

# First Records of Two Pilumnid Crabs (Crustacea: Decapoda) Collected from Jejudo Island, Southern Korea

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## ABSTRACT

Two pilumnid species, *Echinoecus nipponicus* and *Zehntneriana amakusae*, are described and illustrated from Jejudo Island, southern Korea. These species are recorded for the first time in Korea, and *Z. amakusae* is the sole representative of the subfamily Rhizopinae of the family Pilumnidae.

**Keywords:** crabs, *Echinoecus nipponicus*, *Zehntneriana amakusae*, Pilumnidae, Rhizopinae, Korea

## INTRODUCTION

At present, five subfamilies are recognized in the family Pilumnidae (see Ng et al., 2008): Calmaniinae, Eumedoninae, Pilumninae, Rhizopinae, and Xenophthalmodinae. Eumedoninae, with three species, and Pilumninae, with nine species, have so far been reported from Korean waters (Kim and Kim, 1997; Lee et al., 2008; Lee and Ko, 2009). During a survey on decapod fauna from Jejudo Island, two eumedoninid crabs associated with sea urchins and two rhizopinid crabs were collected. The eumedoninid crabs were identified as *Echinoecus nipponicus* Miyake, 1939 and the rhizopinid crabs as *Zehntneriana amakusae* (Takeda and Miyake, 1969). The latter is the first species of the subfamily Rhizopinae from Korean waters. The present study describes and illustrates these two species with color photographs of living crabs.

Drawings were made with the aid of camera lucida. The abbreviation "cl" refers to carapace length from the tip of frontal margin to the posterior dorsal margin of the carapace. All specimens were preserved in 95% ethanol. The brachyuran classification follows that of Ng et al. (2008). All specimens are deposited at the corresponding author's collection of Silla University, Busan.

## SYSTEMATIC ACCOUNTS

Order Decapoda Latreille, 1802

Superfamily Pilumnoidea Samouelle, 1819

Family Pilumnidae Samouelle, 1819

Subfamily Eumedoninae Dana, 1852

<sup>1</sup>\*Genus *Echinoecus* Rathbun, 1894

<sup>2</sup>\**Echinoecus nipponicus* Miyake, 1939 (Figs. 1, 2)

*Echinoecus petiti nipponicus* Miyake, 1939: 86, 88, 90, text-fig. 1-3B.



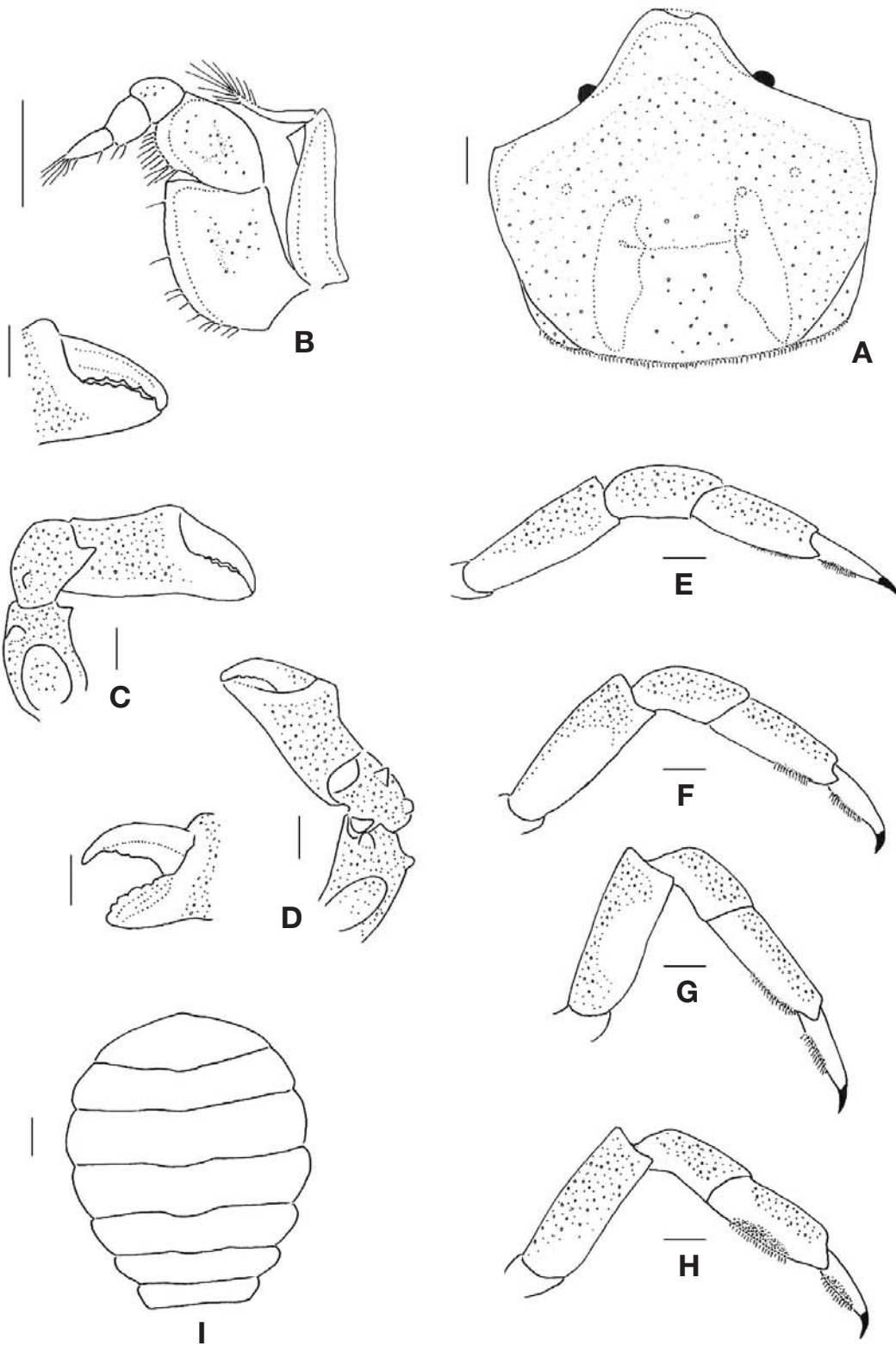
**Fig. 1.** *Echinoecus nipponicus*, female (cl 7.8 mm from Hyeongjeseom Island). cl, carapace length from the tip of frontal margin to the posterior dorsal margin of the carapace.

