent, the Ri of P1 is 3-segmented in both sexes. The female characterized by the urosome has 2-somites, the anal somite is short, and the P5 is of the pontellid type. In the male, the urosome consists of 5-somites (not 4-somites as reported by Brady (1883) and Wickstead & Krishnaswamy (1964), the P5 is well developed but not powerfully built as in *Pontella*, *Labidocera* and *Anomalocera*.

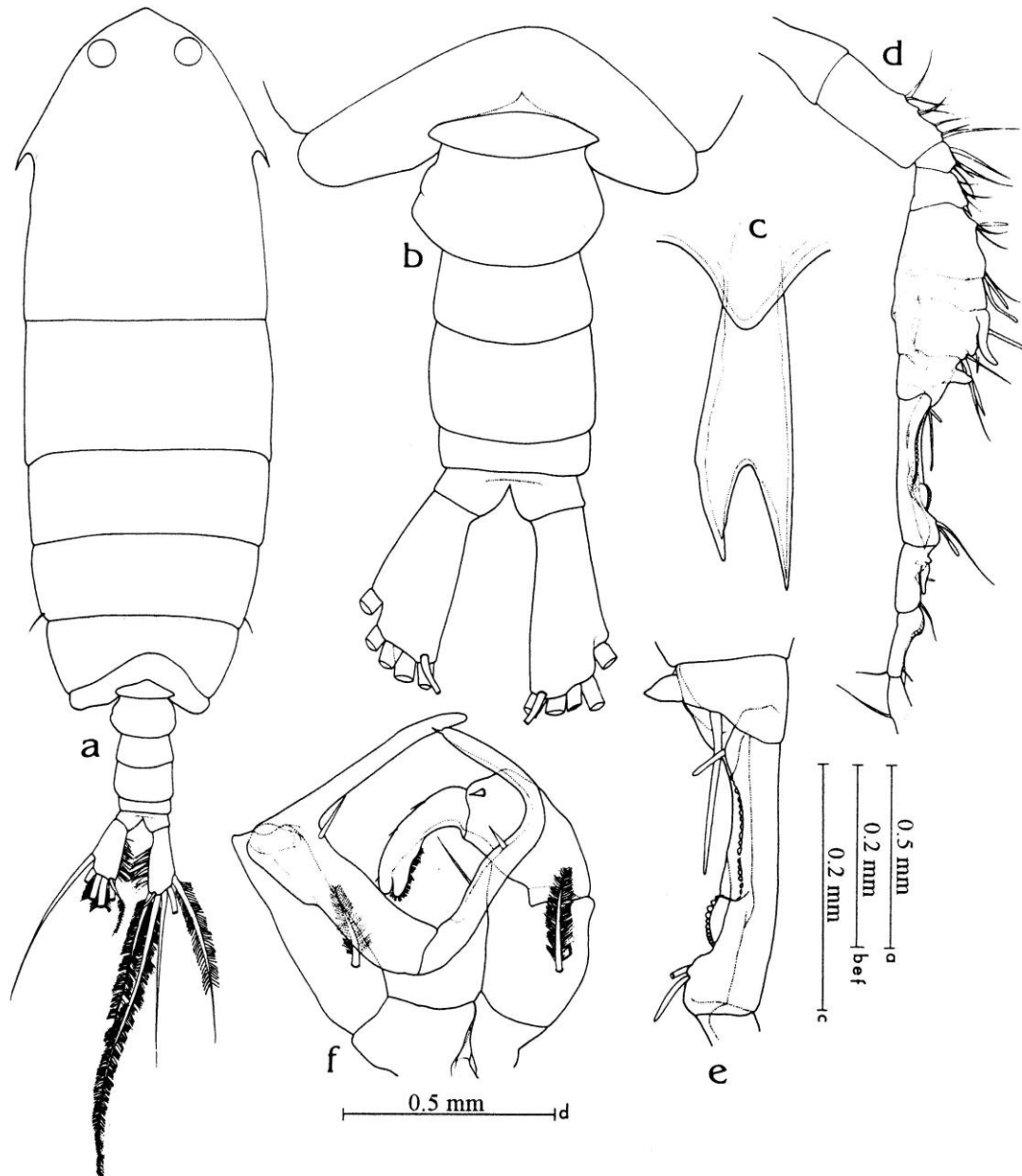


Figure 5. *Ivellopsis elephas* (Brady 1883). Male collected from Damar Besar Insalnd, Jakarta Bay. a, habitus, whole specimen, dorsal view; b, Pd5 and urosome, dorsal view; c, rostrum, anterior view; d, right A1; e, geniculate segments of right A1; f, 5th legs.

