沖縄島から採集された飼育個体に基づくアダヒメオコゼ（新称）(Synanceiidae: Minoinae)の2番目の記録

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Second record of *Minous groeneveldi* Matsunuma & Motomura, 2018 (Synanceiidae: Minoinae) based on an aquarium-held individual collected from Okinawa-jima Island, southern Japan

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Abstract. A single individual of *Minous groeneveldi* Matsunuma & Motomura, 2018 (75.3 mm standard length) was collected from Okinawa-jima Island, southern Japan, and is being reared at the Okinawa Churaumi Aquarium (as of 10 Mar. 2021). No record of this species is known other than the original description, which was based only on the holotype and underwater photographs from Indonesia. This is the second record of the species, which provides additional information regarding the morphology, distribution, and ecology of this species.

Introduction

The stingfish *Minous* Cuvier in Cuvier & Valenciennes, 1829 contains 15 valid species (Eschmeyer et al. 1979; Amaoka & Kanayama 1981; Mandrytsa 1990, 1993; Matsunuma & Motomura 2018) from the Indo-West Pacific region. Among them, three species, *M. monodactylus* (Bloch & Schneider, 1801), *M. pusillus* Temminck & Schlegel, 1843, and *M. quincarinatus* (Fowler, 1934) are known from Japanese waters (Nakabo & Kai 2013; Matsunuma & Motomura 2018).

Minous groeneveldi Matsunuma & Motomura, 2018 is currently known only from the holotype collected at a depth of 30 m off Bali, Indonesia and underwater photographs taken in Lembeh Strait, North Sulawesi, Indonesia (Matsunuma & Motomura 2018). The species is distinguished from other congeners by the following combination of characters: 1st dorsal-fin spine much shorter than 2nd dorsal-fin spine, their bases close together; dorsal-fin rays XI, 11; anal-fin rays II, 9; head depth 17.6% of standard length (SL); eye moderately low set on head (horizontal line through top of snout bulge level with ventral margin of pupil in 77.7 mm SL specimen); anterior and posterior lacrimal spines blunt, tips of both spines canted ventrally; body entirely pale pink or yellow with narrow dusky stripe centrally, but without oblique alternating dark and light stripes; inner surface of pectoral fin largely bright yellow basally with dark stripes along rays, distal portion largely yellow (whitish) when fresh; pore above pectoral-fin base associated with short, rounded skin flap (Matsunuma & Motomura 2018).

On 16 March 2020, a single individual of *Minous groeneveldi* was collected from a set net near Okinawa-jima Island, southern Japan. This fish was brought alive to the Okinawa Churaumi Aquarium (Okinawa, Japan), and is being reared in captivity (as of 10 Mar. 2021).

This is the second record of the species and also the first record from Japanese waters. Herein, we describe the morphology and ecological features observed in the aquarium of the individual.

Materials and methods

Morphological observations, photography, and radiography were performed under anesthesia using 2-phenoxyethanol on 20 May 2020. Counts, measurements, and terminology follow Matsunuma & Motomura (2018). Number of vertebrae were counted using radiographs. Teeth and gill rakers were not observed in this study to avoid serious damage to the living organism. Ecological observations were made in a sand bed tank (35 L, sand thickness 5 cm). The individual used in this study will be assigned a specimen number (OCF-P4319) and deposited at the Okinawa Churashima Foundation (OCF) as a formalin-fixed specimen when dead.

