

A New Record of Cavernicolous Crab *Sesarmoides boholano* Ng, 2002 (Brachyura, Sesarmidae) from Ishigaki Island, Southern Ryukyu Islands, Japan

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Abstract. *Sesarmoides boholano* is newly recorded from Ishigaki Island, the southern Ryukyu Islands, Japan. The specimens from Ishigaki Island tend to have larger body size and more slender ambulatory legs than those from topotypic specimens. However the differences of these populations are not very significant, Ishigaki population is regarded as *S. boholano*. This study records a second distributional area of the species and substantially extends the range north from the Bohol, the Philippines.

Key words: *Sesarmoides boholano* Ng, 2002, cavernicolous crabs, taxonomy, new to Japan, Ryukyu Islands.

Introduction

Sesarmoides boholano Ng, 2002 (Decapoda: Brachyura: Sesarmidae) was originally described from Panglao Island, Bohol, the Philippines and had been only known from the type locality. Recently we obtained a number of specimens from caves on Ishigaki Island, the southern Ryukyu Islands, Japan (Fig. 1). In the present study, we describe the morphological features of newly obtained material and compare them with the topotypic specimens.

Materials and Methods

Specimens are deposited in the Natural History

Museum and Institute, Chiba, Japan (CBM), the Ryukyu University Museum, Fujukan, Okinawa, Japan (RUMF), the Museum of the University of San Carlos (USC), and the Zoological Reference Collection, Raffles Museum of Biodiversity Research, National University of Singapore, Singapore (ZRC). The abbreviations CL, CW, G1 and G2 are used for carapace length, carapace width, male first gonopod, and male second gonopod, respectively. All characters were measured using digital slide caliper (Mitsutoyo CD-20PM) to the nearest 0.1 mm. Measurements of the specimens are of CL and CW respectively.

Taxonomy

SESARMIDAE

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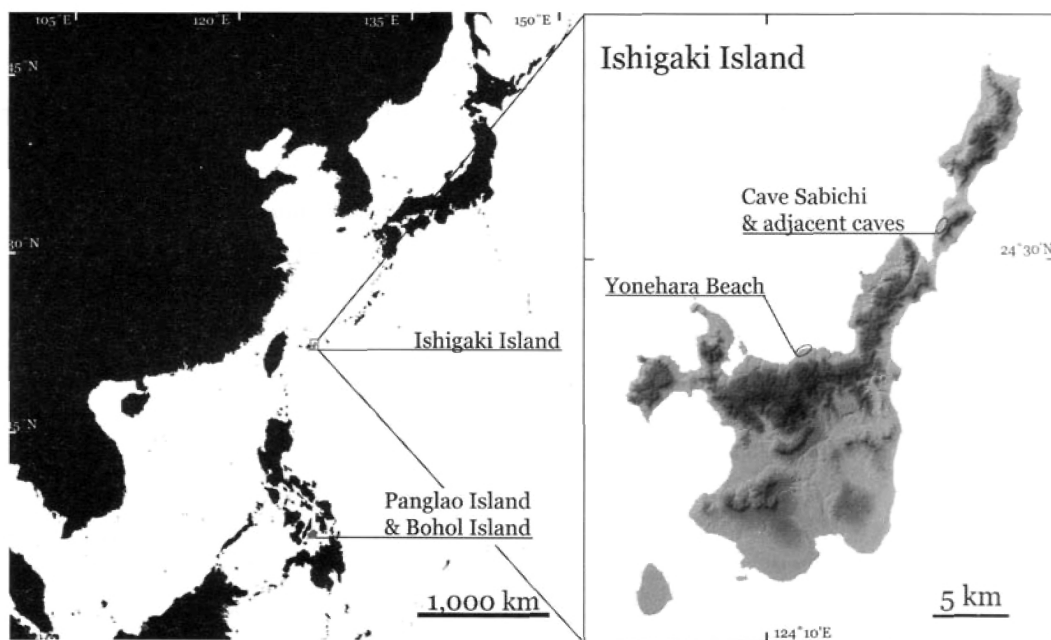


Fig. 1. Distribution of *Sesarmoides boholano*.

