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COMPOSITION AND DISTRIBUTION OF THE FAMILY PONTELLIDAE (CRUSTACEA: COPEPODA) IN INDONESIAN WATERS*)

Mulyadi
Balitbang Zoology, Puslitbang Biologi-LIPI, Cibinong-Bogor

ABSTRACT

COMPOSITION AND DISTRIBUTION OF THE FAMILY PONTELLIDAE (CRUSTACEA: COPEPODA) IN INDONESIAN WATERS. MULYADI. Very few studies on the taxonomy and ecology of the family Pontellidae from Indonesian waters have been carried out. The present paper deals with relevant informations on the composition and distribution of pontellid species collected from 15 sites in the Indonesian waters during 1985-1995. Forty-two species belonging to 5 genera were recorded. Seven of these species were new to science including 4 species *Calanopia asymmetrica* Mulyadi & Ueda, 1996, *Labidocera javaensis*, *L. muranoi*, and *Pontella labuanensis* (which are publication), and other 15 species are new records.

Keywords: distribution, family Pontellidae, species-groups, Indonesian waters.

ABSTRAK

KOMPOSISI DAN DISTRIBUSI FAMILI PONTELLIDAE (KRUSTASEA: KOPEPODA) DI PERAIRAN INDONESIA, MULYADI. Pengetahuan mengenai taksonomi dan ekologi dari famili Pontellidae di perairan Indonesia masih sangat terbatas. Penelitian kali ini bertujuan untuk memberikan informasi yang relevan mengenai komposisi dan distribusi dari jenis-jenis pontellid yang dikoleksi dari 15 area di perairan Indonesia selama 1985-1995. Empatpuluh-dua jenis dalam 5 genera ditemukan, *Calanopia asymmetrica* Mulyadi & Ueda, 1996, *Labidocera javaensis*, dan *Pontella labuanensis* (siap dipublikasikan), dan 15 jenis lainnya adalah jenis yang pertama kalinya dilaporkan di Indonesia.

Kata kunci: distribusi, famili Pontellidae, kelompok-jenis, perairan Indonesia.

INTRODUCTION

The family Pontellidae comprises of 140 known species (Silas & Pillai, 1973). Species of Pontellidae generally predominate or concentrate in the surface layer in tropical to warm temperate latitudes and have been used as a biological indicator to characterize water masses, major zoogeographic divisions, and

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inshore-offshore boundaries. In view of the importance of Pontellidae in such studies, taxonomic and ecological investigation of this family were taken up.

In Indonesian waters, hitherto 35 pontellid species have been reported (Cleve, 1901; Carl, 1907;

A. Scott, 1909; Fleminger & Hulsemann 1974; Fleminger *et al.*, 1982; and Ohtsuka *et al.*, 1987. Although some studies on Pontellidae have been done in Indonesian waters, it is obvious that knowledge of distribution patterns is limited to species within quite restricted groups. Much more basic and synoptic systematic works are prerequisite to discuss the distribution patterns of pontellid species in Indonesian waters.

The purpose of the present study are to provide the more specific and accurate information
on the taxonomy of pontellid species, their distribution, and the use of some pontellid species as biological indicators in the Indonesian waters. The author have examined more than 100 samples collected from 15 sites in Indonesian waters.

MATERIALS AND METHODS

The present plankton samples, many of which were provided by collections of Research and Development Centre of Oceanology, Indonesian Institute of Sciences (LIPI), were collected at 15 sites in Indonesian waters during 1985-1995. A map of study sites is shown in Fig. 1. Sampling date, number of stations and samples and maximum depth in vertical net hauls at each site were shown in Table 1. All sites except that in the Flores Sea were located near the coast. In the present study, stations at each site were dealt with as a whole except Site 1 (Cilacap Bay), where environment differ largely among stations.

For convinience of description, these sites are divided into three areas with the consideration of their topography and hydrological conditions. They were the coastal waters of Indian Sea side of south Java (Area A including Sites 1 and 2), the Java Sea (Area B including Sites 3 to 5) and the eastern region (Area C including Sites 6 to 15). Samplings done by the author were surface and vertical hauls (from 10-25 m, deep to surface) of conical plankton nets (0.1 mm and 0.33 mm mesh size; 0.3 m and 0.45 m mouth aperture). Samples provided by LIPI were obtained by vertical hauls (from 100 m or 200 m deep to surface) of a 0.45 m diameter conical plankton net with 0.33 mm mesh, except in the Ambon Bay (Site 10) where samples were collected by surface tows. The samples were fixed and preserved in 5% formalin/sea water solution. During the study, water temperature and salinity were measured by a YSI 33 M S-T meter at sites 1 to 5 and 10, and a deep-sea reversing thermometers and a Beckman, Model RS 7-C portable Induction Salinometer at sites 6 to 9 and 11 to 15.