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**Fig. 2.** *Echinoecus nipponicus*, female (cl 7.5 mm from Seongsanpo). A, Dorsal view of carapace; B, Left third maxilliped, ventral; C, Left cheliped and enlargement of distal part, dorsal; D, Right cheliped and enlargement of distal part, dorsal; E-H, Right first to fourth ambulatory legs, dorsal; I, Abdomen. cl, carapace length from the tip of frontal margin to the posterior dorsal margin of the carapace. Scale bars: A-I=1 mm.

*Echinoecus pentagonus*: Sakai, 1976: 295, Pl. 100, fig. 1; Takeda, 1982: 136, fig. 402; Miyake, 1983: 55, 213, Pl. 19, fig. 3; Hong et al., 2006: 383, unnumbered fig.

*Echinoecus nipponicus*: Chia et al., 1999: 816, figs. 2Q, 3, 4A-G; Ng et al., 2008: 139 (list only).

**Materials examined.** 1 ♀ (cl 7.8 mm), Hyeongjeseom Island, 12 Aug 2010, Lee KH, SCUBA at 12 m depth; 1 ♀ (cl 7.5 mm), Seongsanpo, 17 Oct 2010, Lee SH, SCUBA at 15 m depth.

**Description.** Carapace (Figs. 1, 2A) pentagonal, punctuate, about 1.1 times broader than long; rostrum short, broad, triangular, length approximately 0.35 width of its base; regions poorly defined on surface; antero- and posterolateral margins clearly demarcated by small tooth; posterior margin slightly concave medially.

Third maxilliped (Fig. 2B) quadrate; ischium rectangular, median oblique sulcus shallow; merus slightly rounded; exopod almost reaching antero-external edge of ischium.

Chelipeds (Fig. 2C, D) punctuate, subequal; merus with blunt inner and outer teeth; carpus with blunt outer proximal tooth and sharp inner distal tooth; propodus short; cutting margins of each fingers with 3-4 blunt teeth.

Ambulatory legs (Fig. 2E-H) punctuate, subcylindrical; anterior margins of meri terminating in small angles; carpi without setae; posterior margins of propodi and dactyli with short setae on legs 1-3, with dense short setae on leg 4.

Female abdomen (Fig. 2I) broad, segments 4, 5 broadest. Telson broad, length 1/3 width of its base.

**Color in life.** Entire animal generally purple red or pale purple red; carapace with longitudinal whitish purple red stripe on each epibranchial region.