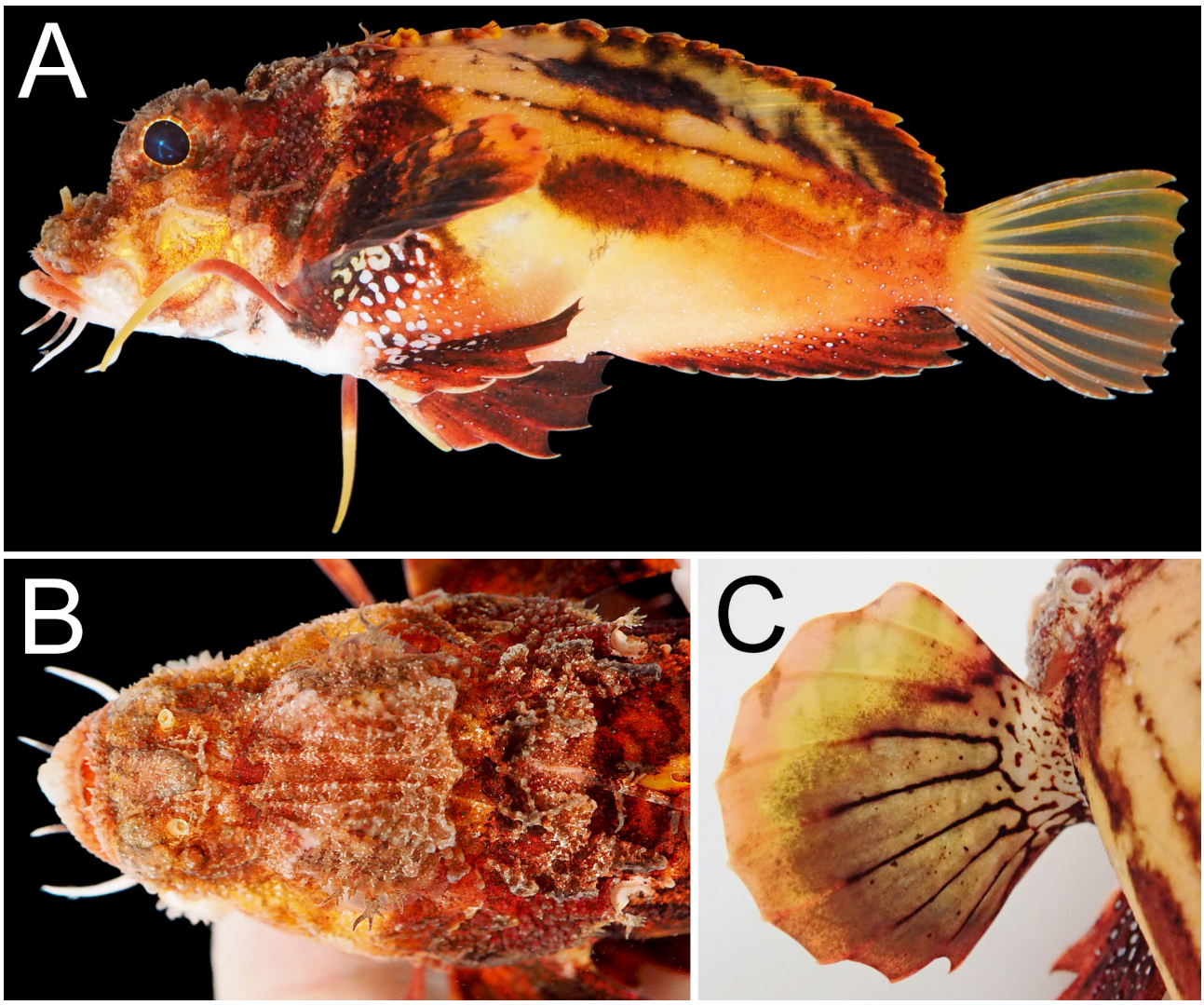

Fig. 1. Photographs of anesthetized *Minous groeneveldi* (74.3 mm standard length, from Okinawa-jima Island, Japan). A) Lateral view; B) Dorsal view of head; C) Inner surface of pectoral fin.
図 1．アダヒメオコゼ Minous groeneveldi (標準体長 74.3 mm，沖縄島安田産) の麻酔下での写真．A) 側面；B) 頭部背面；C) 胸鰭内側．

Results and Discussion

***Minous groeneveldi* Matsunuma & Motomura, 2018**

English name: Groeneveld's Stingfish
New standard Japanese name: Ada-hime-okoze
(Figs. 1–3; Table 1)

Material examined. 75.3 mm SL, 16 March 2020, off Ada, Okinawa-jima Island, Japan (26°43′N, 128°19′E), set net.