RESULT AND DISCUSSION

A total of 42 species of pontellid were identified during the study, including 5 species of *Calanopia*, 11 of *Labidocera*, 14 of *Pontella*, 9 of *Pontellopsis*, and 3 of *Pontellina* (Table 2). Among these species, *Calanopia asymmetrica* Mulyadi & Ueda, 1996 is a new species, *Labidocera javaensis*, *L. muranoi* and *Pontella labuanensis* have been accepted for publication (Mulyadi, in press), and 3 species denoted here without specific name, may be new to science. Further 15 known species (marked with an asterisk) have been recorded for the first time from Indonesian waters. A large number of species from this family have been recorded for the first time from Indonesian waters. A large number of species from this family have been reported from surface waters of the Indian and Pacific Oceans (Pillai, 1975; Silas & Pillai, 1973; Grice, 1962; Fleminger, 1986). Species of this family were never abundant in the present samples and the frequency of occurrence of many species is not clear. However, random analysis of neuston samples revealed large number of specimens belong to this family, thus showing that vertical hauls do not give a true picture of their abundance. Many of the species appear to be chiefly neritic albeit also occurring rarely in oceanic waters.

Most pontellid species are recorded only in the surface waters of Java Sea, except *Labidocera bataviae*, *L. laevidentata*, *Pontellopisis armata*, *P. regalis*, *Pontellina morii*, *P. plumata*, and *P. sobrina*. *Calanopia elliptica*, *C. minor*, *Labidocera acuta*, and *L. minuta*, which occurred commonly in Indonesian waters.

All the species mentioned above were analysed for the purpose of clarifying the geographi-cal distribution patterns. Their distributional patterns and habitats are listed in Table 2. The largest num-bers of Indonesian pontellid species are belonging to Indo-Pacific species comprising 42.8% (18 species). The species are only recorded from the Indian or Pacific Ocean occupy 23.8% (10 species) and 2.4% (1 species, *Pontellina sobrina*), respectively. Among the rest of species 11.9% (5 species) have been though to be endemic species for China Sea and 2.3% (1 species, *Pontella forcicula*) for the Philippines waters before this study, and 16.7% (7 species) are new species.

1. Grouping of the pontellid species

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

Fleminger (1967, 1986) and Fleminger *et al.* (1982) recognized seven species-groups among the Indo-West Pacific *Labidocera* and *Pontella*: i.e., the *L. detruncata*-group, the *L. kroyeri*-group, the *L. pectinata*-group, the *P. alata*-group, the *P. andersoni*-group, the *P. fera*-group, and yet to be assigned-group, but they did not give any definitions for these groups. By analizing the characteristics of all these groups I still recognize some other new groups. They are the 4th group of *Labidocera*, the *L. minuta*-group; and 4th, 5th and 6th groups of *Pontella*, the *P. danae*-group, the *P. labuanensis*-group, and the *Unassigned*-group, respectively (marked with an asterisk). Therefore all the species of *Labidocera* and *Pontella* recorded in this study were divided into 5 *Labidocera* species-groups (*detruncata*, *kroyeri*, *minuta**, *pectinata*, and *unassigned*-groups), and 6 *Pontella* species-groups (*alata*, *andersoni*, *fera*, *danae**, *labuanensis**, and *un-assigned*-groups*). The characteristic features of the Indo-West Pacific *Pontella*-groups and *Labidocera*-groups and their members were explained in detail by Ohtsuka *et al.* (1986), Fleminger *et al.* (1982), and Mulyadi (in press).

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

L. detruncata-group Fleminger, 1967 (mostly tropical, neritic or island forms of Indo-West Pacific): *L. bataviae* A. Scott, *L. detruncata* (Dana), *L. pavo* Giesbrecht, *L. sinilobata* Shen & Lee.