Sesarmoides Serène & Soh, 1970

Sesarmoides boholano Ng, 2002

(Figs 2, 3)

Material examined. 1 ♀, 16.1 by 20.5, RUMF-ZC-103, a cave located north of Sabichi Cave, Ishigaki Island, coll. Hisao Tamura, 25 Nov. 2003; 1 ♂, 10.7 by 13.3 mm, RUMF-ZC-34, a cave near Yonehara Beach, Ishigaki Island, coll. Hisao Tamura, 29 Jul. 2004; 1 ♂, 17.9 by 20.6 mm, RUMF-ZC-35, a second cave located north of Cave

Sabichi, Ishigaki Island, coll. Hisao Tamura. 10 Nov. 2004; 2 ♂, 12.4 by 15.6, 14.0 by 17.2 mm, CBM-ZC 8350, locality same as RUMF-ZC-103, coll. Tohru Naruse, 22 Jul. 2004.

Comparative material. *Sesarmoides boholano*: 1 ♂, holotype, 15.9 by 13.1 mm. USC, Tawala Cave, Panglao Island, Bohol, Philippines, coll. P. K. L. Ng et al., 27 Nov. 2001; 1 ♂, paratype, 15.3 by 12.7 mm, 1 ♀, paratype, 17.8 by 14.5 mm, ZRC 2002.0007, data same as holotype; 9 ♂ 2 ♀, ZRC 2003.0391, locality same as holotype, coll. P. K. L.

Table 1. Comparisons of measurements of carapace and third ambulatory meri along their growth between Ishigaki and Panglao populations of *Sesarmoides boholano*. The characters were compared by ANCOVA with Bonferroni test using CL as the covariate. Abbreviations as follows: *df*: degrees of freedom; *F*: *F* statistic; *I*: Ishigaki population; *L*: length; *MS*: mean squares; *P*: probability; *PG*: Panglao population; *SS*: sum of squares; *W*: width. The taxa sharing the same superscript letter indicated no significant difference in Bonferroni test.

Characters	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P</i>	multiple	comparison
3rd ambulatory merus L	0.027	1	0.027	0.043	0.839	I ^a	PG ^a
3rd ambulatory merus W	0.075	1	0.075	0.779	0.392	I ^a	PG ^a
3rd ambulatory propodus L	1.296	1	1.296	6.712	0.021		
3rd ambulatory propodus W	0.004	1	0.004	0.286	0.601	I ^a	PG ^a

