

First Specimen-Based Japanese Record of the Sponge-Dwelling Goby *Sueviota minersorum* (Teleostei: Gobiidae) from Iriomote Island, Yaeyama Islands

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(Received 28 December 2024; Accepted 24 April 2025)

Two specimens (15.8 and 22.4 mm in standard length) of *Sueviota minersorum* Greenfield, Erdmann, and Utama, 2019, a species originally described on the basis of four specimens from Misool, Raja Ampat Islands, Indonesia, were collected from Sotobanari Island, off Iriomote Island, Yaeyama Islands, southern Japan. Although *S. minersorum* in Japanese waters has previously been identified on underwater photographs taken at Iriomote Island, this study provides the first specimen-based record of *S. minersorum* from Japan, and proposes a new standard Japanese name, “Kadomori-awase-isohaze” for the species.

Key Words: distribution, morphology, *Sueviota lachneri*, *Sueviota larsonae*.

Introduction

The genus *Sueviota* Winterbottom and Hoese, 1988, distributed throughout the tropical Indo-West Pacific, ranges from the Gulf of Aqaba (northern Red Sea) east to Papua New Guinea and southern Japan, and south to northwestern Australia (Akihito et al. 2002; Nunes Peinemann et al. 2024). It currently includes nine valid species (Nunes Peinemann et al. 2024): *S. aethon* Nunes Peinemann, Pombo-Ayora, and Tornabene, 2024, *S. aprica* Winterbottom and Hoese, 1988, *S. atrinasa* Winterbottom and Hoese, 1988, *S. bryozophila* Allen, Erdmann, and Cahyani, 2016, *S. lachneri* Winterbottom and Hoese, 1988, *S. larsonae* Winterbottom and Hoese, 1988, *S. minersorum* Greenfield, Erdmann, and Utama, 2019, *S. pyrios* Greenfield and Randall, 2017, and *S. tubicola* Allen and Erdmann, 2017. Among these, two species (*S. lachneri* and *S. larsonae*) have been recorded in Japanese waters and have been assigned standard Japanese names (Akihito et al. 2002; Shibukawa et al. 2008).

Sueviota minersorum was previously known only from Raja Ampat Islands, West Papua, Indonesia, based on four type specimens. Recently, two specimens identified as *S. minersorum* were collected at a depth of 23 m from Sotobanari Island, off Iriomote Island, Yaeyama Islands, Okinawa Prefecture, Japan. Being the first specimen-based record of this species from Japan, they are described here in detail.

Materials and Methods

Counts and measurements followed Greenfield et al.

(2019), with the following exceptions: scales in transverse series were counted from the origin of the anal fin upward and forward to the base of the first dorsal fin (TS1), from the origin of the anal fin upward and backward to the base of the second dorsal fin (TS2), and from the origin of the second dorsal fin downward and backward to the base of the anal fin (TS3); gill rakers were counted on the first gill arch on the right side; and vertebrae from soft X-ray photographs. Standard length is abbreviated as SL. Measurements were taken under a microscope to the nearest 0.01 mm, with digital calipers. Terminology of the cephalic sensory-canal pore system (observed using versatile staining with Cyanine Blue; Saruwatari et al. 1997) follows Allen and Erdmann (2017). Curatorial procedures for the collected specimens followed Motomura and Ishikawa (2013). The Japanese specimens of *S. minersorum* are deposited at the Kagoshima University Museum (KAUM), Japan. An underwater photograph of living individual registered as KAUM-II. 606 was taken at the same location where the specimens of KAUM-I. 212680 and KAUM-I. 212681 were collected. In addition, underwater photographs taken from Iriomote Island and given by Senou et al. (2004) as *Sueviota* sp. 1 were also identified here as *S. minersorum*.

Sueviota minersorum Greenfield, Erdmann, and Utama, 2019
[English name: Miners' Dwarf goby;
new standard Japanese name: Kadomori-awase-isohaze]
(Figs 1, 2; Table 1)

Sueviota sp. 1: Senou et al. 2004: 155, unnumbered figs (Iriomote Island); Senou et al. 2021: 161, unnumbered figs (Iriomote Island).



Fig. 1. Fresh specimens of *Sueviota minersorum* from Sotobanari Island, off Iriomote Island, Yaeyama Islands, Okinawa Prefecture, Japan (A: KAUM-I. 212680, 22.4 mm SL; B: KAUM-I. 212681, 15.8 mm SL).

