

The Occurrence of a Sea Urchin Associate, *Gnathophylloides mineri* Schmitt, 1933 (Crustacea: Decapoda: Gnathophyllidae) in Japanese Waters

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Abstract A gnathophyllid shrimp, *Gnathophylloides mineri* Schmitt, 1933, is first recorded from Japan based on two males and two ovigerous females collected from Hachijo-jima Island, Izu Islands, southern Japan. The present specimens were associated with a toxopneusid sea urchin, *Tripneustes gratilla* (Linnaeus, 1758).

Key words: Gnathophyllidae, *Gnathophylloides mineri*, sea urchin associate, first record, Japan.

The gnathophyllid genus, *Gnathophylloides* Schmitt, 1933, is distinguished from other genera of the Gnathophyllidae by having the uniungiculate ambulatory dactyli with blunt lobe on the ventral margin, the normal second maxilliped not overreaching the third maxilliped, and the telson with rounded posterior margin (Chace and Bruce, 1993; Holthuis, 1993). This genus contains two sea urchin associates, *G. mineri* Schmitt, 1933, the type species, and *G. robustus* Bruce, 1973 (Chace and Bruce, 1993). *Gnathophylloides mineri* was originally described from Porto Rico [= Puerto Rico], the western Atlantic (Schmitt, 1933). Subsequently, this species was recorded not only from the Atlantic Ocean, but also from the Indo-Pacific region through Zanzibar, the western Indian Ocean, to Malpelo Island, the eastern Pacific (Bruce, 1988; Wicksten and Hernández, 2000).

During a survey of the decapod crustacean fauna of Hachijo-jima Island, Izu Islands, southern Japan, in 1999–2000, we captured four specimens of *G. mineri*, which were associated with a sea urchin, *Tripneustes gratilla* (Linnaeus, 1758), inhabiting at depths of 5 to 15 m. They represent the first record of this species from the Japanese waters, as well as the northernmost record of its geographical range.

Materials and Methods

The abbreviation CL indicates the postorbital carapace length. The shrimp and sea urchin specimens examined are deposited in the collection of the Coastal Branch of Natural History Museum and Institute, Chiba (CMNH).

Taxonomy

Gnathophylloides Schmitt, 1933
(New Japanese name: Magatama-ebi zoku)
Gnathophylloides mineri Schmitt, 1933
(New Japanese name: Magatama-ebi)
(Figs. 1–3)

Gnathophylloides mineri Schmitt, 1933; 7, fig. 3 (type locality: Porto Rico); Schmitt, 1935: 167, fig. 31 (Porto Rico); Holthuis, 1955: 79, fig. 52 (no new locality); Lewis, 1956: 288, figs. 1, 2 (Barbados, Jamaica, Florida, Venezuela); Castro, 1971: 398 (Hawaii); Chace, 1972: 52 (Antigua Island, Tobago Cays, Bahia de la Ascension); Bruce, 1974a: 305, tab. 2; Bruce, 1974b: 313, fig. 1 (Zanzibar, Seychelles); Abele, 1975: 72 (Malpelo Island); Bruce, 1982: 206; Burukovskii, 1982: 102, fig. 124 [from Holthuis (1955)]; Coen and Heck, 1983: 207 (Caribbean Panama); Bruce, 1984: 151; Criales, 1984: 312 (Colom-

