

## HERMIT CRABS (CRUSTACEA: ANOMURA) OF THE ANAMBAS EXPEDITION 2002

Dwi Listyo Rahayu

Research Center for Oceanography, Indonesian Institute of Sciences  
Jl. Pasir Putih 1, Ancol Timur, Jakarta 14430, Indonesia  
Email: dwilistyo@yahoo.com

**ABSTRACT.** – Fourteen species of hermit crab families Coenobitidae, Diogenidae and Paguridae are reported from the terrestrial, littoral and shallow subtidal habitats in Anambas and Natuna Islands, Indonesia. Almost all species are widely distributed in the Indo-West Pacific. Only *Diogenes spinicarpus* Rahayu & Forest, 1995, has limited distribution, so far reported only from Indonesian waters.

**KEY WORDS.** – Coenobitidae, Diogenidae, Paguridae, Anambas Expedition 2002, Indonesia.

### INTRODUCTION

Indonesian littoral hermit crabs are fairly well studied (Buitendijk, 1937, Haig & Ball, 1988; Rahayu & Forest, 1992, 1995, 1999; Rahayu, 1999, 2003; Rahayu & Hurtle, 2002). However, hermit crabs from Anambas and Natuna have never been reported.

The material used in this study was collected during the Anambas Expedition to Natuna and Anambas Islands as part of South China Sea regional program. Considering the variety of the habitats of the islands (rocky shores, sandy-mud flat, coral reef and mangrove) it is rather surprising that only small number of hermit crabs species were collected (one species of Coenobitidae, ten species of Diogenidae and three species of Paguridae). All specimens belong to common species and are expected to be found in littoral areas.

The material is deposited in the Zoological Reference Collection of the Raffles Museum of Biodiversity Research, National University of Singapore (ZRC); and in Museum Zoologische Bogoriense, Indonesian Institute of Sciences, Cibinong, Indonesia (MZB). Animal size, indicated by shield length, was measured from the tip of rostrum or midpoint of the rostral lobe (exclusive of the intercalary rostral process in species of *Diogenes*) to the midpoint of the posterior margin of shield. Synonymies for the species include only references to original descriptions, works providing information on colour and habitat, and reports on the presence of the animals in Indonesian waters. The abbreviation St. and ov. indicate the Station and ovigerous female (s), respectively.

### TAXONOMY

#### FAMILY COENOBITIDAE

##### *Coenobita rugosus* H. Milne Edwards, 1837

*Coenobita rugosa* H. Milne Edwards, 1837: 241; Fize & Serène, 1955: 12, figs. 2A-C, 3A, Pl. I 3, 5, 7-10.

*Coenobita rugosus* - Nakasone, 1988: 168, figs. 3, 9A; Haig & Ball, 1988: 157.

**Material examined.** – 2 females (7.2, 8.8 mm) (ZRC), St. EA-ZJ 01, Anambas: Pulau Jemaja: northern edge of Teluk Tiru, opposite Pulau Punisan, 12 Mar.2002, sandy-mud flat, coral rubble; 1 female (9.2 mm) (MZB), St. EA-ZJ 04, Anambas: east coast of Pulau Jemaja: north-eastern corner of Teluk Jebung; western-most of a pair of islands off Tanjung Jebung, 13 Mar.2002; 1 female (6.9 mm) (ZRC), St. EA-ZJ 09, Natuna: north-eastern coast of Pulau Panjang (north-west of Pulau Bunguran), 17 Mar.2002, rocky shore; 1 female (5.6 mm) (MZB), St. EA-ZJ 13, Anambas: south of Pulau Bajau: Teluk Dumang; north-western corner of Pulau Behala, 19 Mar.2002, sandy beach.

**Remarks.** – Although the genus *Coenobita* is represented by ten species in the Indo-Pacific region (Nakasone, 1988); in Indonesian waters only five species have been recorded (Haig & Ball, 1988).

**Distribution.** – East coast of Africa to Line Islands and Tuamotu Archipelago.

FAMILY DIOGENIDAE

***Calcinus laevimanus* (Randall, 1840)**

*Pagurus laevimanus* Randall, 1840: 135

*Calcinus laevimanus* - Buitendijk, 1937: 267; Haig & Ball, 1988: 160; Poupin, 1997: 702, figs. 2F, 3G, 4E.