Later on Scott (1909) described *P. forficula* based on two male specimens collected from the Sulu Sea, southern Philippines. The present female specimens agree with the figures provided by Brady (1883), Wilson (1950 as *P. valida*), and Wickstead & Krishnaswamy (1964). Slight differences were found with respect to Brady's (1883) figures of the female, (1) the genital double-somite has 1 naked and rounded process on each side near its base (Fig. 4a, b) (vs. distal part of left rounded process with many setae) (Brady 1883, fig.14), (2) CR asymmetrical, right ramus longer and wider than left (vs. CR almost symmetrical) in Brady (1883, fig. 14).

The female of *Ivellopsis elephas* has found at the islands Panaitan, Damar Besar, Sempu, Bali, Lombok, and near Bunaken Island, and always co-occurs with the male of *P. forficula*. Our analyses of the characteristics of both, especially the characteristics of the absence of rostral lens, the right antennules and the fifth legs forms, resulted in the conclusion that *P. forficula* A. Scott, 1909 must be treated as the male of *Ivellopsis elephas* (Brady, 1883), and therefore Scott's (1909) species name is invalid.

Distribution.—Wickstead (1961) remarked that on the basis of the pattern of water movements, *I. elephas* could be expected to extent at least to the South China Sea, Java Sea and Sulawesi Sea. The close association of this species with floating *Sargassum* was stressed by Wickstead & Krishnaswamy (1964). However, these authors failed to comment on Wilson's (1950) remarks about the conspecificity of *Pontella valida* Dana 1849 and *Ivellopsis elephas* (Brady, 1883). Sherman (1964) clarified the position by redescribing *P. valida* from the central south Pacific. Sherman (1964) has thus shown that Wilson's remarks on *P. valida* are based on misidentification, and that his description and figures (Wilson 1950: 301-303, pl. 29 figs. 432-444) actually represent *I. elephas*. Wilson (1950) misidentified the male he described as *P. surrecta*; the examination of the type specimens confirmed that this male should be referred to as *I. elephas*. This clarification on the validity of *P. valida* Dana, 1849 by Sherman (1964) drew my attention to re-examine *P. forficula* A. Scott, which was described by him from the Philippine seas from where *I. elephas* had been described. The present record of *I. elephas* (Brady) in Indonesian waters, adds more localities to the known distribution of this species.

***Ivellopsis denticauda* (A. Scott, 1909) (figs. 6-7)**

Pontella denticauda A. Scott, 1909: 161, pl. 25, figs. 1-12 (type locality: from 13 Siboga stations, eastern Indonesian waters); Sewell, 1932: 376; Wilson, 1950: 291; Silas & Pillai, 1973: 828, fig. 23; Matsuo & Marumo, 1982: 93; Madhupratap & Haridas, 1986: 109; Mulyadi, 2002: 90, fig. 29.

Material examined.- 10 females (2.91-2.95 mm), 10 males (2.54-2.58 mm) (MZB Cr. Cop. 133) collected by author from Damar Besar Island, Jakarta Bay, by surface tow of 0.33 mm plankton net at daytime on 16 December 2009.

Female.- Body (Fig. 6a) robust; cephalon triangular and rather sharply pointed in front, but without median crest, with distinct lateral hooks on each side; articulations between cephalon and Pdg1, and between Pdg4 and Pdg5 distinct, posterior corners of Pdg5 produced into slightly asymmetrical, rounded processes. Rostrum bifid, symmetrical, thickened basally,

stout and pointed, directed downward, rostral lenses present. Dorsal eye lenses distinct and rounded and more or less concealed by their opaque covering. A1 22-segmented reaching to distal end of Pdg3 when stretched backwards.