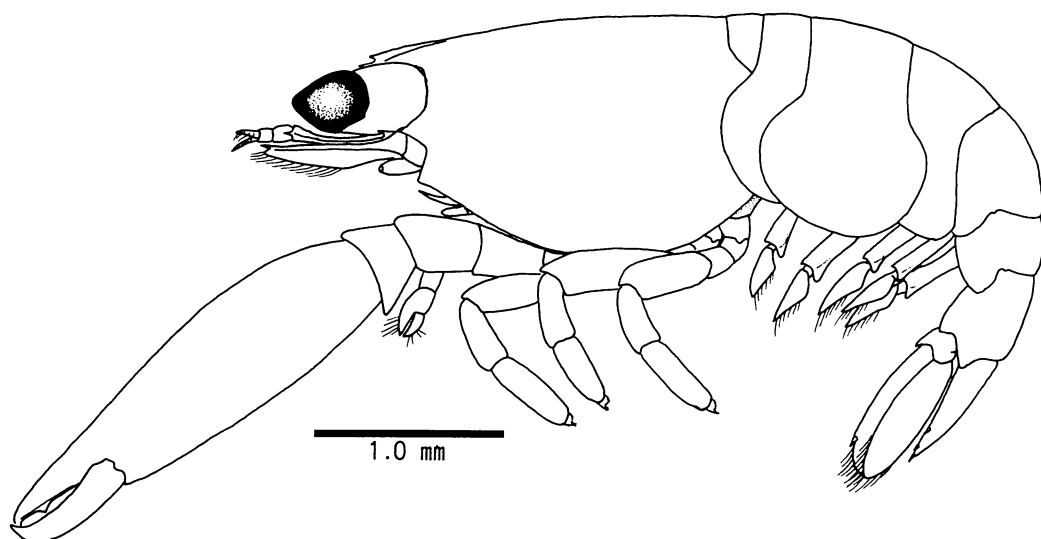


Fig. 1. *Gnathophylloides mineri* Schmitt, 1933. Male (CMNH-ZC 00436, 1.6 mm CL). Entire animal in lateral view.

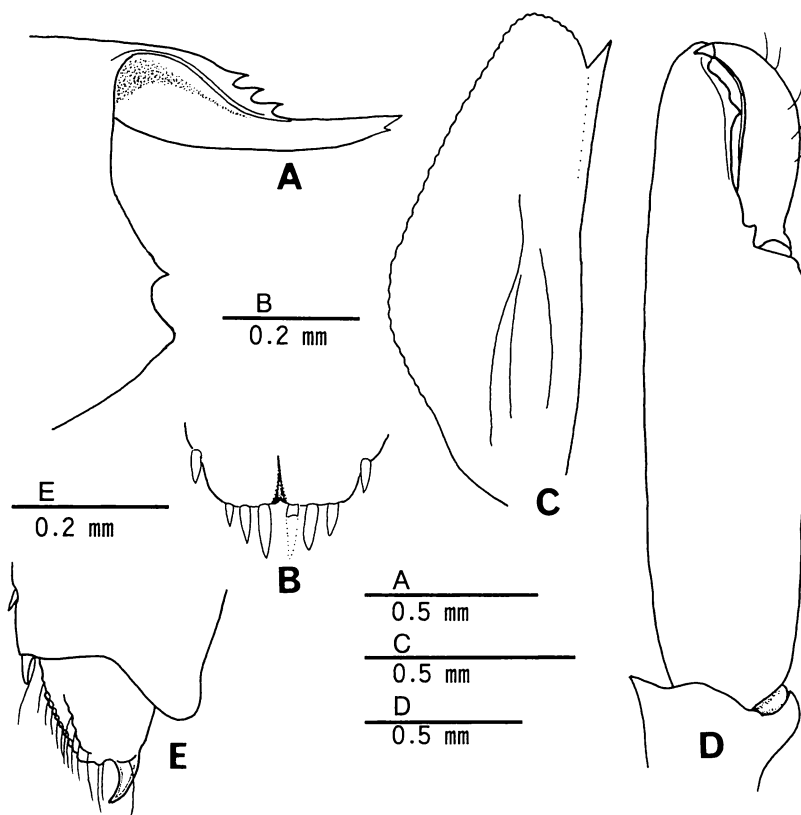


Fig. 2. *Gnathophylloides mineri* Schmitt, 1933. Ovigerous female (CMNH-ZC 00435, 2.2 mm CL). A, anterior part of carapace with rostrum, lateral; B, posterior margin of telson, dorsal; C, right scaphocerite, dorsal; D, chela of right second pereopod, mesial; E, dactylus and distal part of propodus of right third pereopod.

bia); Patton *et al.*, 1985: 616, figs. A, B (Virgin Islands); Bruce, 1986: 469 (list); Bruce, 1988: 97, fig. 1 (Australia, Tonga); Titgen, 1989: 201 (Hawaii); Wicksten, 1989: 12 (key); Bruce, 1990a: 62, unnumbered figs. (Australia); Bruce, 1990b: 10; Wicksten and Hendrickx, 1992: 7 (list); Lemaitre and Alvarez León, 1992: 39 (list); Holthuis, 1993: 94, fig. 83 [from Holthuis (1955)]; Chace and Bruce, 1993: 134; Gosliner *et al.*, 1996: 215, fig. 780 in color (Hawaii); Li, 1997: 226 (South China Sea); Hoover, 1998: 227, unnumbered fig. in color (Hawaii); Debelius, 1999: 32, unnumbered fig. in color (Honduras); Wicksten and Hernández, 2000: 94 (Galapagos Islands).