L. kroyeri-group Fleminger, 1967 (predominantly neritic, Indo-West Pacific): *L. kroyeri* (Brady), *L. muranoi* n. sp.

M. minuta-group (predominantly neritic, Indo-West Pacific): *L. acuta* (Dana), *L. laevidentata* (Brady).

N. alata-group Fleminger, 1967 (predominantly neritic, Indo-West Pacific): *P. surrecta* Wilson, *P. tridactyla* Shen & Lee.

O. andersoni-groupFleminger, 1986 (predominantly neritic, Indo-West Pacific): *P. andersoni* Sewell.

P. fera-group Fleminger, 1986 (predominantly neritic, Indo-West Pacific): *P. denticauda* A. Scott, *P. fera* Dana, *P. valida* Dana.

P. danae-group (predominantly neritic, Indo-West Pacific): *P. latifurca* Chen & Zhang.

P. labuanensis-group (neritic, Indian Sea side of southern Java): *P. labuanensis* n. sp. ***Unassigned***-group)predominantly neritic, Indo-West Pacific): *P. diagonalis* Wilson, *P. forcicula* A. Scott, provisionally designated as *Pontella* sp.1 and *Pontella* sp.2.

Distribution of published and new records of the *P. alata*-group are restricted to inshore regions of sea areas between 33°N and 20°S and 106°E (Fig. 2). *P. surrecta* widely distributed from eastern Australian waters to Philippine waters; *P. alata* in the vicinity of Wallacea; *P. tridactyla* from the South China Sea to Java Sea; and *P. rostracticauda* to be endemic to the southern Japanese waters.

Figure 3 shows the distribution of *L. pectinata*-group including a new species, *L. javaensis*. *L. japonica* is restricted to Japanese waters (Mori, 1937): *L. papuensis* is endemic to Sorong Sea (Fleminger *et al.* 1982); *L. moretoni* to eastern Australian waters: *L. carpentariensis* to Gulf of Carpentaria and northern Arafura Sea; *L. pectinata* to coastal neritic waters of north-east Indian Seas; and *L. javaensis* n. sp. to Java Sea.

Fleminger (1986) mentioned an undescribed species belonging to the *L. pectinata*-group, *Labidocera* sp.#3, inhabiting coastal waters of the Indian side of the Greater Sunda Islands. There is a high possibility that *L. javaensis* is identical with his undescribed species, but the whereabouts of the specimen was unknown (Mullin, Greenwood, Park, and Ohman, pers. comm.). Fleminger records (1986) of the *L. rotunda* inhabiting coastal-neritic waters from the southern Japan Sea to Java Sea is doubtful, because no *L. rotunda* specimen was obtained during this study.

Published records of the *L. kroyeri*-group are restricted to inshore regions of tropical and subtropical areas between 35°N and 25°S and 70°E and 151°E (Fig. 4). *L. kroyeri* is widely distributed within this area, however, the rest of the group seem to have a relatively narrow distribution range, i.e., *L. dakini* from eastern Australian waters and Gulf of Carpentaria; *L. gallensis* and *L. stylifera* have only been recorded from the pheriphery of north-east Indian Sea. *L. muranoi* n. sp. collected from Cilacap Bay in Central Java, a mangrove estuary facing the Indian Ocean, may also have a narrow distribution range with a preference for low salinity.

2. Community composition of pontellids at each site and in each area

For the convinience of discussion, these sites are divided into 3 study areas as mentioned in Materials and Methods. I named the area including Cilacap Bay and Off Labuan (Sites 1 and 2) as Area A, the Java Sea (Sites 3, 4 and 5) as Area B, and the eastern waters (Sites 6 to 15) as Area C.

Among the pontellid species occurred in the present study, 7 species have been found from all the study areas (Table 2). These common species in Indonesian waters are mostly neritic and neritic-oceanic forms. Nine species restricted to eastern waters (Area C), 12 to Area B, 5 to Area A. The remainder of species occurred in two area, i.e., 5 to Areas A-B, 2 to Areas A-C, and 1 to Areas B-C, respectively.