Description. Counts and measurements of the Okinawan individual and the holotype of *M. groeneveldi* presented in Table 1.

Body oblong, moderately compressed laterally, without scales. Lateral-line tubes continuous, each tube with a short skin tube. Head moderately large; interorbital space deep, interorbital ridges developed, well separated from each other; occipital pit deep (Fig. 1B). Anterior and posterior lacrimal spines blunt, canted ventrally, length of both spines almost same; suborbital ridge with rough bony clusters with numerous small spines (Fig. 2); preopercle with 6 spines, second spine behind end of suborbital ridge longest, lowermost 2 spines blunt, plate-like; ventral surfaces of lower jaw with 2 relatively long tentacles, posterior tentacle below lacrimal spines longer than anterior tentacle. Snout blunt; dorsal profile of snout relatively steep, forming an angle of ca. 40° to the horizontal axis of head and body. Mouth moderately large, slightly oblique, forming an angle of ca. 30° to the horizontal axis of head and body; posterior margin of maxilla not reaching vertical through mid-orbit; lower jaw tip slightly projected anteriorly when mouth closed. Eye moderately large, with numerous tentacles on dorsal portion, longest

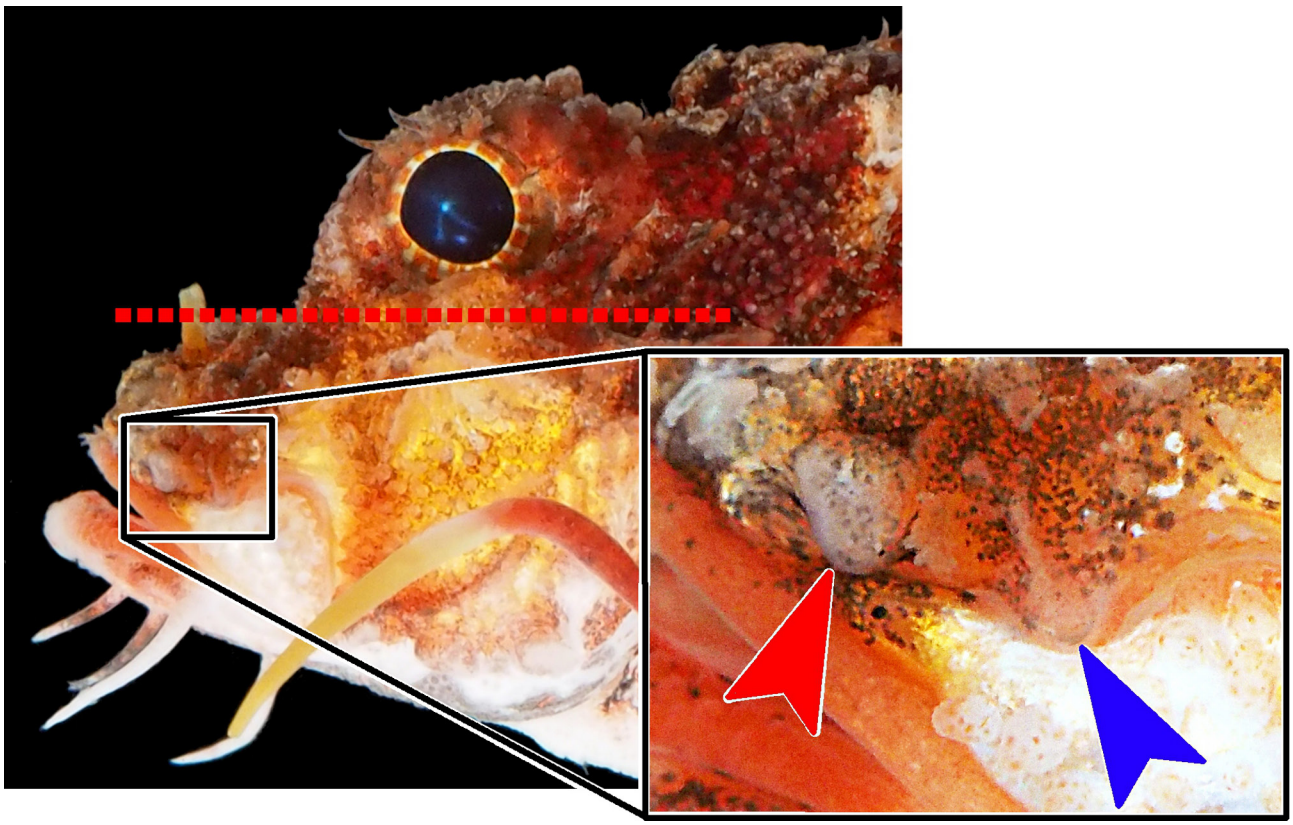

Fig. 2. Lateral view of head of *Minous groeneveldi*. Red dotted line indicates the horizontal line through top of snout bulge. Red and blue arrowheads indicate anterior and posterior lacrimal spines, respectively.
図 2. アダヒメオコゼ *Minous groeneveldi* の頭部側面 . 赤色破線は吻突出部における水平線を示す . 赤色矢印は前方の , 青色矢印は後方の涙骨棘を示す .

tentacle branched, tips extending beyond dorsal contour of orbit; dorsal contour of orbit (about half of orbit) extending beyond a line between snout tip and dorsal-fin origin; horizontal line parallel to head and body axil through top of snout bulge just reaching ventral margin of orbit (Fig. 2). Preocular, supraocular, and postocular (surrounding orbit) rough, with numerous spines.