Material Examined. Hachijo-jima Island, Izu Islands. Yaene Harbor, 33°05.6'N, 139°46.5'E, 5 m depth, 8 Dec. 1999, SCUBA, coll. by K. Tanaka, 1 ovig. ♀ (CMNH-ZC 00410, 1.7 mm CL); 2 Dec. 1999, SCUBA, coll. by K. Tanaka, 1♂ (CMNH-ZC 00411, 1.3 mm CL). Sokodo, 33°07.3'N, 139°49.2'E, 15 m

depth, 2 Sep. 2000, SCUBA, coll. by J. Okuno, 1 ovig. ♀ (CMNH-ZC 00435, 2.2 mm CL); 1♂ (CMNH-ZC 00436, 1.6 mm CL).

Host. *Tripneustes gratilla* (Linnaeus, 1758) (Echinodermata: Echinoidea: Toxopneustidae). CMNH-ZE 00185, 82.9 mm in shell diameter, host of CMNH-ZC 00410; CMNH-ZE 00351, 78.6 mm in shell diameter, host of CMNH-ZC 00435.

Recognition characters. Integument smooth, glabrous (Fig. 1). Carapace (Fig. 2A) armed with antennal spine; pterygostomian angle protruded, but blunt. Rostrum (Fig. 2A) short, slightly upturned distally, proximally depressed, overreaching level of distal margin of proximal segment of antennular peduncle; dorsal margin with 3-4 teeth proximally, ventral margin with a small tooth subapically. Telson broad, armed with 2 pairs of dorsolateral spines posteriorly, posterior margin (Fig. 2B) armed with 3 pairs of simple spines, with or without median notch. Antennule with acutely pointed stylocerite,



Fig. 3. *Gnathophylloides mineri* Schmitt, 1933. Male (CMNH-ZC 00411, 1.3 mm CL). Underwater photograph, Yaene Harbor, Hachijo-jima Island, 5 m depth, in association with *Tripneustes gratilla*, photo by K. Tanaka.

flagella greatly reduced. Scaphocerite (Fig. 2C) falling slightly short of distal margin of antennular peduncle, with faintly concave lateral margin, strongly convex mesial margin. Cornea (Fig. 1) somewhat tapering distally. Third maxilliped with exopod longer than endopod. First pereopod chelate; ischium unarmed, but with distoventral process. Second pereopod with stout chela, fixed finger (Fig. 2D) armed with distinct tooth at midlength of cutting border, dactylus (Fig. 2D) unarmed, entire. Dactyli (Fig. 2E) of third to fifth pereopods very deep, subquadrate in lateral view, armed with row of rounded tubercles along ventral margin, 2 low, rounded denticles at truncate distal margin, acuminate unguis arising dorsodistally; ventrolateral surface and ventral margin each with row of setae.

Distribution. Pantropical: Distributed through Zanzibar to Malpero Island in the Indo-Pacific; Florida and Caribbean Sea in

the western Atlantic Ocean (Bruce, 1988; Wicksten and Hernández, 2000). Hachijo-jima Island is the northernmost locality of the distributional range of this species in the Western Pacific.

Remarks. Morphologically, the specimens from Hachijo-jima Island agree with the previous descriptions and figures of *G. mineri* except for the conformation of the posterior margin of telson. Close examination of the present specimens has revealed that the conformation of the posterior margin of telson is variable in *G. mineri*. The posterior margin of telson has a faint median notch in the ovigerous female from Sokodo (CMNH-ZC 00435), but in the other specimens, the mentioned margin is rounded. Previous authors (Schmitt, 1933; Bruce, 1973; Chace and Bruce, 1993) have mentioned that the posterior margin of the telson of the *G. mineri* is rounded, without median notch. Particularly, Bruce (1973) cited the absence of the median notch

Table 1. Localities and hosts of *Gnathophylloides mineri* Schmitt, 1933.