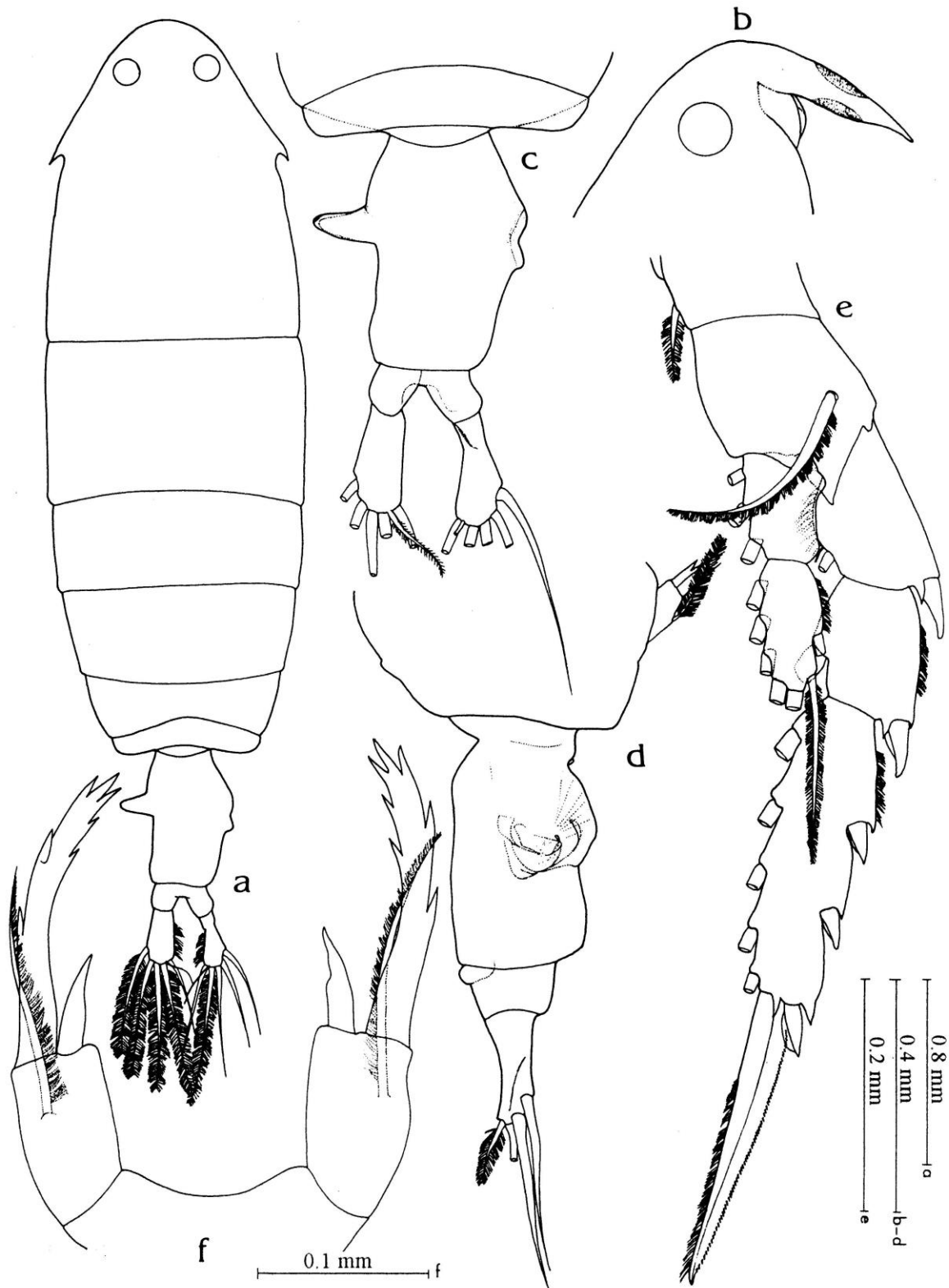


Figure 6. *Ivellopsis denticauda* (A. Scott 1909). Female collected from Damar Besar island, Jakarta Bay. a, habitus, whole specimen, dorsal view; b, cephalon, lateral view; c, Ms5 and urosome, dorsal view; d, Ms5 and urosome, lateral view; e, 4th leg; f, 5th legs.