Dorsal-fin origin just behind occipital pit, surrounded by parietal spine clefts; 1st spine relatively short, thin, much shorter than 2nd spine, its length 36% of length of 2nd spine, their bases close together; 3rd spine shorter than 2nd spine, its length 68% of length of 2nd spine; 3rd to 7th spines gradually becoming longer posteriorly, remaining posterior spines subequal in length; membranes in anterior spinous portion well incised, remaining membranes moderately incised; 2nd and 3rd spines associated with many small dermal flaps on both lateral sides; 1st dorsal-fin soft ray little bit longer than last spine; dorsal contour of soft-rayed portion rounded; last soft ray attached to caudal peduncle by broad membrane. Anal-fin origin below 11th dorsal-fin spine base; spines tiny, covered with skin; last soft ray attached to caudal peduncle by broad membrane. Pectoral fin rounded, moderately large, posterior tip extending far beyond vertical through anal-fin origin but not reaching end of anal-fin base; lowermost ray long, slightly thickened, free from membrane, its base well separated from base of adjacent membrane-associated ray, its length 90% of pectoral fin length. Pelvic-fin origin below 4th dorsal-fin spine base, spine covered with skin, last soft ray attached to abdomen by broad membrane; its tip just reaching a vertical through anal-fin origin when depressed; end of pelvic-fin base not reaching level of anus. Caudal fin moderately long, posterior margin slightly rounded. All segmented rays in dorsal, anal, pectoral, pelvic, and caudal fins unbranched.

Coloration (Fig. 1)**.** Body entirely yellowish, a relatively broad dark red stripe centrally; lateral line tinged with dark red, short skin tube whitish; anterior part of abdomen dark red with several irregularly shaped small white blotches. Head dark red dorsally, whitish ventrally; snout dark red; anterior part of mouth reddish; dark red stripe narrower than pupil from eye to posterior portion of mouth; lower jaw tentacles whitish; iris light yellow with radially orange stripes; pupil black. Dorsal fin