2.1. Community composition in the Area A: Cilacap Bay (Site 1) and off Labuan (Site 2)

This area located in Indian Sea side of southern Java, which are influenced by the Indian Sea waters of high salinity and low temperature. Twenty species occurred in this area. Among them, *Calanopia australica*, *C. elliptica*, *C. minor*, and *L. pavo* were the commonly occurred species. Thirty-three species occurred in this area (Table 2). These includes some species which had been considered as endemic to other waters, i.e; one species to Indian Sea (*Pontellopsis scotti*) (Sewell, 1932; Silas & Pillai, 1973), 1 to the Pacific (*Pontellopsis yamadae*) (Mori, 1937), and 2 to the China Sea (*Pontellopsis inflatodigitata* and *Pontella tridactyla*) (Shen & Lee, 1963; Chen & Shen, 1974).

Cilacap Bay is located on the southern coast of Central Java, a mangrove estuary facing the Indian Ocean. Sampling of copepods were conducted at 9 stations (Mulyadi & Ishimaru, 1994). Nine pontellid species were identified from this area, including adults of both sexes and some copepodid stages. The pontellid species population was classified into 3 groups of species as follows; 1) Species tolerant to the low salinities which generally remain associated with the low salinity waters in the upper reaches of the estuary, e.g. *Pontella labuanensis*,

Pontellopsis herdmani; 2) Species tolerant to wide salinity range, i.e., *Pontellopsis scotti*; and 3) Marine species at the estuary entering from the Indian Sea, i.e., *L. pavo*, *L. acuta*.

Off Labuan is an intermediate area between the Java Sea and Indian Ocean, influenced by the surface water masses of the South China Sea as indicated by the presence of *P. inflatodigitata* and *P. tridactyla* in this area. Nineteen pontellid species were identified, with *L. pavo* (210 inds/m^3) as most abundant. *Calanopia aurivilli*, *P. labuanensis* n. sp. and *P. yamadae* were also found in this area, but absent in Java Sea.

2.2. Community composition in the Area B: Java Sea (Sites 3, 4 and 5)

The annual range in salinity in these water is large, caused by a considerable discharge of fresh waters from the many big rivers, especially in the rainy-season as well as by the inequality of salinity of the ocean-waters coming from the east, and the South China Sea water coming from the west, during the dry and wet-season, respectively. This area had a pontellid community with the most diversity among three study areas and a total of 26 species of pontellids were recorded, including 4 species (*L. sinilobata*, *P. latifurca*, *P. tridactyla*, and *P. inflatodigitata*) which have been recorded only from the China Sea. Among them, *L. bengalensis*, *L. javaensis* n. sp., *L. pavo*, and *C. elliptica* were commonly occurred species.

2.3. Community composition in the Area C: Eastern waters (Sites 6 to 15)

This area is influenced by the Indian and Pacific Oceans, so that the oceanic copepod species as well as cosmopolitan species have been occurred in high percentages.

A total of 19 species have been found from this area. Among them, *C. minor*, *L. laevidentata*, *Pontellina plumata* where the species which occurred in large numbers.

The number of neritic-oceanic species increased considerably from Sumbawa Sea to the Sorong Sea.

3. Comparison of pontellid community among three areas

The presence of some South China Sea species (*P. tridactyla* and *P. inflatodigitata*) at Labuan suggests that the surface water of Java Sea moving out to Sunda Strait. It is unlikely that the Indian water penetrates the Java Sea, as indicated by the absence of *C. aurivilli*, *P. herdmani*, *P. scotti*, and *P. labuanensis* n. sp. in Java Sea.

In the Area B (Java Sea) the pontellid species composition evidently have a coastal character. The dominant species in Java Sea were *C. australica*, *L. pavo*, *L. bengalensis*, and *L. javaensis* n. sp. *L. javaensis* n. sp. was present at almost sites in great abundance with the highest population density at off Labuan. *C. australica* was only abundant at off Tegal, and the number decreased markedly less than 100 inds/m^3 at off Surabaya. It was absent in Sumbawa Sea.

In the Area C, the species recorded were mainly composed of those recorded from Indo-Pacific waters.

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

This study has indicated some of the factor which need to be considered in future plankton studies, such as the movements of water which have been shown to have a considerable effect on the distribution of pontellids. Also, many problems concerning the animals themselves have not been solved. A more basic knowledge on the seasonal fluctuations, vertical migrations and physiology of copepods is required for this area.