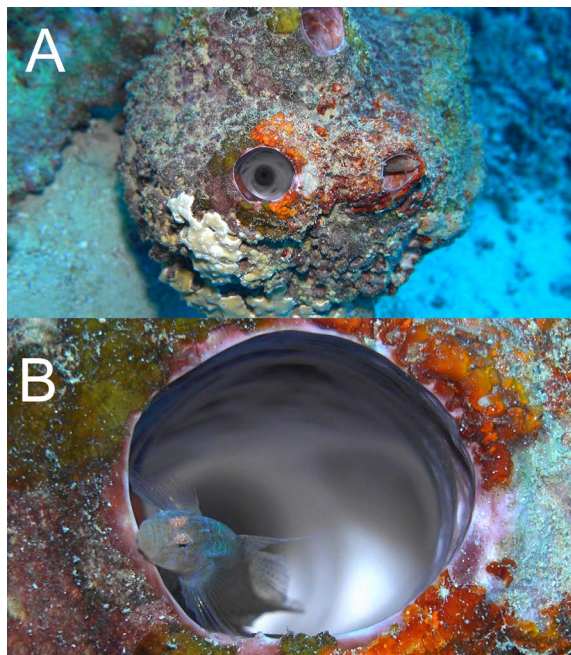


Fig. 2. Host sponge, *Theonella* (A), from which the Japanese specimens of *Sueviota minersorum* (KAUM-I. 212680, 22.4 mm SL; KAUM-I. 212681, 15.8 mm SL) were collected; close-up of osculum of the host sponge (B) with a living individual of *S. minersorum* (not collected; KAUM-II. 606; photo by K. Yano).

Material examined. KAUM-I. 212680, female, 22.4 mm SL, KAUM-I. 212681, female, 15.8 mm SL, Sotobanari Island, off Iriomote Island, Yaeyama Islands, Ryukyu Islands, Japan, 23 m depth, 9 October 2024, hand net, collected by K. Yano.

Description. Counts and measurements are given in Table 1. Body stocky, deepest at pelvic-fin origin. Head rounded anteriorly. Snout short, its length approximately equal to pupil diameter. Mouth terminal, oblique, forming angle of 54.1° to horizontal axis of body in KAUM-I. 212680

Table 1. Counts and measurements of *Sueviota minersorum* collected from Sotobanari Island, off Iriomote Island, Yaeyama Islands, Japan.

	KAUM-I. 212680	KAUM-I. 212681
	female	female
Standard length (SL; mm)	22.4	15.8
Count		
First dorsal-fin rays	VI	VI
Second dorsal-fin rays	I, 9	I, 9
Anal-fin rays	I, 8	I, 7
Pectoral-fin rays	17	17
Pelvic-fin rays	I, 5	I, 5
Segmented caudal-fin rays	17	16
Branched caudal-fin rays	13	14
Longitudinal scales	26	27
Scales in transverse series 1 (TS1)	7	7
Scales in transverse series 2 (TS2)	6	7
Scales in transverse series 3 (TS3)	6	7
Gill rakers	1 + 8	2 + 8
Vertebrae	10 + 16 = 26	10 + 16 = 26
Measurements (% of SL)		
Head length	26.5	28.3
Snout length	5.9	5.9
Eye diameter	7.0	9.2
Snout to first dorsal-fin origin	32.1	33.2
Snout to second dorsal-fin origin	52.4	55.4
Snout to anal-fin origin	55.6	60.2
Body depth (at pelvic-fin origin)	22.4	24.7
Body depth (at anal fin-origin)	22.1	23.1
Caudal-peduncle length	26.9	27.3
Caudal-peduncle depth	16.8	17.2
Pectoral-fin length	27.4	27.2
Caudal-fin length	22.6	22.1
Pelvic-fin length	22.3	27.7

(48.0° in KAUM-I. 212681); lower jaw slightly projecting; posterior margin of maxilla level with or slightly beyond anterior margin of pupil. Tip of tongue pointed, free from mouth floor. Interorbital space as narrow as pupil diameter. Anterior nasal with short tubular opening just behind snout tip; no fleshy flap at tip of anterior naris. Posterior nasal with elevated rim opening just in front of anterior margin of orbit. Cheek bulging. Gill opening wide, extending to about level of posterior edge of preopercle; ventral half of lower part of gill slit closed by membrane; gill rakers poorly developed.