**Material examined.** – 4 males (5.5 - 6.5 mm) (ZRC), 1 female ov. (7.5 mm) (MZB), St. EA-ZJ 09, Natuna: north-eastern coast of Pulau Panjang (north-west of Pulau Bunguran), 17 Mar.2002, rocky shore.

**Remarks.** – This species is very common in intertidal and shallow subtidal areas.

**Distribution.** – Widespread in the Indo-Pacific, from East Africa across the Indian Ocean to the Indo-Malaysia Archipelago, Japan, Australia, Tuamotu Archipelago and Hawaii.

***Calcinus lineapropodus* Morgan & Forest, 1991**

*Calcinus* undescribed sp. - Haig & Ball, 1988: 161.

*Calcinus lineapropodus* Morgan & Forest, 1991: 650, figs. 1, 2; Asakura & Nomura, 2001:94, figs. 4-7, 8G.

**Material examined.** – 1 male (4.3 mm) (MZB), St. D 11, Natuna: rocky islet south-east of Pulau Laut, 04°37'39.8"N, 107°58'18.1"E, 16 Mar.2002, fringing reef.

**Remarks.** – This specimen agrees well with the original description of the species by Morgan & Forest (1991). Haig & Ball (1988) [as *Calcinus* undescribed sp.] and Morgan & Forest (1991) mentioned the similarity of this species with *C. pulcher* Forest, 1958b, and discussed the differences in the coloration. The longitudinal stripes on the second and third pereopods of *C. lineapropodus* are uninterrupted and limited only on the propodi, while in *C. pulcher* the longitudinal stripes are interrupted and found on the entire length of the pereopods, which are also embellished with a dark brown broad band at midlength of the dactyli and subdistally on the propodi, whereas, on the carpi and meri this dark brown band is situated dorsally.

**Distribution.** – Cocos Keeling, Christmas and Cartier Islands in Indian Ocean, Indonesia (Banda and Seram Islands), New Guinea, Taiwan and Japan.

***Calcinus minutus* Buitendijk, 1937**

*Calcinus minutus* Buitendijk, 1937: 269, figs. 13-15; Forest, 1958a: 185, figs. 1, 6-8; Haig & Ball, 1988: 160.

**Material examined.** – 1 female ov (4.3 mm) (ZRC), St. D.09. Natuna: Pulau Laut, south coast, 04°38'54.8"N, 107°57'43.3"E, 16 Mar.2002, extensive reef and sand flats (pasir putih). 1 male (4.5 mm), 1 female (5 mm), 1 female ov. (3.5 mm) (MZB), St. D 11: Natuna, rocky islet south-east of Pulau Laut, 04°37'39.8"N, 107°58'18.1"E, 16 Mar.2002, fringing reef.

**Remarks.** – The red yellowish colour on dactyli and distal part of propodi of the second and third pereopods that persist in alcohol separates this species from the other species of the genus.

**Distribution.** – Christmas and Cocos Keeling Island, northern Australia, Indonesia, Malaysia, Japan, New Guinea, Palau, Mariana Islands and Samoa.

***Calcinus pulcher* Forest, 1958**

*Calcinus pulcher* Forest, 1958b: 287, figs. 4, 12, 13, 16; Haig & Ball, 1988: 161; Asakura & Nomura, 2001: 95, figs. 1-3, 8A-F.

**Material examined.** – 1 female ov. (2.5 mm) (ZRC), 1 female (4.5 mm), (MZB), St. EA-D 09, Natuna: Pulau Laut, south coast, 04°38'54.8"N, 107°57'43.3"E, 16 Mar.2002, fringing reef, extensive reef and sand flats (pasir putih).

**Remarks.** – The present specimens agree in all respects with the original description of the species by Forest (1958b) except for the tubercles on the dorsal margin of the left cheliped that are much stronger than those shown in his figures (Forest, 1958b: figs. 12, 13). The colour has faded, leaving traces specific to this species: the palms of both chelipeds each has a dark brown spot on the lateral and mesial face; the entire length of the second and third pereopods have several short, dark brown longitudinal spots; on dactyli and propodi there are dark brown broad bands at midlength and subdistally, respectively, and on the carpi and meri these dark brown bands are situated dorsally.

**Distribution.** – Cocos Keeling, Christmas Island, Indonesia, Vietnam, Taiwan and southern Japan.

***Clibanarius demani* Buitendijk, 1937**

*Clibanarius demani* Buitendijk, 1937: 252, figs. 1, 2; Rahayu & Forest, 1992: 759, figs. 4a, 5a, 6a.