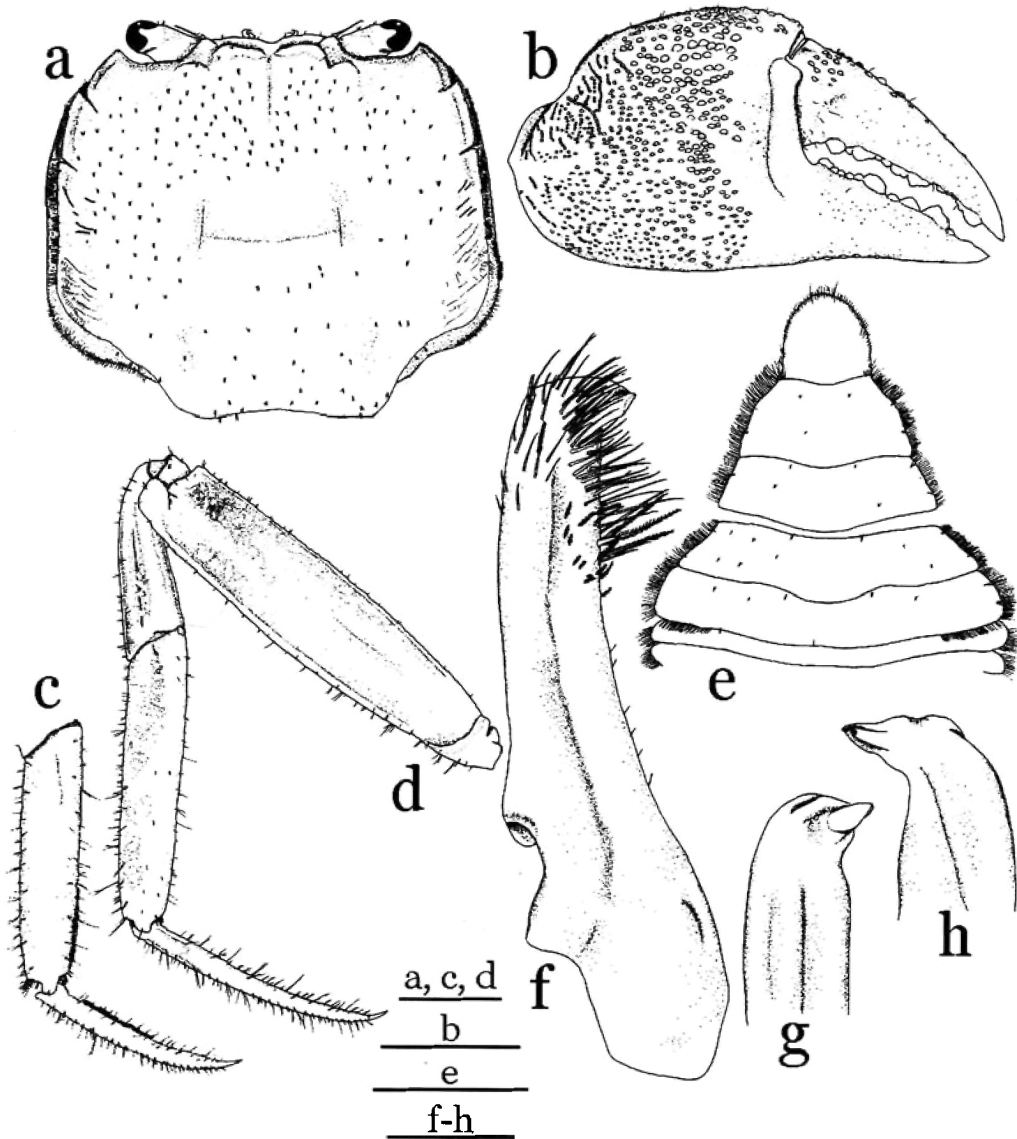


Fig. 2. *Sesarmoides boholano* Ng, 2002. a: carapace, dorsal view; b: chela, right, outer view; c: second ambulatory leg, left; d: third ambulatory leg, left; e: abdomen and telson; f: G1, ventral view; g: distal part of G1, ventral view (setae were not drawn); h: distal part of G1, dorsal view (setae were not drawn). a-c, e-h: RUMF-ZC-35, male, CW 20.6 mm; d: RUMF-ZC-103, female, CW 20.5 mm. Scales: a-e, 5 mm; c, f-h, 1 mm.

Ng *et al.*, 25–30 Jul. 2003.

Sesarmoides kraussi: 1 ♂, RUMF-ZC-130, mangrove forest of the river mouth of Yukishida River, Iriomote Island, coll. Tohru Naruse, 19 Oct. 2001; 1 ♂1 ♀, RUMF-ZC-131, upper margin of mangrove

forest of Urauchi River, Iriomote Island, coll. Takashi Nagai, Akihumi Yogi, *et al.*, 26 Feb. 2003.

General description. Carapace (Fig. 2a) approximately trapezoidal with lateral margins diverging backwards, greatest width between base of second



Fig. 3. Life colours of *Sesarmoides boholano* Ng, 2002 in a cave of Ishigaki Island, CBM-ZC 8350, female, CW 18.6 mm.

ambulatory legs, about 1.2–1.3 times CL; regions indistinct, dorsal surface minutely punctate, scattered with tufts of a few short setae on gastric to hepatic regions. Front about 0.4 times fronto-orbital width, deflexed, with broad median notch; epigastric crista low, median groove distinct. Supraorbital margin straight in centre part; infraorbital margin composed of two ridges, anterior ridge lower, minutely granular, posterior ridge higher than anterior, distinctly granular; inner orbital tooth very small, subtriangular. External orbital angle acute, directed anterior inner ward; anterolateral margin with two epibranchial teeth behind external orbital angle, former larger, latter rounded, smaller, tip of former tooth placed closer to external orbital angle than second epibranchial tooth. Posterolateral region with weak striae and very short setae; short setae lined below anterolateral to posterolateral margins. Epistome longitudinally concave, with sparse setae; posterior margin smooth, with medial triangular lobe and lateral angle.

Eye rather small, subdistal width of cornea slightly narrower than peduncle in frontal view.