**Habitat.** These crabs were found on the external surfaces of sea urchins.

**Remarks.** Chia et al. (1999) defined the genus *Echinoecus* including three species: *E. nipponicus*, *E. pentagonus* (Milne Edwards A, 1879), and *E. sculptus* (Ward, 1934). They described that *E. nipponicus* differed from *E. pentagonus* in having a much shorter and broader rostrum, not elongate, and an anterolateral angle of the carapace marked with a small tooth, not smooth. Our specimens agree well with their description and illustration of *E. nipponicus*. The female specimen reported by Kim and Chang (1985) as *E. pentagonus* seems to be *E. nipponicus* because it has a broad triangular rostrum and a small tooth on the anterolateral angle of the carapace. Also, the unnumbered fig. by Hong et al. (2006) as *E. pentagonus* seems to be *E. nipponicus*.

**Distribution.** Japan and now Korea.

<sup>1</sup>\*Subfamily Rhizopinae Stimpson, 1858

<sup>2</sup>\*Genus *Zehntneriana* Ng and Takeda, 2010

<sup>3</sup>\**Zehntneriana amakusae* (Takeda and Miyake, 1969) (Figs. 3, 4)

*Lithocheira amakusae* Takeda and Miyake, 1969: 10, fig. 1. *Zehntneria amakusae*: Yamaguchi et al., 1987: 57, Pl. 10, fig. 4; Ng et al., 2008: 144 (list only).

*Zehntneriana amakusae*: Ng and Takeda, 2010: 49.

**Materials examined.** 1 ♂ (cl 5.5 mm), 1 ♀ (cl 5.3 mm), Munseom Island, 13 Aug 2010, Lee KH, SCUBA at 15 m depth.

**Description.** Carapace (Figs. 3, 4A) transversely ovate, about 1.4 times broader than long; regions not defined except for median longitudinal shallow furrow and gastrocardiac transverse depression; surface almost naked, only frontal, supraorbital, and anterolateral regions covered with dense short setae; anterolateral margin separated into 3 tooth like crests, last small granular tooth; posterior margin wide, slightly concave medially.

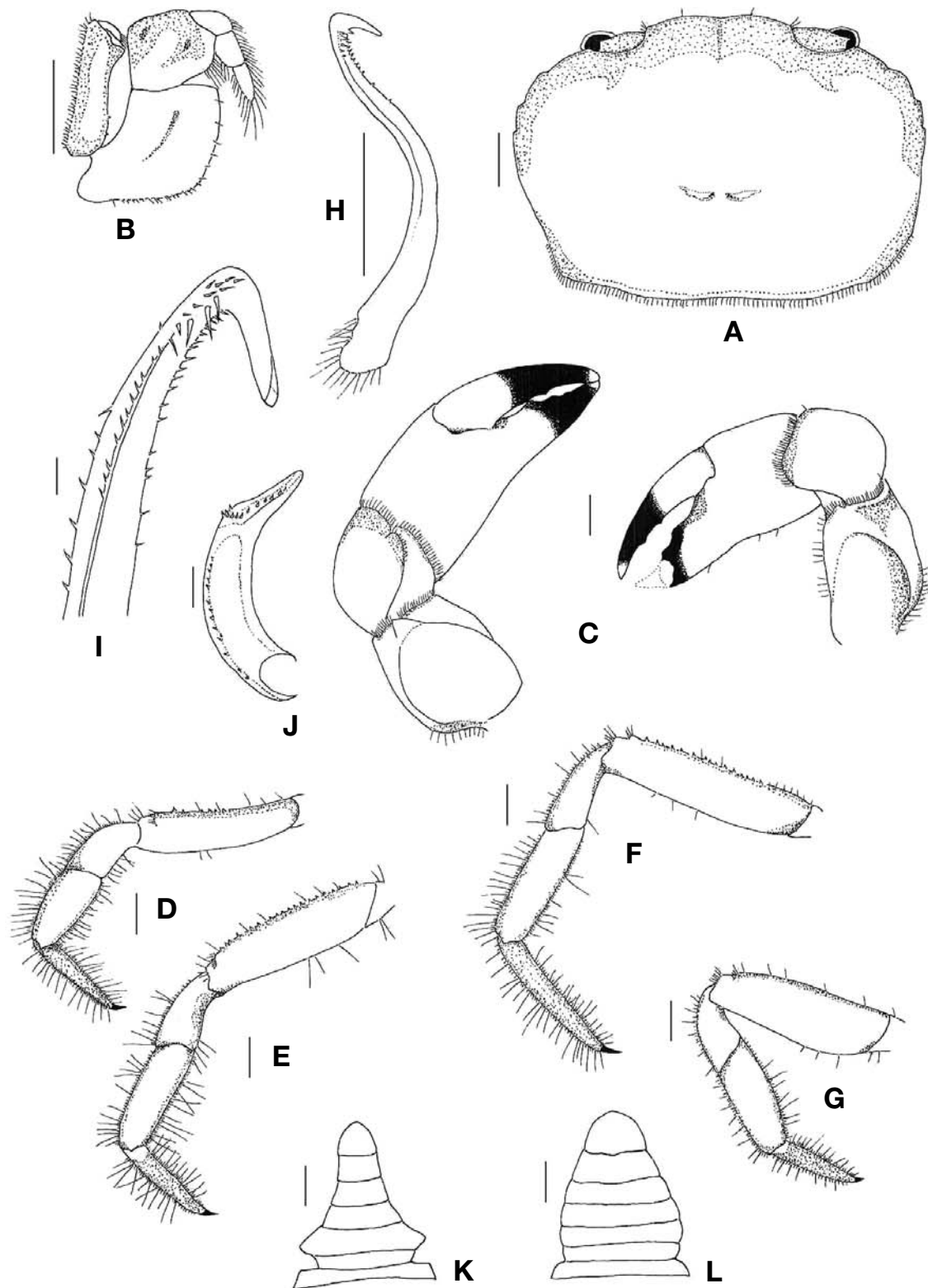
Third maxilliped (Fig. 4B) broad; ischium rectangular, median oblique sulcus distinct; merus with 2 prominent depressions.