**Material examined.** – 1 male (5 mm), St. EA-DW 10, Natuna: Pulau Laut: Teluk Air Payang: Desa Air Payang, Kecamatan Bunguran Barat, Kabupaten Natuna, Province Riau, 04°42.86'N, 107°57.79'E, 16 Mar.2002, sand-flat (MZB); 1 female (3.5 mm), St. EA-JL 06, Natuna: Pulau Laut, south coast, 16 Mar.2002, mangroves (MZB).

**Remarks.** – As for many pagurid crabs, colour is a very important character to distinguish species accurately. The colour of the two specimens in this collection has faded, leaving only traces of the stripes on the second and third pereopods. However, the identification of this species is still possible based on morphological characteristics, e.g., ocular peduncles that are definitely longer than the antennal and antennular peduncles; ocular acicles with two or three terminal spines; antennal acicles long, exceeding bases of fifth segments; dactyli of the second and third pereopods that are longer than propodi, with nine to 14 spines on the ventral margins.

**Distribution.** – Western Indian Ocean, Phuket, Indonesia and Vietnam.

***Clibanarius longitarsus* (De Haan, 1849)**

*Pagurus longitarsus* De Haan, 1849: 211, pl. 50, fig. 3.

*Clibanarius longitarsus* - Buitendijk, 1937: 253; Haig & Ball, 1988: 163; Rahayu & Forest, 1992: 762, figs, 4b, 5b, 6b; Rahayu, 2003: 100.

**Material examined.** – 11 males (3 - 9.5 mm), 19 females (3.5 - 7.5 mm), 2 females ov. (5.5, 6 mm) (MZB), St. EA-ZJ 03, Anambas: east coast of Pulau Jemaja: north-eastern shore of Teluk Jebung, 13 Mar.2002, mangroves; 1 male (12 mm) (ZRC), St. EA-DW 04, Anambas: Pulau Jemaja: Teluk Jebung: northern mangrove inlet, 02°58.35'N, 105°40.18'E, 13 Mar.2002, mangroves; 5 males (4.6 - 7 mm), 5 females (5.5 mm) (ZRC), St. EA-DW 05, Anambas: Pulau Jemaja: Teluk Jebung: coastal part of the southern mangrove inlet, 02°56.54'N, 105°48.52'E, 13 Mar.2002, mangroves; 1 male, (6.5 mm) (MZB), St. EA-DW 10, Natuna: Pulau Laut: Teluk Air Payang: Desa Air Payang, Kecamatan Bunguran Barat, Kabupaten Natuna, Province Riau, 04°42.86'N, 107°57.79'E, 16 Mar.2002, sand flats.

**Remarks.** – This species is very common in mangrove areas.

**Distribution.** – Widespread in the Indo-Pacific, from the Red Sea across Indian Ocean to the Malay Archipelago, Japan and Australia.

***Clibanarius ransoni* Forest, 1953**

*Clibanarius ransoni* Forest, 1953: 446, figs 2, 6; Fize & Serène, 1955: 150, fig. 23; Rahayu & Forest, 1992: 774.

**Material examined.** – 1 male (5 mm), 1 female (4.5 mm) (MZB), 2 males (4.5mm, 5 mm), 2 females (4.5mm, 5.5 mm) (ZRC), St. EA-ZJ 11, Natuna: northeastern coast of Pulau Salor (off the west coast of Pulau Bunguran), 18 Mar.2002, rocky-sandy shore.

**Remarks.** – This species is recognizable by large, uninterrupted longitudinal stripe on lateral faces of the dactyli to meri of the second and third pereopods. When the colour has faded it is easily confounded with *C. merguensis* De Man, 1888 or *C. englaucus* Ball & Haig, 1972 (see Forest, 1953; Ball & Haig, 1972). Morphological differences of these three species were discussed by Rahayu & Komai (2000).

**Distribution.** – Andaman Sea, Vietnam and Tahiti. Although not abundant, this species is well distributed in Indonesian waters, from east Java to Sorong in Papua.

***Clibanarius striolatus* Dana, 1852**

*Clibanarius striolatus* Dana, 1852: 463; 1855: pl. 29, figs. 3a-c; Buitendijk, 1937: 258; Rahayu & Forest, 1992: 758.