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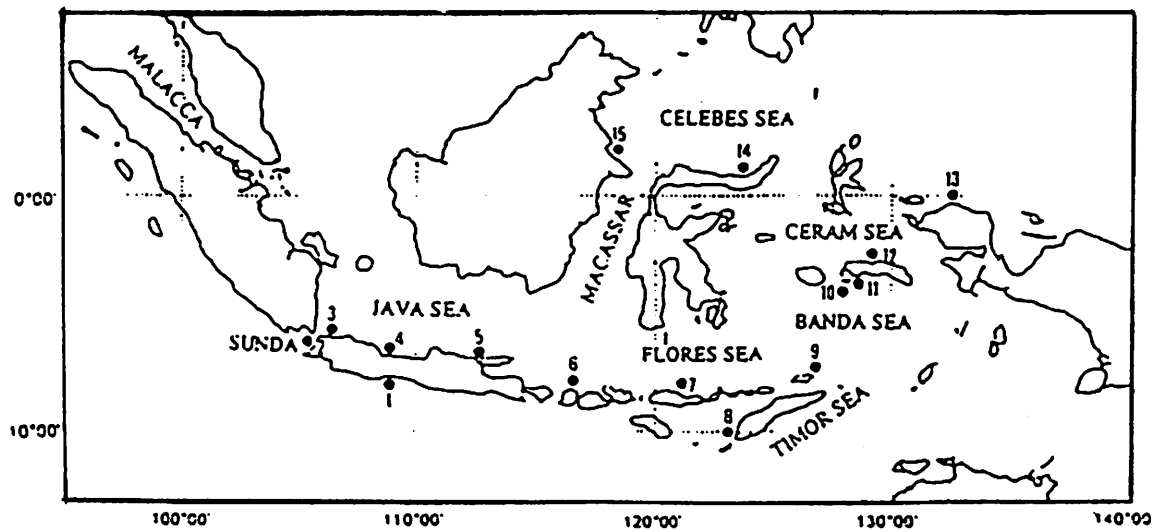

Figure 1. A Map of Indonesia waters showing study sites 1-15
Gambar 1. Peta perairan beserta stasiun penelitian 1-15

Table 1. Sampling sites, dates and number of samples in Indonesian waters
Tabel 1. Area pengambilan sampel, waktu dan jumlah sampel di perairan Indonesia

	Sites / Position	Date	Depth of hauls	Number of stations	Number of samples
1.	Cilacap Bay, Centra Java (07°40'S 109°00'E)	19 May 1993 6 June 1994	10 m	9	76 12
2.	Off Labuan, West Java (06°10'S 106°00'E)	11 May 1993 18 June 1994	5 m	6	34 72
3.	Jakarta Bay- Pari Island (06°00'S 106°45'E)	1-2 June 1994	25 m	3	48
4.	Off Tegal, Central Java	3-4 June 1994	10 m	5	71
5.	Off Surabaya, East Java (07°10'S 109°10'E)	8-9 June 1994	10 m	3	64
6.	Sumbawa Sea (08°40'S 112°45'E)	4 September 1993*	100 m	2	3
7.	Flores Sea (07°29'S 121°05'E)	15 February 1985*	100 m	2	3
8.	Kupang Sea (10°20'S 123°00'E)	15 December 1994*	100 m	2	3
9.	Banda Sea (07°39'S 126°50'E)	29 July 1992*	100 m	2	3
10.	Ambon Bay (03°40'S 128°10'E)	18 Jul, 12 Dec.1993+ 13-14 March 1995	25 m	6	10 91
11.	Haruku Strait (03°40'S 128°00'E)	2 August 1983*	100 m	1	3
12.	Seram Sea (03°16'S 129°00'E)	23 July 1991*	100 m	3	3
13.	Sorong Sea (00°20'S 132°10'E)	25 January 1995*	100 m	3	3
14.	Off North Sulawesi (01°30'N 124°00'E)	6-9 October 1994*	100 m	3	3
15.	Derawan Strait, Borneo (02°12'N 118°17'E)	22 October 1994*	100 m	3	3

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

Table 2. Species list of the family Pontellidae recorded in the present study, their sampling sites and their previous records in Indonesian waters, neiighbouring areas and the major oceans. O = present records, ● = previous records, n = new species, nr = new records, A = Indonesian waters, B = Malaysian waters, C = China Seas, D = Australasian waters, E = Japanese waters, F = Philippine waters, I = Indian Ocean, P = Pacific Ocean, At = Atlantic Ocean.