Chelipeds (Fig. 4C) robust, subequal; merus with blunt tooth on upper margin, dense brush like setae on distal margin; inner blunt angle of carpus prominent, dense brush like setae on distal inner margin; propodus smooth, stout; fingers blunted, its distal half black, cutting margins sharply toothed.

Ambulatory legs (Fig. 4D-G) generally long, stout, leg 3 longest; meri minutely serrated on anterior margins; carpi



**Fig. 3.** *Zehntneriana amakusae*, male (cl 5.5 mm from Munseom Island). cl, carapace length from the tip of frontal margin to the posterior dorsal margin of the carapace.



**Fig. 4.** *Zehntneriana amakusae*, male (cl 5.5 mm from Munseom Island). A, Dorsal view of carapace; B, Right third maxilliped, ventral; C, Chelipeds, dorsal; D-G, Left first to fourth ambulatory legs, dorsal; H, I, Left first gonopod and enlargement of distal part, ventral; J, Left second gonopod, ventral; K, Abdomen, ventral. Female (cl 5.3 mm from Munseom Island); L, Abdomen, ventral. cl, carapace length from the tip of frontal margin to the posterior dorsal margin of the carapace. Scale bars: A-H, K, L=1 mm, I, J=0.1 mm.

fringed with setae on anterior margins; propodi fringed with setae on both margins; dactyli as long as propodi, covered with dense short setae.

Male abdomen (Fig. 4K) relatively narrow; segment 1 broadest; segment 6 about 1.8 times broader than long. Telson semicircular; length subequal to width of its base. Abdomen of female (Fig. 4L) relatively broad; segment 1 broadest. Telson relatively narrow, length 0.7 times of width of its base.

Gonopod 1 (Fig. 4H, I) long, slender, curved, with stout setae on distal one-thirds; tip bent about 60°, bluntly pointed. Gonopod 2 (Fig. 4I) short, stout, curved, with row of small spines on surface.

**Color in life.** Carapace generally bright red except on cardiac and intestinal regions. Chelipeds bright red on upper surfaces. Ambulatory legs pale red.

**Habitat.** These crabs were found under the stones.

**Remarks.** Our specimens agree well with the original description of Takeda and Miyake (1969). The genus *Zehntneriana* currently contains four species: *Z. villosa* (Zehntner, 1894), *Z. amakusae* (Takeda and Miyake, 1969), *Z. miyakei* (Takeda, 1972), and *Z. novaeinsulicola* (Takeda and Kurata, 1977). Based on their original descriptions, *Z. novaeinsulicola* is clearly separated from the other three species by no short seate on the dorsal surface of the carapace, whereas, the carapace is covered entirely with short setae in *Z. villosa* and partially with short setae in *Z. miyakei* and *Z. amakusae*. *Zehntneriana amakusae* is superficially similar to *Z. miyakei*, but, in *Z. miyakei* short setae of the carapace are much sparser and not distinctly restricted to the frontal, supraorbital and anterolateral regions.