*Clibanarius* A Fize & Serène, 1955: 109, fig. 15, pl. 3, fig. 6.

**Material examined.** – 2 males (5 mm), 1 female (4.5 mm), 6 females ov. (3 - 4 mm) (MZB), St. EA-ZJ 03, Anambas: east coast of Pulau

Jemaja: north eastern shore of Teluk Jebung, 13 Mar.2002, mangroves. 1 female (5 mm) (ZRC), St. EA-DW 10, Natuna: Pulau Laut: Teluk Air Payang: Desa Air Payang, Kecamatan Bunguran Barat, Kabupaten Natuna, Province Riau, 04°42.86'N, 107°57.79'E, 16 Mar.2002, sand flats. 1 male (6.5 mm) (MZB), St. EA-ZJ 11, Natuna: northeastern coast of Pulau Salor (off the west coast Pulau Bunguran), 18 Mar.2002, rocky-sandy shore.

**Remarks.** – *Clibanarius striolatus* is very common in littoral tropical waters.

**Distribution.** – Widely distributed in the Indo-West Pacific, from the Red Sea and Indian Ocean to Singapore, Malaysia, Indonesia and Japan.

***Dardanus lagopodes* (Forskål, 1775)**

*Cancer lagopodes* Forskål, 1775: 93.

*Pagurus sanguinolentus* Quoy & Gaimard, 1824: 532, pl. 79, fig. 2; Fize & Serène, 1955: 158, fig. 25, pl.4 figs. 4, 5.

*Dardanus lagopodes* - Haig & Ball, 1988: 166.

**Material examined.** – 2 males (9.5, 8.5 mm) (ZRC), St. D-06, Anambas: south-western coast of P. Matak: islets near Tanjung Yang, in Selat Peninting, 03°15'19.9"N, 106°13'48.3"E, 14 Mar.2002, dead coral; 1 male (8 mm) (MZB), St. EA-ZJ 02, Anambas: Pulau Jemaja: Teluk Tiru: northern-coast of Pulau Punisan, 12 Mar.2002, shallow reef.

**Remarks.** – Fize & Serène (1955) discussed the morphological variation of this species. Ball & Haig (1972) discussed in detail the colour variation. Specimens in this collection are represented by red color variant. One of them has markedly flattened carapace.

**Distribution.** – From the Red Sea and east coast of Africa across the Indian Ocean to the Malay Archipelago, Japan, Marshall and Gilbert Islands and Tuamotu Archipelago.

***Diogenes spinicarpus* Rahayu & Forest, 1995**

*Diogenes spinicarpus* Rahayu & Forest, 1995: 406, figs. 6a-f, 7a-h.

**Material examined.** – 2 males (1.7, 2.3 mm), 1 female ov. (2.2 mm) (MZB), EA-DW 04, Anambas: Pulau Jemaja: Teluk Jebung: northern mangrove inlet, 02°58.35'N, 105°40.18'E, 13 Mar.2002; 2 males (2, 2.4 mm), 7 females (1.8 - 2.4 mm) (ZRC). St. EA-DW 05, Anambas: Pulau Jemaja: Teluk Jebung: coastal part of the southern mangrove inlet, 02°56.54'N, 105°48.52'E, 13 Mar.2002, mangroves.

**Remarks.** – *Diogenes spinicarpus* Rahayu & Forest, 1995 belongs to the group II subgroup 3 of *Diogenes* (Rahayu & Forest, 1995). This group is characterized by short antennal peduncles, never overreaching the bases of the corneas, and short, sparse setae on the antennal flagella. Rahayu & Forest (1995) discussed the noticeable variability of the left cheliped and carpal spinulation on the second pereopods. The specimens in this collection show a similar degree of variation of the left cheliped as that presented by Rahayu & Forest

(1995: figs. 6d-f). The carpi of the second pereopods of all the specimens examined have only two distal and two proximal spines on dorsal margins. Rahayu & Forest (1995) and Rahayu & Hortle (2002) noted the similarity of this species with *D. leptocerus* Forest, 1956. This is the second record of *D. spinicarpus* since its description.

**Distribution.** – Indonesia (Papua, Ambon, Kendari and Anambas).

#### FAMILY PAGURIDAE

##### *Nematopagurus* sp.

(Fig. 1)

**Material examined.** – 1 female ov. (4 mm) (MZB), EA-TT 04, Anambas: east coast of Pulau Jemaja: mouth of Teluk Jebung, 02°53.03'N, 105°50.55'E - 02°55.39'N, 105°51.15'E, 24m - 31m, 13 Mar.2002, trawl.