Tabel 2. Lis jenis dari famili Pontellidae yang ditemukan pada penelitian ini, areal pengambilan sampel dan laporan sebelumnya di perairan Indonesia dan sekitarnya serta perairan samudra. O = jenis yang ditemukan, ● = laporan sebelumnya, n = jenis baru, nr = pertama kali ditemukan, A = perairan Indonesia, B = perairan Malaysia, C = Laut Cina, D = perairan Australia, E = perairan Jepang, F = perairan Philipina, I = samudra India, P = samudra pacific, At = samudra Atlantik.

		SITES															Neighbouring areas Oceans								
	SPECIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	A	B	C	D	E	F	I	P	At
1.	*Calanopia aurivilli*		o								o						●	●		●		●	●		
2.	*C. asymmetria*		o		o	o											n								
3.	*C. australica*	o	o		o	o											nr	●		●			●		
4.	*C. elliptica*	o	o	o	o	o	o	o	o		o	o	o			o	●	●	●	●			●	●	
5.	*C. minor*	o	o	o		o	o		o	o	o	o	o	o	o	o	●	●	●			●	●		
6.	*Labidocera acuta*	o	o	o		o	o	o	o	o	o	o	o		o	o	●	●		●	●	●	●	●	
7.	*L. bataviae*										o						●				●		●	●	
8.	*L. bengalensis*		o	o	o	o					o			o			nr	●		●			●		
9.	*L. detruncata*										o						●				●		●	●	
10.	*L. javaensis*		o	o	o	o	o										n								
11.	*L. krayeri*		o	o	o	o		o			o						●	●	●	●	●	●	●	●	
12.	*L. laevidentata*									o		o	o			o	●	●		●	●	●	●	●	
13.	*L. minuta*		o	o	o	o	o		o		o				o	o	●	●	●	●	●	●	●	●	
14.	*L. muranoi*	o															n								
15.	*L. pavo*	o	o	o	o	o	o										●	●	●	●	●	●	●	●	
16.	*L. sinilabata*					o											nr		●						
17.	*Pontela andersoni*			o													nr						●		
18.	*P. denticanda*			o				o								o	●				●	●	●	●	
19.	*P. diaganalis*			o													nr					●	●		
20.	*P. fera*			o													●			●			●	●	
21.	*P. forcicula*			o		o											nr					●			
22.	*P. labuanensis*	o	o														n								
23.	*P. latifi:rea*					o											nr		●						
24.	*P. princeps*			o													nr		●				●		
25.	*P. spinipes*					o											●			●	●	●	●	●	
26.	*P. surrecta*			o													●					●	●		
27.	*P. tridactyla*		o	o	o	o											nr		●						
28.	*P. valida*			o													nr					●	●		
29.	*Pantella sp. 1*			o													n								
30.	*Pantella sp. 2*			o													n								
31.	*Pantellapsis armata*										o						●		●		●	●	●	●	
32.	*P. herdmani*	o	o														nr	●			●			●	
33.	*P. inflatadigitata*		o	o	o												nr		●						
34.	*P. krameri*		o								o						●		●	●			●	●	
35.	*P. macronyx*		o	o	o												●						●	●	
36.	*P. regalis*									o							●						●	●	
37.	*P. seotti*	o	o														nr						●		
38.	*P. yamadae*		o														nr		●		●				
39.	*Pontellopsis sp.*										o						n								
40.	*Pontellina morii*										o						●	●	●	●	●	●	●	●	
41.	*P. plumata*								o	o	o						●		●	●	●	●	●	●	
42.	*P. sabrina*										o						nr							●	