Urosome (Fig. 6a, d) composed of 2 somites, genital double-somite rectangular, asymmetrical, longer than the combined lengths of anal somite and CR, with 1 rounded process on each side near base, left process much larger than right. Ur2 (anal somite) asymmetrical, small and short. CR asymmetrical, left ramus distinctly broader than right, enlarged distally, more than twice as long as wide, inner margins hirsute. P5 almost symmetrical, with coxa, basis, and 1-segmented Re and Ri; basis with 1 plumose seta on posterior surface; Re with 3 outer, 3 inner and 1 apical spines; Ri acuminate.

Male.- Prosome (Fig. 7a) elongate, posterior corners of Pdg5 produced into rounded lobes, somewhat symmetrical, lateral cephalic hooks prominent. Rostrum bifurcate, asymmetrical, left side shorter and broader than right, rostral lenses present. Urosome composed of 5 somites, naked, genital somite asymmetrical, left side inflated posteriorly; Ur3 longest, anal somite shortest, CR asymmetrical, right ramus being longer. Left A1 asymmetrical, right one geniculate, segment 14 with stout, elongate spine, anterior margin from distal end of segment 16 to $\frac{3}{4}$ of segment 18 with toothed ridge of denticles, proximal denticles being triangular and distal ones villiform and depressed close together; fused segments 19-21 carrying a pear-shaped projection at its proximal part and a non-serrated plate and ending in short spine distally, segments 22-25 completely fused (Fig. 7d).

P5, right leg, coxa short, proximal of basis with 1 large spinous process which Scott (1909) described as 'rudimentary' Ri, 1 small distal process, 1 spine-like process and 1 small seta medially, and 1 spine-like seta; thumb large and stout, $\frac{1}{3}$ length of thumb curved outwards with 1 seta near base, inner margin of hand with a spine-like seta and 1 conspicuous tubular blunt process distally; Re2 (claw) lamelliform and spoon-shaped and armed with two setae. Left leg 3-segmented, basis broader with a small spine attached to seta; Re1 with small distolateral spine; Re2 terminating in 2 strong subequal spines, inner one pointed with marginal setules, outer spine longer and stout, with 3 outer spines (Fig. 7e-g).

Remarks.- A. Scott (1909) originally described *P. denticauda* from the Sulu, Sulawesi and Timor Seas. The present females are similar with the female figures by A. Scott (1909) in the following characters: (1) the A1 with 22 segments, (2) the Ri of P5 not very slightly bifurcated at apex, and (3) the genital double-somite with 1 rounded process on each side near base, left process much larger than right. *Pontella denticauda* A. Scott, 1909 must be included in the genus *Ivellopis* Claus, 1893 because the female processes: the posterior corners of Pdg5 produced into rounded lobes, the A1 has 22 segments, the genital double-somite bears 2 lateral processes, and the Re of P5 has 3 apical spines, with acuminate Ri. The male was identified by its having of: (1) the posterior corners of Pdg5 produced into rounded lobes, (2) the CR asymmetrical, right ramus slightly longer than left ramus, and (3) the terminal segment (Re2) of left P5 curved and slender, bifurcate at apex and inner margin hirsute.