**Diagnosis.** – Shield as broad as long. Rostrum broadly rounded, not reaching level of lateral projections. Ocular peduncles stout, corneas dilated, reaching distal half of penultimate segment of antennular peduncles. Ocular acicles moderately small, terminating subacutely, with submarginal spine laterally. Antennal peduncles as long as or slightly exceeding ocular peduncles; antennal acicle slightly arcuate, fringe with setae mesially. Chelipeds similar in form, right larger than left, short setae on dorsal surface but not obscuring the armature. Pereopods long, slender, with tuft of short setae on dorsal margin of dactyli and propodi. Mesial face of dactyli of second and third pereopod with longitudinal row of nine to ten spiniform setae. Dorsal margin of carpi of second and third pereopods with one distal spine, and two proximal spines. Posterior lobes of telson slightly asymmetrical, separated by prominent median cleft; terminal margin with strong and weak spines.

**Remarks.** – This single ovigerous female, without fourth pereopods (lost during collection) appears to belong to the

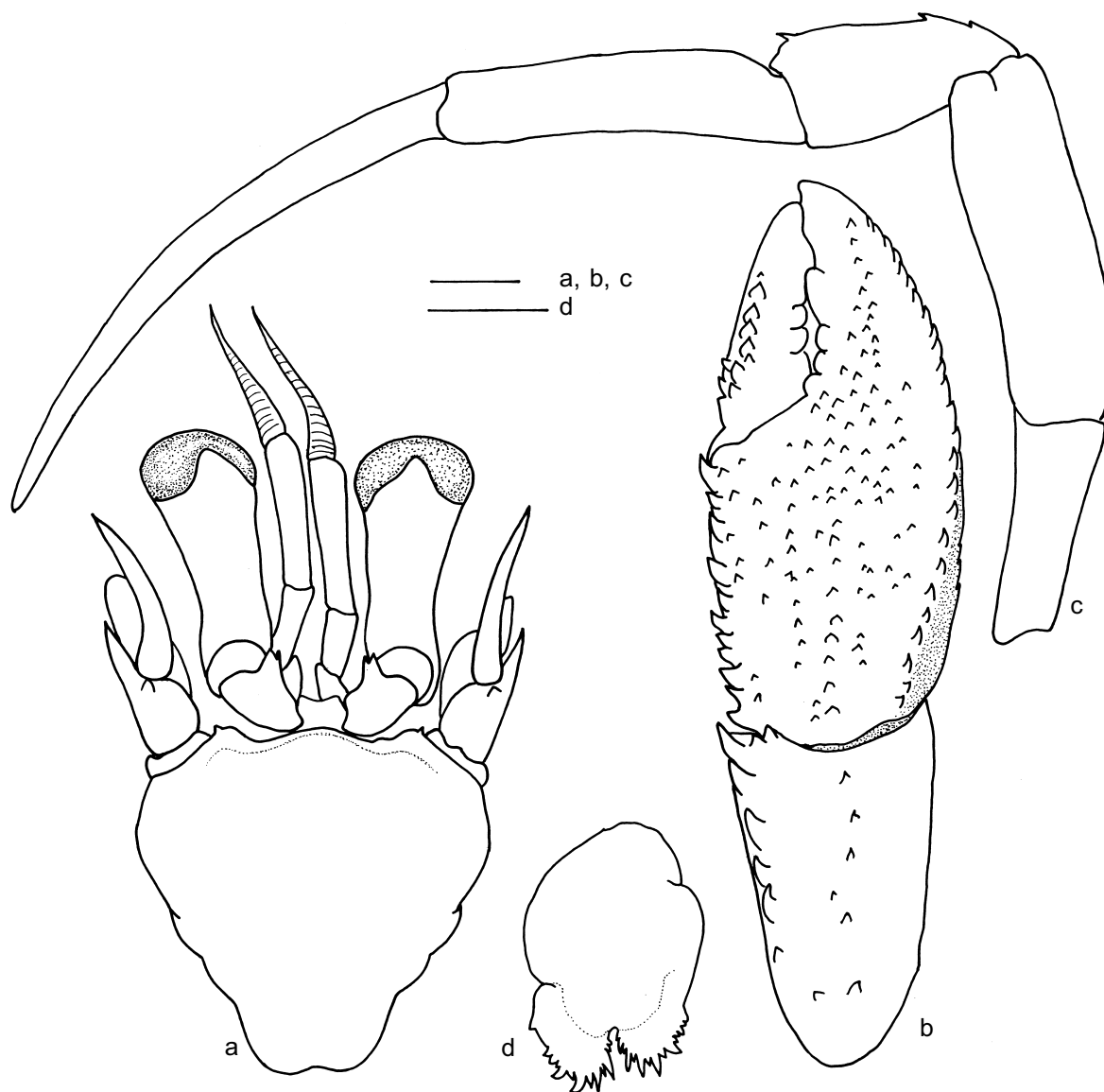


Fig. 1. *Nematopagurus* sp., female, 4 mm. a. Shield and cephalic appendages, b. right cheliped, c. left third pereopod, d. telson. Scale 1 mm.

genus *Nematopagurus*. General morphological characters agree with the genus *Nematopagurus*: 11 pairs of biserial gills, crista dentata with 1 accessory tooth, pair of first pleopod modified as gonopods, paired gonopores, subequal chelipeds, telson with terminal margin rounded and spinulose.

This species resembles *Nematopagurus* sp. McLaughlin, 1997, from Kai Island, Indonesia, in having submarginal spine on the ocular acicles and the stoutness of the ocular peduncles which have dilated corneas. However, the armature of the chelipeds are different; the palm of the right cheliped of the specimen from Anambas is slightly longer than dactylus, with a row of spines on the dorsolateral margin extending to the tip of fixed finger while in *Nematopagurus* sp. McLaughlin, 1997, the palm of the right cheliped is the same length as dactylus and the spines on the dorsolateral margin extending only to proximal half of the fixed finger.