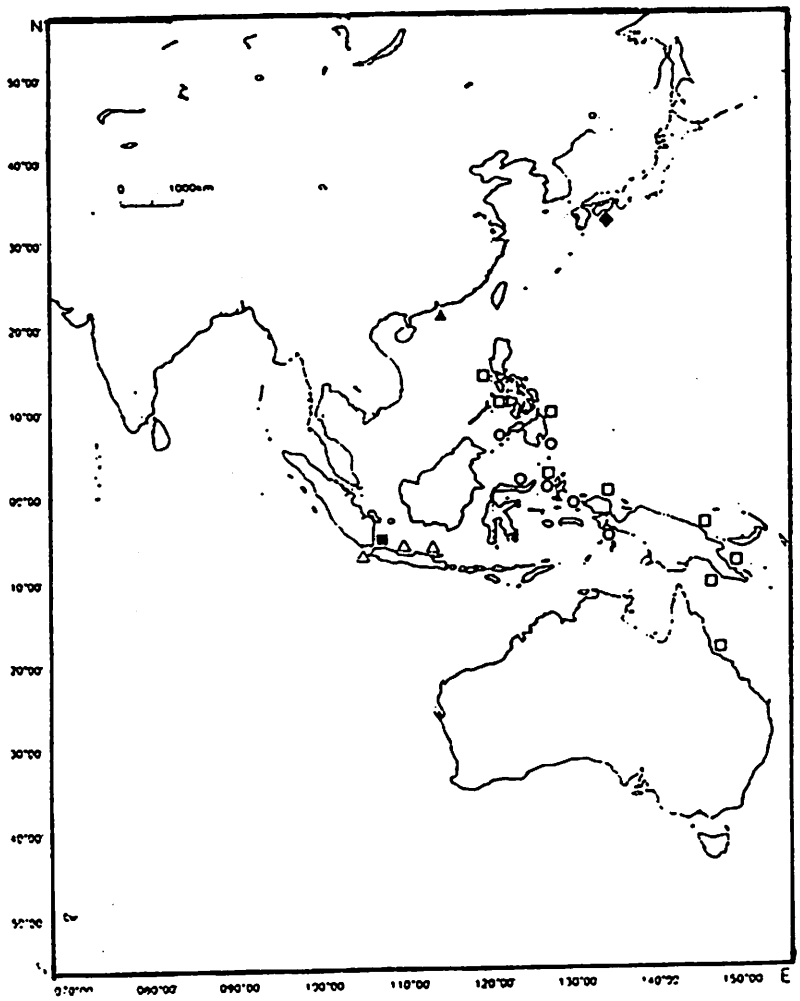

Figure 2 : Distribution of published and new records of the *Pontella alata* group
Gambar 2 : Publikasi dan data baru mengenai distribusi dari grup *Pontella alata*

◆ = ***P. rostraticauda*** Ohtsuka, Fleminger & Onbé (previous records). O = ***P. alata*** A. Scott (previous records), □ = ***P. surrecta*** Wilson (previous records), ■ = ***P. surrecta*** Wilson, ▲ = ***P. tridactyla*** Shen & Lee (previous records), △ = ***P. tridactyla*** Shen & Lee (new records).