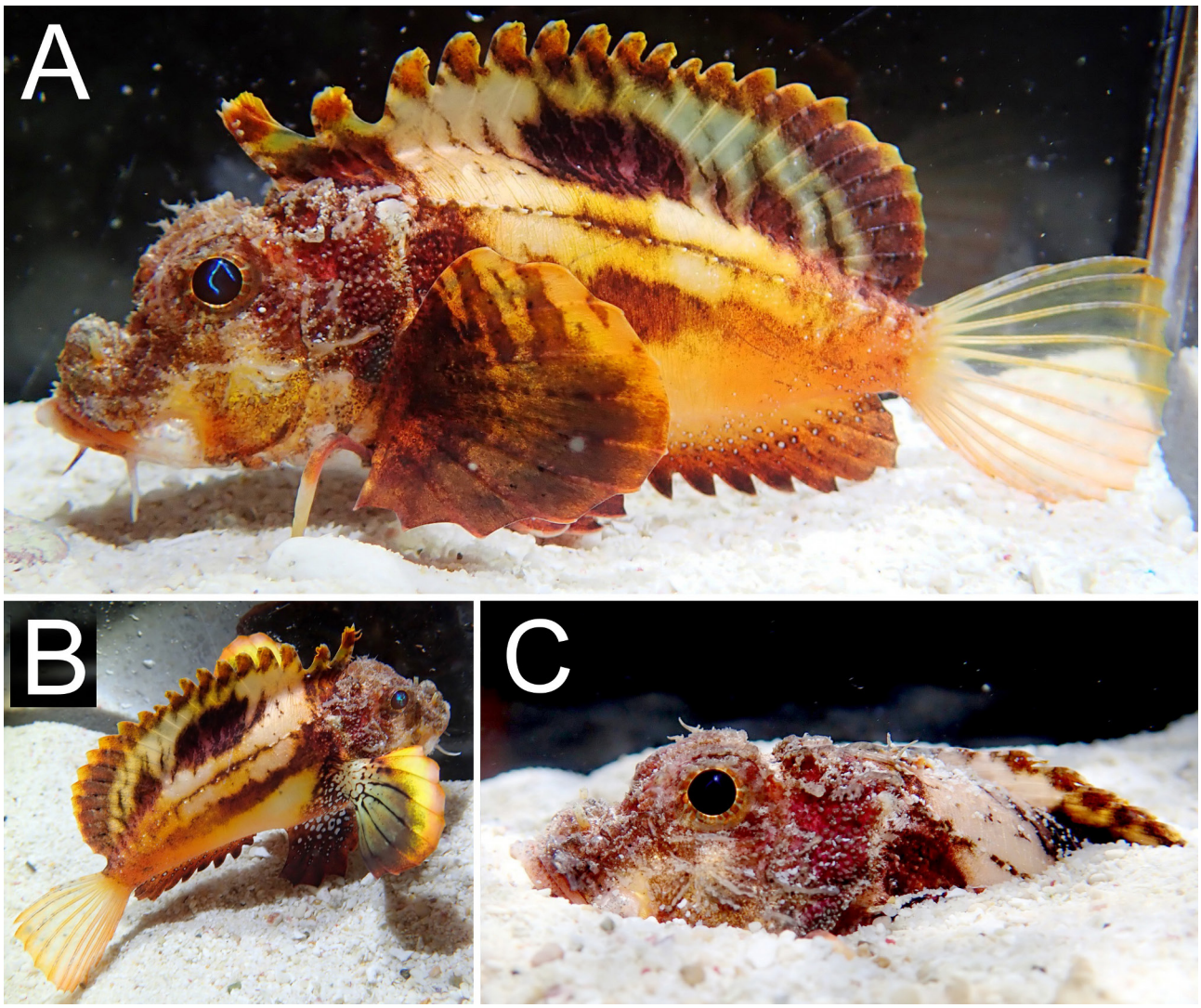

Fig. 3. Photographs of captive *Minous groeneveldi* in a sand bed tank. A) Lateral view; B) Diagonal view from behind; C) Buried in the sand.
図 3．砂底水槽で飼育されるアダヒメオコゼ *Minous groeneveldi*．A) 側面；B) 斜め後方から；C) 砂に潜る様子.

generally yellowish; outer margin broadly edged dark orange; various sized dark red blotches on basal membranes, largest blotch on 8th spine–3rd soft ray. Anal fin dark orange; small black-edged white dots scattered. Pectoral fin outer surface generally orange with dark red blotches; lowermost free ray reddish at the anterior half, yellowish at the posterior half; inner surface generally yellow; outer margin edged orange; basal portion grayish, rays tinged with black; axil whitish with several small black blotches. Pelvic fin dark orange with numerous irregularly shaped small white blotches. Caudal fin generally yellowish, membrane transparent; small white spots scattered on lower edge.