Both jaws with a band of slightly recurved conical teeth; outermost teeth in a single row, fewer and larger than inner teeth. Two large caniniform teeth innermost on each side of lower jaw.

Cephalic sensory-canal pore system includes anterior oculoscapular canal with pores, NA, single AITO, single PITO, SOT, and AOT, two preopercular-canal pores POP. Urogenital papilla short, bulbous.

Scales finely ctenoid on body, absent on head and chest region, but present on belly; anterior extent of scales reaching top of pectoral-fin base, but absent along bases of first

four dorsal-fin spines in KAUM-I. 212680 (first two dorsal-fin spines in KAUM-I. 212681).

First dorsal fin triangular; origin slightly behind posteriormost base of pelvic fins; second dorsal fin close to and connected to first via low membrane; all dorsal-fin spines slender, flexible; first spine filamentous in KAUM-I. 212680 (not filamentous in KAUM-I. 212681). All segmented rays of second dorsal fin branched, except first; last ray branched to base. Origin of anal fin below base of first segmented ray of second dorsal fin; height of anal fin slightly less than second dorsal fin when spread; anal-fin spine slender, flexible; all segmented anal-fin rays branched. Caudal fin rounded. Pectoral fin reaching posteriorly to below base of first or second dorsal segmented ray; lower half of pectoral-fin rays branched, upper half unbranched. Origin of pelvic fin slightly in front of vertical through lowermost point of pectoral-fin base; all segmented pelvic-fin rays branched, fifth ray with two branches, subequal to fourth, well-developed basal membrane joining the two fifth rays, extending to ends of the rays, no frenum.

Live and fresh color (Figs 1, 2B). Background color of head and body translucent yellowish-gray (KAUM-II. 606 bluish-gray in life); scale pockets on body with elongated, strong, burnt-orange marks, scales sprinkled with fine melanophores. Head sprinkled with small melanophores and overlaid with orange markings consisting of three irregular bars across nape; snout and both jaws with orange reticulations; anterior tubular naris gray in KAUM-I. 212680 (black in KAUM-I. 212681); jaws brownish with red-orange reticulations; four orange blotches radiating from eye, at 2, 4, 6, and 7 o'clock positions; two blotches on cheek, one pupil-sized on lower edge of preopercle, the other vertical, just behind posterior edge of preopercle. Pupil black, iris bluish-gray with eight red lines radiating from pupil; opercular membrane burnt-orange, heavily peppered with melanophores. Pectoral-fin base sprinkled with melanophores, and two orange spots, one upper and one lower. Ground color of first and second dorsal fin translucent grayish-white; membrane with small scattered bluish-white and yellow spots, distal margin iridescent bluish-white; all spines of first and second dorsal fin orange with bluish-white dots along length; round orange spots along all rays of second dorsal fin. Caudal-fin rays orange with bluish-white squares spaced along length, membranes peppered with bluish-white and yellow spots, dorsal and ventral edges more yellow, distal margin iridescent bluish-white. Anal-fin rays yellow, membranes peppered with bluish spots. First to fourth pelvic-fin rays white, fifth ray yellow, membrane between fifth rays peppered with bluish-white spots. Pectoral-fin rays translucent orange, membrane clear.

Distribution and habitat. *Sueviota minersorum* is found in the western Pacific Ocean, with records from Sotobanari Island, off Iriomote Island, Yaeyama Islands, Japan, and the Raja Ampat Islands, West Papua, Indonesia (Greenfield et al. 2019; Senou et al. 2021; this study). Both Japanese specimens were collected from inside the same sponge, a species of *Theonella* Grey, 1868 (Fig. 2). Individuals, typically in pairs or groups of three or more, were seen in the

osculum of other sponges, including, occasionally, those of *Xestospongia testudinaria* (Lamarck, 1815) (Fig. 3) (K. Yano, personal communication).