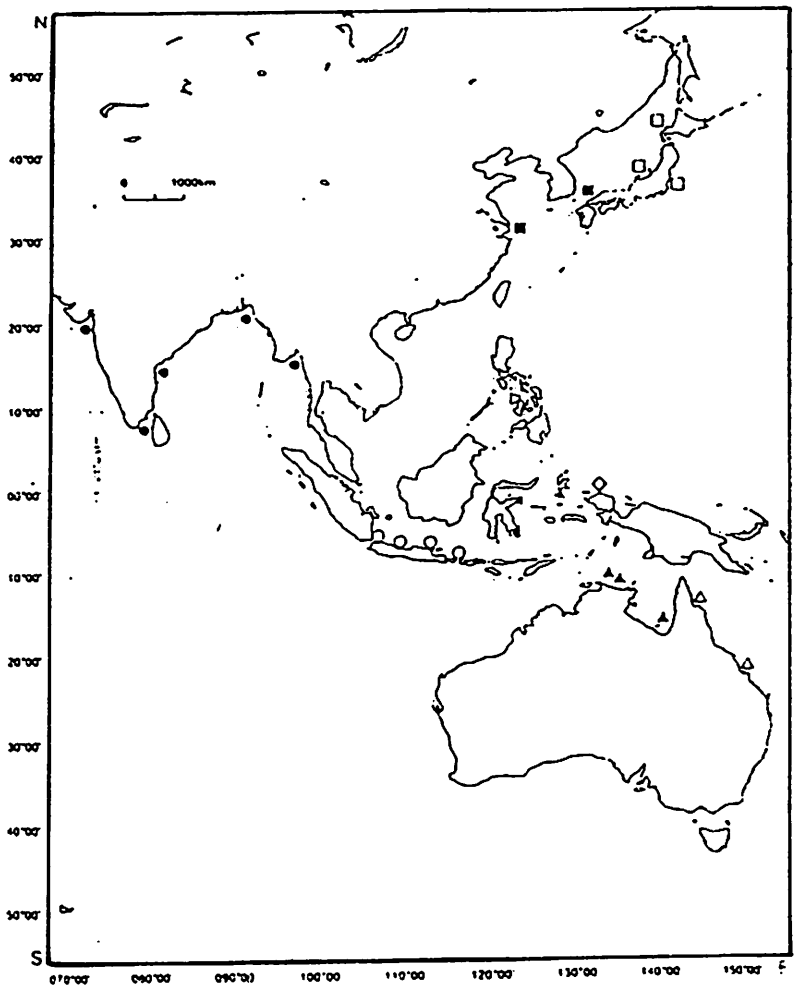

Figure 3 : Distribution of published and new records of the *Labidocera pectinata* group
Gambar 3 : Publikasi dan data baru mengenai distribusi dari grup *Labidocera pectinata*

● = ***L. pectinata*** Thompson & Scott, O = ***L. javaensis*** n. sp. ■ = ***L. rotunda*** *Mori*, □ = ***L. japonica*** Mori, ▲ = ***L. carpentariensis*** Fleminger, Othman & Green wood, △ = ***L. moretoni*** Greenwood, ◇ = ***L. papuensis*** Fleminger, Othman & Greenwood.

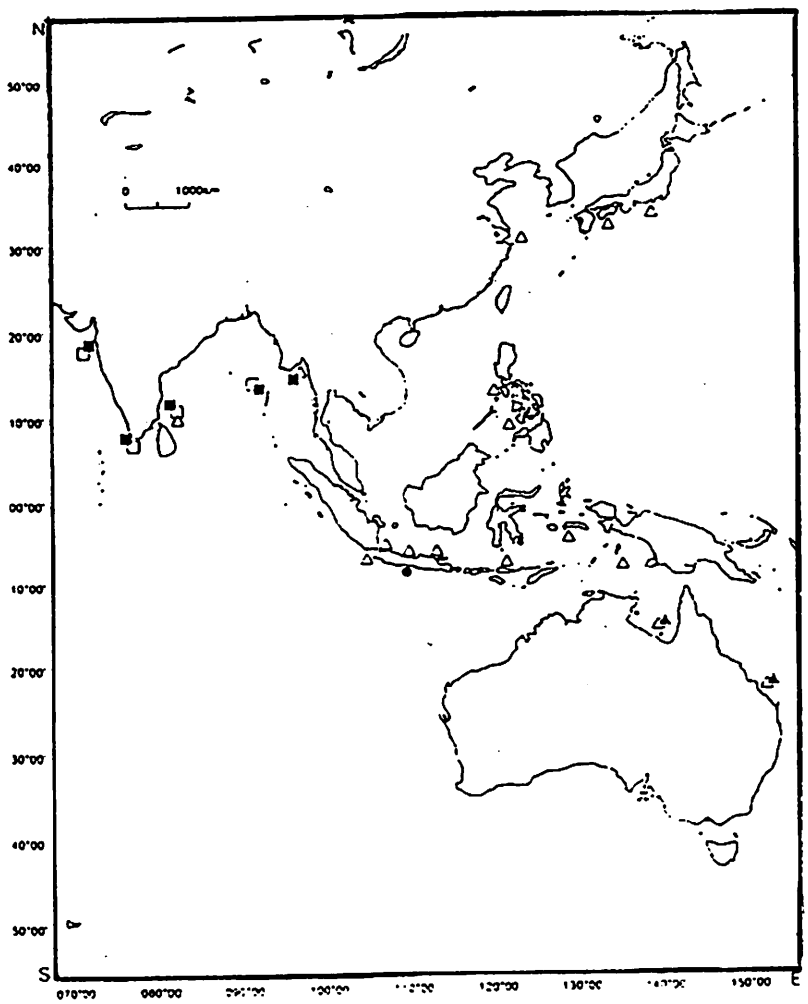

Figure 4 : Distribution of published and new records of the *Labidocera kroyeri* group
Gambar 4 : Publikasi dan data baru mengenai distribusi dari grup *Labidocera kroyeri*

▲ = ***L. dakini*** Greenwood, △ = ***L. kroyeri*** (Brady), ■ = ***L. gallensis*** Thompson & Scott, □ = ***L. styfera*** (Thompson & Scott), ● = ***L. muranoi*** n. sp.