Antennule and antenna contiguous. Basal segment of antennule relatively large. Antenna set vertically; second segment with short distal outer process not reaching distal margin of third segment.

Male chelipeds subequal, large, robust. Merus granular on ventral surface, dorsal margin sharply carinate, tuberculate, with distal hackly lamina, rather simple in small individual, ventral anterior and posterior angles toothed, posterior surface smooth, with longitudinally lined hairs on sub-dorsal part and sparse hairs on lower part. Carpus with dorsal rim composed of granules, smooth. Palm without pectinate crests on dorsal surface; inner surface convex, with low and rounded tubercles; outer surface of palm (Fig. 2b) convex, granular, dorsal half with larger granules, dorsal proximal part with weak ridges; ventral half less granular. Tip of fingers terminating in simple corneous claw. Dactylus slightly shorter than palm, straight in young individuals, weakly incurved in adults; dorsal surface sparsely lined with granules.

Ambulatory legs long (Figs 2c, d); third leg noticeably elongated, length of coxa to dactylus and merus to dactylus 2.66–2.86 times and 2.40–2.76 times CW, respectively. Meri armed with subdistal angle on anterior margin, dorsal surface rough; distal part of posterior dorsal margin lamellarly arching out posteriorly; merus of third ambulatory leg 3.92–4.83 times as long as wide. Carpi with two, one and one longitudinal ridges on dorsal, outer, and ventral surfaces, respectively. Propodi slender, with rectangular cross section, 2–7 sharp spines on distal dorsal and ventral corners; propodi with short setae mixed with several longish setae, of which outer surface bears three longitudinal bands; propodus of third ambulatory leg 4.37–5.33 times as long as wide. Dactylus of third ambulatory leg 0.83–0.92 times as long as propodus, terminating in corneous spine; each outer and inner surface covered with three longitudinal bands of short setae mixed with several longish setae. Mats of dense short setae on distal inner surfaces of propodi and proximal inner margin