Remarks. The specimens in this study closely matched the diagnosis of *Sueviota minersorum* given by Greenfield et al. (2019), as follows: basal membrane fully joining fifth pelvic-fin rays; no frenum; cephalic sensory-canal system including POP, NA, AITO (single), PITO, AOT, and SOT pores; all pelvic-fin rays branched; second dorsal-fin elements I, 9; pectoral-fin rays 17; body stocky with deep caudal peduncle (16.8% and 17.2% SL), not tapering from mid-body; color pattern in life including a gray background with orange markings over the head, pectoral-fin base, and as bars on each body scale, with iridescent bluish margins and round reddish spots along rays of second dorsal fin. The most obvious difference between the present specimens and the original description of *S. minersorum* was the pectoral-fin ray condition, the Japanese specimens having branched rays in the lower portion, compared with all pectoral-fin rays originally described as unbranched (Greenfield et al. 2019). However, examination of the figure of the holotype (Greenfield et al. 2019: fig. 1), disclosed that the pectoral-fin rays were also branched in the lower portion, similar to the Japanese specimens, and that no distinction existed in pectoral-fin characteristics between the holotype of *S. minersorum* and the specimens described herein. In addition, anal-fin elements of KAUM-I. 212681 (I, 7) differed from that (I, 8) given in the original description of *S. minersorum* (based only on 3 specimens). Since the variation of I, 7 or I, 8 in anal-fin elements was also confirmed in a congener *Sueviota bryozophila*, the difference in the number of anal-fin elements found in *S. minersorum* is also likely to be intraspecific variation.

Sueviota sp. 1 sensu Senou et al. (2004) was identified as *S. minersorum*, based on shared traits, including a relatively deep caudal peduncle and the color pattern described above. Although no definitive evidence, except in photographs from Iriomote Island, was available [and no additional photographs of the species were registered in the Fish Image



Fig. 3. *Xestospongia testudinaria*, in which some *Sueviota minersorum* were observed (Funauki Bay, Iriomote Island, Yaeyama Islands, Okinawa Prefecture, Japan, 30 m depth; photo by K. Yano).

Database (FishPix) of the Kanagawa Prefectural Museum of Natural History (KPM)], Senou et al. (2021) suggested a broad distribution of *Sueviota* sp. 1 across southern Japan (Hachijo Island, Izu Islands; Kochi Prefecture; Yaku Island, Osumi Islands; Miyako Island, Miyako Islands; Ishigaki Island, Yaeyama Islands). On the other hand, a specimen (KPM-NI 22560, 15.0 mm SL) from Yaku Island reported as *Sueviota* sp. by Motomura et al. (2010) was not identified here as *S. minersorum* because the former had a relatively low caudal peduncle (vs. deep caudal peduncle in the latter). Accordingly, the Japanese specimens described herein as *S. minersorum*, previously known only from Indonesia (type locality), represent the first specimen-based record from Japan and northernmost record of the species. The new standard Japanese name, “Kadomori-awase-isohaze”, is derived from “Kadomori” meaning “doorkeeper”, referring to the fish seemingly keeping watch on the osculum of sponges, and “Awase-isohaze”, the common Japanese name for *Sueviota*.

Acknowledgments

We are especially grateful to K. Yano (Dive Service Yano) for collecting specimens and information on the ecology of *Sueviota minersorum*; Y. Dewa (KAUM) and M. Matsuoka (Kagoshima University) for collecting specimens in Iriomote Island; R. A. Cabebe-Barnuevo (KAUM) for valuable comments on an early draft; T. Hashimoto (KAUM) for taking soft X-ray photographs; G. S. Hardy (Ngunguru, New Zealand) for reading the manuscript and providing help with English; S. Ishihara and J. Nakamura (Kagoshima City Aquarium), K. Kuriyama (KAUM), and the staff of Iriomote Station, Tropical Biosphere Research Center, University of the Ryukyus for supporting the survey; and volunteers, graduates, and students of KAUM for curatorial assistance.

Authors Contributions

Masayuki C. Sato: Conceptualization; Formal analysis; Visualization; Writing – original draft. Hiroyuki Motomura: Supervision; Resources; Investigation; Writing – review & editing; Project administration; Funding acquisition.

Funding

This study was supported in part by JSPS KAKENHI Grant Numbers 20H0311, 21H03651, 23K20304, and 24K02087; the JSPS Core-to-Core CREPSUM JPJSCCB20200009; and the “Establishment of Glocal Re-

search and Education Network in the Amami Islands” project of Kagoshima University, adopted by the Ministry of Education, Culture, Sports, Science and Technology, Japan.

Declarations

Competing interests. The authors declare no conflicts of interest.

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