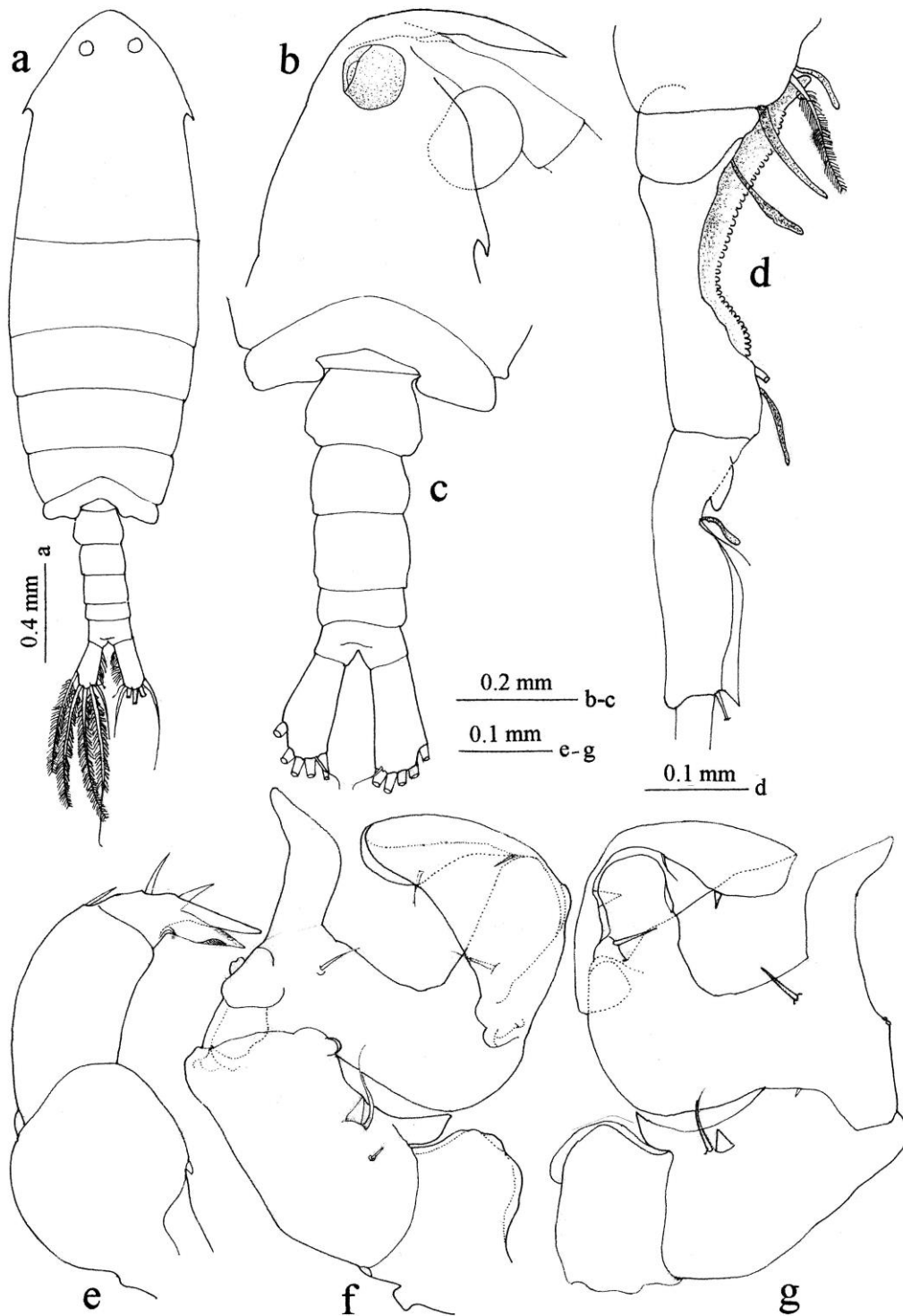


Figure 7. *Ivellopsis denticauda* (A. Scott 1909). Male collected from Damar Besra Island, Jakarta Bay. a, habitus, whole specimen, dorsal view; b, cephalon, lateral view; c, Pdg5 and urosome, dorsal view; d, geniculate region of right A1; e, left 5th legs; f-g, right 5th legs

Distribution.- An Indo-West Pacific, warm water epiplanktonic form. Indian Ocean records include Sewell (1932) from the Bay of Bengal. Silas & Pillai (1973) from Andaman Sea. Veronina (1962) from eastern Indian Ocean, south Java. Wilson (1950) described a

single female of this species from Caldera Bay, west Mindanao, Philippines, and (present records) from Panaitan Island-Sunda Strait, Damar Besar Island-Jakarta Bay, off Bojonegara-Banten, Sempu Island-east Java, Bali Strait, Togean Island-central Sulawesi, Bunaken Island-Manado Bay, and Manyilibit Bay, Raja Ampat, West Papua.