Distribution. *Minous groeneveldi* has been collected from the Bali Strait, Indonesia (Matsunuma & Motomura 2018) and Okinawa Island, Japan (this study). In addition, underwater photographs were taken in Lembeh Strait, North Sulawesi, Indonesia (Matsunuma & Motomura 2018).

Ecological note. In the breeding tank, *Minous groeneveldi* walks on the bottom sand using its lowermost free pectoral ray as legs. In addition, it often buries itself in the sand with only mouth and eyes showing above the sand (Fig. 3C).

Remarks. The individual examined in this study from Okinawa Island shares with *Minous groeneveldi* Matsunuma & Motomura, 2018 and *M. roseus* Matsunuma & Motomura, 2018 the following characters: 1st dorsal-fin spine much shorter than 2nd dorsal-fin spine, their bases close together; dorsal-fin rays XI, 11; anal-fin rays II, 9; basal portion of pectoral fin inner surface with dark stripes along rays . These two species are also similar in

Table 1. Counts and measurements of *Minous groeneveldi*. *As of 20 May 2020. **uncounted/unmeasured.
表 1. アダヒメオコゼ *Minous groeneveldi* の計数 • 計測値 . *2020 年 5 月 20 日現在 . ** 未計数もしくは未計測 .

Characters 形質	This study 本研究 Okinawa-jima Island, Japan 沖縄島・日本 OCF-P4319*	Matsunuma & Motomura (2018) Bali, Indonesia インドネシア・バリ Holotype NTM S.11031-002	Characters 形質	This study 本研究 Okinawa-jima Island, Japan 沖縄島・日本 OCF-P4319*	Matsunuma & Motomura (2018) Bali, Indonesia インドネシア・バリ Holotype NTM S.11031-002
Standard length (SL; mm) 標準体長	74.3	77.7	Pre-pelvic-fin length 腹鰭前長	38.1	43.1
Counts: 計数形質			1st dorsal-fin spine length 第1背鰭棘長	5.2	5.8
Dorsal-fin rayss 背鰭鰭条数	XI, 11	XI, 11	2nd dorsal-fin spine length 第2背鰭棘長	14.7	15.9
Anal-fin rays 臀鰭鰭条数	II, 9	II, 9	3rd dorsal-fin spine length 第3背鰭棘長	10.0	13.3
Pectoral-fin rays 胸鰭鰭条数	12	12	4th dorsal-fin spine length 第4背鰭棘長	13.2	13.7
Pelvic-fin rays 腹鰭鰭条数	I, 5	I, 5	5th dorsal-fin spine length 第5背鰭棘長	13.9	13.7
Lateral-line tubes 有孔側線鱗数	17	16	6th dorsal-fin spine length 第6背鰭棘長	14.8	15.2
Gill rakers 鰓耙数	—**	2 + 8 = 10	7th dorsal-fin spine length 第7背鰭棘長	15.7	15.4
Vertebrae 脊椎骨数	11 + 15 = 26	11 + 15 = 26	8th dorsal-fin spine length 第8背鰭棘長	15.7	15.6
Measurements (% SL) 計測形質			9th dorsal-fin spine length 第9背鰭棘長	15.9	—
Body depth 体高	35.3	35.1	10th dorsal-fin spine length 第10背鰭棘長	15.3	—
Body width 体幅	26.9	28.5	11th dorsal-fin spine length 第11背鰭棘長	14.5	17.0
Head length 頭長	41.2	45.1	1st anal-fin spine length 第1臀鰭棘長	5.9	—
Head width 頭幅	17.5	17.0	2nd anal-fin spine length 第2臀鰭棘長	7.1	9.9
Head depth 頭高	16.4	17.6	Pectoral-fin length 胸鰭長	36.1	38.0
Snout length 吻長	15.2	17.0	Lowermost pectoral-fin ray length 胸鰭最下軟条長	32.3	35.1
Orbit diameter 眼窩径	12.1	13.1	Pelvic-fin spine length 腹鰭棘長	12.7	16.2
Interorbital width at mid-orbit 眼窩間幅	9.3	11.0	Longest pelvic-fin soft ray length 腹鰭最長軟条長	23.0	28.9
Width between interorbital ridges 眼窩間隆起幅	2.3	2.7	Pelvic-fin base length 腹鰭基底長	20.9	20.2
Upper-jaw length 上顎長	17.1	19.7	Caudal-fin length 尾鰭長	29.6	—
Maxillary depth 主上顎骨高	6.5	7.1	Caudal peduncle length 尾柄長	8.6	9.5
Postorbital length 眼窩後長	15.2	16.7	Anterior lacrimal spine length 前方の涙骨棘長	—**	4.0
Pre-dorsal-fin length 背鰭前長	33.5	32.2	Posterior lacrimal spine length 後方の涙骨棘長	—**	4.9
Pre-anal-fin length 臀鰭前長	60.2	70.0			