*Zehntneriana* species have been reported from Indonesia, the Palau Islands, and southern Japan. The occurrence of *Z. amakusae* in Korean waters represents a major expansion of this species, which until now has been limited to southern Japan.

**Distribution.** Japan and now Jeju Island in Korea.

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## REFERENCES

Chia DGB, Castro P, Ng PKL, 1999. Revision of the genus *Echinoecus* (Decapoda: Brachyura: Eumedonidae), crabs symbiotic with sea urchins. *Journal of Crustacean Biology*,

19:809-824.

Hong SY, Park KY, Park CW, Han CH, Suh HL, Yun SH, Song CB, Jo SG, Lim HS, Kim DJ, Ma CW, Son MH, Cha HK, Kim KB, Choi SD, Oh CW, Kim DN, Shon HS, Kim JN, Kim MH, Choi IY, 2006. Marine Invertebrate in Korean Coasts. Academy Publishing Co., Seoul, pp. 1-479.

Kim HS, Chang CY, 1985. The brachyuran crabs of Cheju Island, Korea (Crustacea: Decapoda). *Korean Journal of Systematic Zoology*, 1:41-60.

Kim W, Kim HS, 1997. Order Decapoda. In: List of animals in Korea (excluding insects) (Ed., Korean Society Systematic Zoology). Academy Publishing Co., Seoul, pp. 212-223.

Lee SH, Ko HS, 2009. First record of crinoids symbiotic crab, *Harrovia japonica* (Decapoda: Brachyura: Pilumnidae) from Korea. *Korean Journal of Systematic Zoology*, 25:125-128.

Lee SK, Kim SH, Kim W, 2008. Report of four species of crabs (Crustacea: Decapoda: Brachyura) from Korea. *Korean Journal of Systematic Zoology*, 24:291-297.

Milne Edwards A, 1879. Description de quelques Crustacés nouveaux. *Bulletin des Sciences par la Société Philomahique de Paris*, 7:103-110.

Miyake S, 1939. Note on crabs of the genus *Echinoecus* Rathbun living commensally with echinoids (Parthenopidae, Eumedoninae). *Annotationes Zoologicae Japonenses*, 18:83-94.

Miyake S, 1983. Japanese Crustacean Decapods and Stomatopods in colour. Vol. 2, Brachyura (Crabs). Hoikusha, Osaka, pp. 1-277.

Ng PKL, Guinot D, Davie PJF, 2008. Systema Brachyurorum: Part 1. An annotated checklist of extant brachyuran crabs of the world. *The Raffles Bulletin of Zoology*, 17:1-286.

Ng PKL, Takeda M, 2010. *Zehntneriana*, a replacement name for *Zehntneria* Takeda, 1972 (Crustacea, Brachyura, Pilumnidae), preoccupied by *Zehntneria* Brunner Von Wattenwyl, 1907 (Insecta, Orthoptera, Phasmidae). *Bulletin of the National Museum of Nature and Science, Series A (Zoology)*, 36:49-50.

Sakai T, 1976. Crabs of Japan and the adjacent seas. Kodansha, Tokyo, pp. 1-773.

Takeda M, 1972. Systematic status of *Ceratoplax villosa* Zehntner and some related species (Crustacea, Decapoda, Brachyura). *Proceeding of the Japanese Society of Systematic Zoology*, 8:34-41.

Takeda M, 1982. Keys to the Japanese and foreign Crustaceans. Hokuryukan, Tokyo, pp. 1-284.

Takeda M, Kurata Y, 1977. Crabs of the Ogasawara Islands IV. A collection made at the new volcanic island, Nishino-shima-shinto, in 1975. *Bulletin of the National Science Museum, Series A (Zoology)*, 3:91-111.

Takeda M, Miyake S, 1969. A new species of the family Goneplacidae (Crustacea, Brachyura) from the Amakusa Islands, Kyushu. *Publications from the Amakusa Marine Biological Laboratory*, 2:9-15.

Ward M, 1934. Notes on a collection of crabs from Christmas Island, Indian Ocean. *Bulletin of the Raffles Museum*,

(Singapore), 9:5-28.  
Yamaguchi T, Harada K, Takeda M, Kikuchi T, 1987. Crab  
fauna of the Amakusa Islands. *Calanus*, 10:1-71.  
Zehntner L, 1894. Crustacés de l'Archipel Malais. Voyage de  
MM. M. Bedot et Ch. Pictet dans l'Archipel Malais. *Revue*

*suisse de Zoologie et Annales du Musée d'Histoire Naturelle  
de Genève*, 2:135-214.

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