DISCUSSIONS

The species of *Pontella* comprise a somewhat heterogenous assemblage. So far, no complete review of the group based on the study of species from all over the world have been made, and very few attempts have ever been made to separate groups of related species. As will be shown, there are several groups of different species, each sharing a number of important features, thus constituting several morphologically distinct groups. In the genus *Pontella* species and species-groups can be distinguished by the structure of the last pedigerous somite, the genital somite, the caudal rami, the rostrum, and the fifth legs of both sexes (Ohtsuka *et al.* 1987, Mulyadi 2002, 2003).

Fleminger (1986) recognised three species-groups among the Indo-West Pacific species of *Pontella*, i.e., the *P. alata*, the *P. andersoni* and the *P. fera* groups, but he did not give any definition of these groups. Subsequently, Ohtsuka *et al.* (1987) defined the *P. alata* group when establishing the new species *P. rostraticauda*. Although Fleminger (1986) did not give a definition for those species-groups, they are distinguished by a combination of characters as listed in Table 2.

Table 2. Characteristic features of three *Pontella* species groups in the Indo-West Pacific

	<i>P. alata</i> group	<i>P. andersoni</i> group	<i>P. fera</i> group
Female:			
Ur1	Left side with large process extending posteriorly. Genital opening with spini-form operculum	Symmetrical, not produced ventrally	Left margin swollen, 2 ventral processes present
CR	Asymmetrical, right ramus larger	Symmetrical	Asymmetrical, left ramus larger
Rostral lens	Absent	Absent	Present
P5	Asymmetrical, right Re shorter, Re's virtually naked	Symmetrical, Re with 3 Se and 1 Si	Symmetrical, Re with 3 Se and 3 Si
Male:			
Rostrum	With large double convex lens.	With small lens	Without lens
Fifth legs			
Right Re1	With 1 slender elongated thumb and 1 slender digitiform process	With 3 spiniform processes, without digitiform process	With 3 digitiform processes of unequal length
Left Re2	Short, with 1 large aesthetasc-like seta besides robust spine at apex	Elongated, without aesthetasc-like seta	Short, without aesthetasc-like seta

The distributional characteristics of each record of species and their groups as obtained in the present study, are as follows: *P. alata* (= *P. cerami*) belongs to the *alata* species-group, while *Ivellopsis* is monotypic. Currently, the *P. alata* species-group contains *P. alata* A. Scott 1909 (= *P. cerami* A. Scott 1909), *P. surrecta* Wilson 1950, and *P. rostracticauda* Ohtsuka *et al.*, 1987. Published records of the *P. alata* group form a narrow but distinctive band crossing the broadly tropical from eastern Australia to southern Japan. *Pontella surrecta* tends to occur in coastal waters on the Pacific Ocean side of these island, whereas *P. alata* predominates west of these same islands along the coast facing the eastern seas of the Indo-Malayan region. It may also occur south in the Ryukyus and possibly as far as Taiwan. The rest of species, *P. rostracticauda* is endemic to the southern Japanese waters.