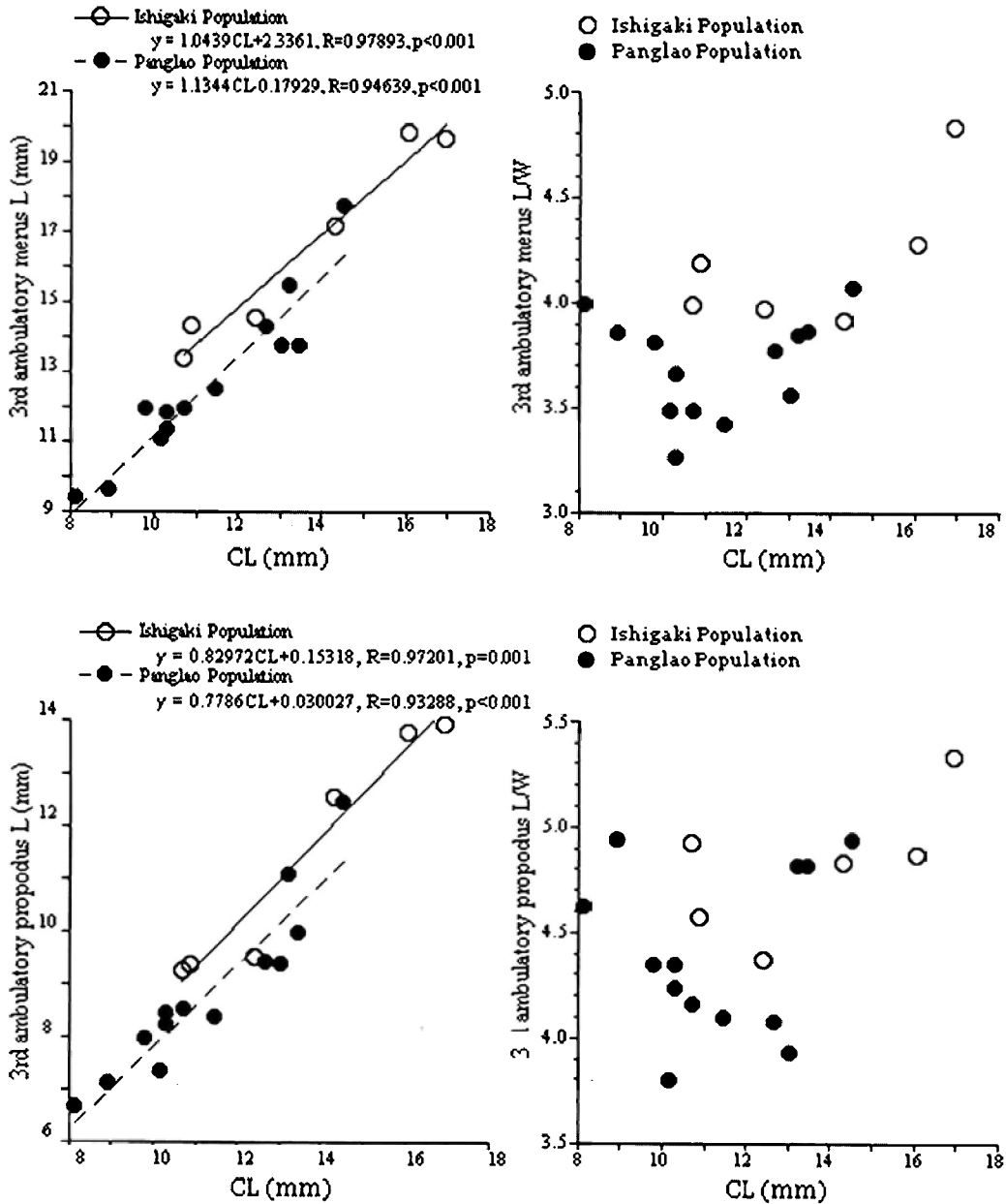


Fig. 4. Comparison of allometric growth of third ambulatory meri and propodi among Ishigaki and Panglao populations of *Sesarmoides boholano* Ng, 2002. a: regression of the merus length on carapace length; b: length/width ratio of merus; c: regression of the propodus length on carapace length; d: length/width ratio of propodus. Open symbol, Ishigaki population; closed symbol, Panglao (=topotypic) population.

of dactyli of male first and second ambulatory legs, faint in male third leg, absent in all female legs and male fourth leg. Prominent tufts of long setae pre-

sent on anterior ventral surfaces of coxae of third and fourth ambulatory legs.

Anterior sternal plate subtrapezoidal; surface

somewhat concave, male with dense soft setae on centre to anterior margin.

Male abdomen (Fig. 2e) relatively wide, somewhat narrowed at base of fifth. Sixth somite length 0.40–0.46 times basal width, longer than or as long as fifth somite. Telson as long as basal width and as long as to longer than sixth abdominal somite, terminal margin rounded.

G1 (Figs 2f–h) stout, almost straight; distal part sharply bent outwards, corneous terminal part short.

Colour (Fig. 3). The dorsal surface of carapace is dark brown, meri to carpi of ambulatory legs are vermilion, propodus and dactylus are whitish vermilion.

Habitat. The type locality is a horizontal excavation with very narrow stream. *Sesarmoides boholano* was observed walking on the stalactitic cave walls (Fig. 3).

Distribution. Known from Panglao Island, Bohol, Philippines, and Ishigaki Island, Yaeyama Group, southern Ryukyu Islands, Japan. The geographical range of this species is substantially extended north from the Bohol, the Philippines.

Remarks. The specimens from Ishigaki Island agree well with the type series of *Sesarmoides boholano* by Ng (2002). Our detailed comparison showed that the specimens from Ishigaki Islands tend to have larger body size and more slender ambulatory legs than those from Panglao (Fig. 4). However the differences of these populations are not very significant (Table 1) and there is no difference in taxonomically important G1. Therefore, Ishigaki population is here regarded as *S. boholano*.

Komai *et al.* (2004) recorded *S. kraussi* (De Man, 1887) living on the same island with *S. boholano*, which is easily distinguished from *S. kraussi* by the less divergent lateral margins of the carapace (*vs* strongly divergent in *S. kraussi*), the relative position of the tip of the former epibranchial tooth

(placed closer to external orbital angle in *S. boholano vs* equidistance from external orbital angle and latter epibranchial tooth), and the absence of the conical tubercles on the outer surface of pollex (*vs* present in *S. kraussi*).

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