Localities		Hosts	References
Northwestern Atlantic Caribbean Sea	Florida	<i>Tripneustes</i> sp.	Lewis, 1956
	Colombia	<i>Tripneustes ventricosus</i> (Lamarck, 1816)	Criales, 1984
	Barbados	<i>Tripneustes ventricosus</i> (Lamarck, 1816) (as <i>Tripneustes esculentus</i>)	Lewis, 1956
	Jamaica	<i>Lytechinus variegatus</i> (Leske, 1778) (as " <i>Toxopneustes</i> " <i>variegatus</i>)	Lewis, 1956
	Virgin Islands	<i>Tripneustes ventricosus</i> (Lamarck, 1816)	Patton <i>et al.</i> , 1985
Eastern Pacific	Malpelo Island	possibly <i>Tripneustes depressus</i> (A. Agassiz, 1863)	Abele, 1975
	Galapagos Islands	<i>Tripneustes depressus</i> (A. Agassiz, 1863)	Wicksten and Hernández, 2000
Central Pacific	Hawaii	<i>Pseudoboletia indiana</i> (Michelin, 1862)	Castro, 1971; Titgen, 1989
	Hawaii	<i>Tripneustes gratilla</i> (Linnaeus, 1758)	Castro, 1971
Western Pacific	Australia	<i>Tripneustes gratilla</i> (Linnaeus, 1758)	Bruce, 1988
	South China Sea	<i>Tripneustes</i> sp.	Li, 1997
	Japan	<i>Tripneustes gratilla</i> (Linnaeus, 1758)	This study
Indian Ocean	Zanzibar	<i>Tripneustes gratilla</i> (Linnaeus, 1758)	Bruce, 1974b
	Seychelles	<i>Tripneustes gratilla</i> (Linnaeus, 1758)	Bruce, 1974b

as one of the diagnostic features in separating *G. mineri* from *G. robustus*. Our finding, however, has shown that this character is not reliable in separating the two congeneric species. The general color pattern of the present specimens (Fig. 3) agrees well with the descriptions given by Patton *et al.* (1985) and Bruce (1988), and the color photographs published by Bruce (1990a), Gosliner *et al.* (1996), Hoover (1998) and Debelius (1999).

Schmitt (1933) first described *Gnathophylloides mineri* from Porto Rico, but its habitat was not mentioned. Since Lewis (1956) reported the association between *G. mineri* and sea urchin based on the examples from Florida and Caribbean waters, the relationship has been recorded from elsewhere, not only in the Atlantic Ocean, but also in the Indo-Pacific region (see Table 1). The previous records on the association show that the host specificity of the shrimp is rather high. All the host animals belong to the family Toxopneustidae. In the Indo-West Pacific region, *Tripneustes gratilla* is the most common host animal.

It is generally considered that distribution of the commensal shrimps is dependent on distribution of the host animals (cf. Bruce, 1976). The host sea urchin of *G. mineri*, *T. gratilla*, is abundant in shallow rocky reef of Hachijo-jima Island (KT, personal observation). Further, the sea around the island is greatly influenced by the Kuroshio Current and its branches (Uda, 1953). These factors may enable *G. mineri* to extend its distribution to the area of relatively high latitude (about 33°N) in the northwestern Pacific.

Patton *et al.* (1985) reported that two to six individuals of *G. mineri* were usually associated with a single host sea urchin in the Virgin Islands. However, during the collection of the present material, we found that only a solitary individual was on the host.

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日本初記録のマガタマエビ (新称; 甲殻綱, エビ目, ヨコシマエビ科)

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伊豆諸島八丈島で採集された雄 2 個体, 抱卵雌 2 個体に基づいて, ヨコシマエビ科マガタマエビ属 (新称) *Gnathophylloides* Schmitt, 1933 のマガタマエビ (新称) *Gnathophylloides mineri* Schmitt, 1933 を報告する。本種はラッパウニ科のウニ類と共生することが知られており, 調査標本の宿主も同科のシラヒゲウニ *Tripneustes gratilla* (Linnaeus, 1758) である。本種はこれまでに日本から記録されていなかったが, 本報告によって日本に分布することが確認され, さらに八丈島が現時点での分布の北限となる。また, 本種と近似種 *G. robustus* Bruce, 1973 を識別する形質のひとつとみなされていた尾節後部の形態は, 本種において種内変異が見られたため, 種を同定するには無効である。