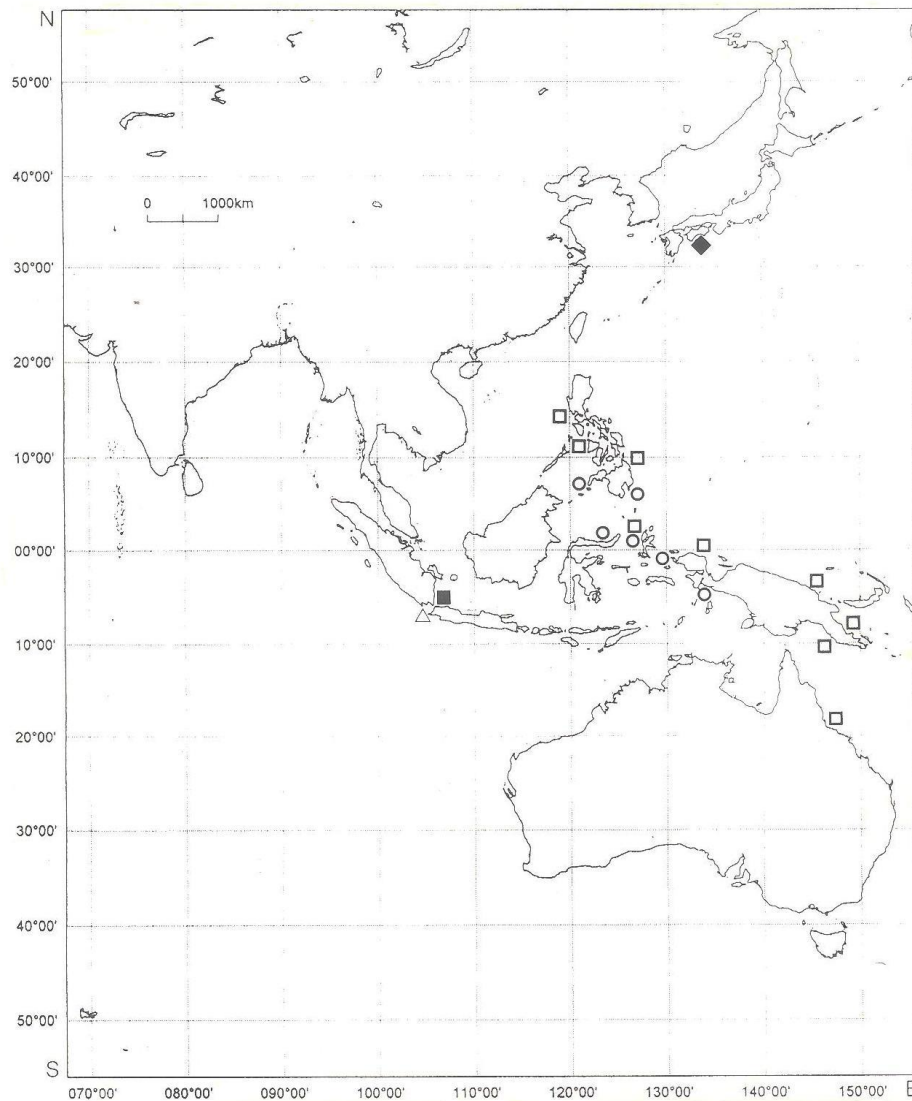


Figure 8. Distribution of new records and published records of the *Pontella alata* species group: *Pontella surrecta* Wilson, *P. alata* A. Scott (= *P. cerami* A. Scott), and *P. rostracticauda* Ohtsuka, Fleminger and Onbé. □ = *P. alata* (previous records); ■ = *P. surrecta* (new records); ○ = *P. alata* (new records); ◆ = *P. rostracticauda*.

The male of *Pontella forficula* and the female of *Ivelloopsis elephas* were found at almost all sites here studied, but were not very abundant. Brady (1883) described a new species of *Pontella*, which he named *P. elephas* based on male specimens collected from off Sibago Island, Philippines. Claus (1893), in his revision of the Pontellidae, created new sub-genus *Ivelloopsis* to include this species. Giesbrecht & Schmeil (1898) raised this sub-genus to the genus rank. Since its original description, this species has not been reported again. Wickstead (1961) and Wickstead & Krishnaswamy (1964) reported its occurrence off Singapore.

Another Indo-Malayan *Pontella*, *P. denticauda* A. Scott, 1909 must also be included in the genus *Ivelloopsis* Claus, 1893. The species was originally described by A. Scott (1909) from the Sulawesi, Timor and Sulu Seas near west Mindanao, Philippines, extends its distribution to the Bay of Bengal, India (Silas & Pillai 1973), eastern Indian Ocean, south of Java (Veronina, 1962), and widely recorded in Indonesian waters (present records).

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Acknowledgements. Acknowledgements of grants, assistance and other matters can be written here in one paragraph.

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