The armature of the chelipeds and the spines on the carpi of the second and third pereopods more resemble *N. gardineri* Alcock, 1905. The two species differ in the shape of the ocular peduncles: *N. gardineri* has slender ocular peduncles and the corneas are not dilated, while in *Nematopagurus* sp. from Anambas the ocular peduncles are stout with dilated corneas.

Revision of the genus *Nematopagurus* by McLaughlin is under way, therefore until its publication, the author identified this species as *Nematopagurus* sp.

Species of the genus *Nematopagurus* are usually collected from deeper water (below 80 m depth) (Alcock, 1905, Lewinsohn, 1969, McLaughlin, 1997). The specimen in this study was collected only from about 30 meter depth.

**Distribution.** – Anambas, Indonesia.

#### *Pagurus hirtimanus* Miers, 1880

*Pagurus hirtimanus* White, 1847: 60 (nomen nudum); Miers, 1880: 375, 376; Haig & Ball, 1988: 186.

**Material examined.** – 1 male (8 mm) (MZB), St. D 11, Natuna: rocky islet south-east of Pulau Laut, 04°37'39.8"N, 107°58'18.1"E, 16 Mar.2002, reef.

**Remarks.** – This species is very common in rocky shore of littoral tropical waters.

**Distribution.** – From the Red Sea to Fiji and Ryukyu Islands and Queensland, Australia.

#### *Spiropagurus fimbriatus* Lewinsohn, 1982

*Spiropagurus fimbriatus* Lewinsohn, 1982: 213, figs. 1, 2; Haig & Ball, 1988: 190.

**Material examined.** – 1 female ovigerous (5.7 mm) (MZB), St. EA-TT 06, Anambas: Teluk Tarempa, 03°15.31'N, 106°09.50'E - 03°15.28'N, 106°11.79'E, 42 - 46m, 14 Mar.2002.

**Remarks.** – The chelipeds and pereopods of the specimen in this collection are missing, however the shield, cephalic appendages and telson agree well with Lewinsohn's description of *Spiropagurus fimbriatus*.

**Distribution.** – Red Sea, Arafura Sea, Torres Strait, Seram, and now Anambas.

### ACKNOWLEDGMENTS

I thank Dr. Peter K.L. Ng, Director of the Raffles Museum of Biodiversity Research, National University of Singapore for conveying the hermit crabs material from the Anambas expedition. I am also grateful to anonymous referees for the comments and corrections of the manuscript. This paper was completed during a visit of the author to the Raffles Museum of Biodiversity Research, National University of Singapore under a fellowship from the Raffles Museum and South China Sea Workshop Process (Indonesia).

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