their color patterns. The Okinawan individual, however, shows a higher similarity to *M. groeneveldi* in having the following characters: anterior and posterior lacrimal spines blunt, tips of both spines canted ventrally (Fig. 3) (vs. lacrimal spines sharp, anterior spine tip canted anteroventrally, posterior spine tip canted anteroventrally or ventrally in *M. roseus*); pores above pectoral-fin base with associated with short, rounded skin flap (vs. long and tentacle-like in *M. roseus*); head depth 16.4% (the holotype of *M. groeneveldi* 17.6% vs. 18.8%–21.6% in *M. roseus*). In addition, counts and measurements of the Okinawan individual are almost in complete agreeance with those of the holotype of *M. groeneveldi* (Table 1). These characteristics indicate that the Okinawan individual is *M. groeneveldi*. Minor differences in measurements and coloration from the original description (outer margin of pectoral fin inner surface orange in the Okinawan individual vs. whitish in the holotype) are regarded as intraspecific variations in this study because similar variations exist in other species of *Minous* (e.g. Amaoka & Kanayama 1981; Matsunuma et al. 2017; Matsunuma & Motomura 2018). The only questionable point is that the eye position of the Okinawan individual is much higher than that of the holotype (horizontal line through top of snout bulge level with ventral margin of orbit [Fig. 2] vs. ventral margin of pupil [Matsunuma & Motomura 2018: fig. 20A, B]). Further research based on additional

specimens is required to assess possible variations of these diagnostic characters.

This is the second record of the species after the original description and also represents the first record from Japanese waters. Matsunuma & Motomura (2018) indicate that this species may have a wider distribution in the East Indies, and this record confirms their theory. A new standard Japanese name “Ada-hime-okoze” is here proposed for *M. groeneveldi* after the name of the collection site. The standard Japanese name is based on the live individual examined in this study, which will eventually be preserved as formalin-fixed specimen (OCF-P4319) when dead.

Acknowledgements

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沖縄島から採集された飼育個体に基づくアダヒメオコゼ（新称）(Synanceiidae: Minoinae) の２番目の記録

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要旨 . 沖縄県安田沖よりフサカサゴ科の *Minous groeneveldi* Matsunuma & Motomura, 2018 が 1 個体採集され，2021 年 3 月 10 日現在，沖縄美ら海水族館で飼育されている．本種はインドネシア産の 1 標本に基づき記載されたが，それ以降報告のない稀種である．ここでは飼育個体の詳細な観察に基づき，その形態および飼育下で観察された生態を記載する．これは本種の 2 番目の記録であると同時に日本海域からの初記録であるため，新標準和名“アダヒメオコゼ”を提唱する．

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