

[短報]

New record of the sea cucumber, *Holothuria (Halodeima) nigralutea* (Aspidochirotida: Holothuriidae) from Okinawa Island, Ryukyu Islands, Japan

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沖縄島から採集された日本初記録のエクレアナマコ (新称)
Holothuria (Halodeima) nigralutea (楯手目: クロナマコ科)

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Abstract A holothuriid sea cucumber, *Holothuria (Halodeima) nigralutea* O'Loughlin, in O'Loughlin, Paulay, Vandenspiegel and Samyn, 2007, is recorded on the basis of individuals collected and observed from the East China Sea coast of Okinawa Island, the Ryukyu Archipelago, southwestern Japan. This species is closely allied to *Holothuria (Halodeima) edulis* Lesson, 1830, but is readily distinguishable by the color pattern of the body. This discovery represents the second record of this species since the collection of the type specimens in Western Australia, and the first record of the species from the northern hemisphere.

Key words Holothuroidea, sea cucumber, *Holothuria (Halodeima) nigralutea*, Okinawa Island, coastal waters

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Introduction

Among sea cucumbers (Echinodermata: Holothuroidea), the Holothuriidae is the most species-rich family in shallow tropical waters (Clark and Rowe, 1971). The Holothuriidae currently includes five genera and approximately 200 species, with *Holothuria* being the most morphologically diverse with about 160 valid species (Samyn et al., 2005, 2006; O'Loughlin et al., 2007; Borrero-Pérez et al., 2010). This group also includes many commercially important species that are utilized throughout the world (Conand, 2004). In the present study, *Holothuria (Halodeima) nigralutea* O'Loughlin, in O'Loughlin, Paulay, Vandenspiegel and Samyn, 2007, is reported from two localities of Okinawa Island, Ryukyu Archipelago, southwestern Japan, based on the collected specimens and field observation. This discovery represents the first record of the poorly known species from Japanese waters and greatly extends the distributional range of the species.

Materials and Methods

Specimens of *Holothuria (Halodeima) nigralutea* were collected by SCUBA diving, at depths of 40-50 m in the East China Sea coast of Okinawa Island (see **Material examined**). After the observation of body color, specimens were preserved in 70% ethanol. Ossicles were examined under light microscopy after dissolving a part of the dorsal body wall in commercial bleach. The specimens are deposited in the echinoderm collections of the Ryukyu University Museum, Fujukan (RUMF) (University of the Ryukyus, 1 Senbaru, Nishihara, Okinawa 903-0213, Japan), Okinawa, and the Florida Museum of

Natural History, University of Florida (UF) (PO Box 117800, Gainesville, FL 32611, USA).

Results and Discussion

Family Holothuriidae Ludwig, 1894

Genus *Holothuria* Linnaeus, 1767

Subgenus *Halodeima* Pearson, 1914

Holothuria (Halodeima) nigralutea O'Loughlin, in O'Loughlin, Paulay, Vandenspiegel and Samyn, 2007

New Japanese name: "Éclair-namako"
(Fig. 1 A-E)

Holothuria (Halodeima) nigralutea O'Loughlin, in O'Loughlin, Paulay, Vandenspiegel and Samyn, 2007: 46, figs. 4-7.

Material examined. Cape Maeda (26°26' N, 127°46' E), Okinawa Island, 45 m depth, 17 July 2010, 3 specimens (UF10564, UF10565, UF10566). Cape Zanpa (26°26' N, 127°42' E), Okinawa Island, 50 m depth, 9 August 2010, 1 specimen (RUMF-ZE-00069). Cape Maeda (26°26' N, 127°46' E), Okinawa Island, 40 m depth, 17 February 2011, 1 specimen (RUMF-ZE-00070).

Morphology. The specimens examined range 285-365 mm long, 48-49 mm high, and 53-55 mm wide in life. The animal is elongate, with parallel sides along nearly entire length, bluntly rounded anterior and posterior margins, and a length/width ratio is 5.2-6.9.

Color pattern. Color in life: Body is citrine yellow, dorsum with 2 irregular rows of large, dark brown spots that are mostly fused across the midline to form transverse blotches, and may further be fused into a broad, longitudinal band; venter with a broad, dark brown band. Papillae and tube feet are darker than the background color: black-brown over dark

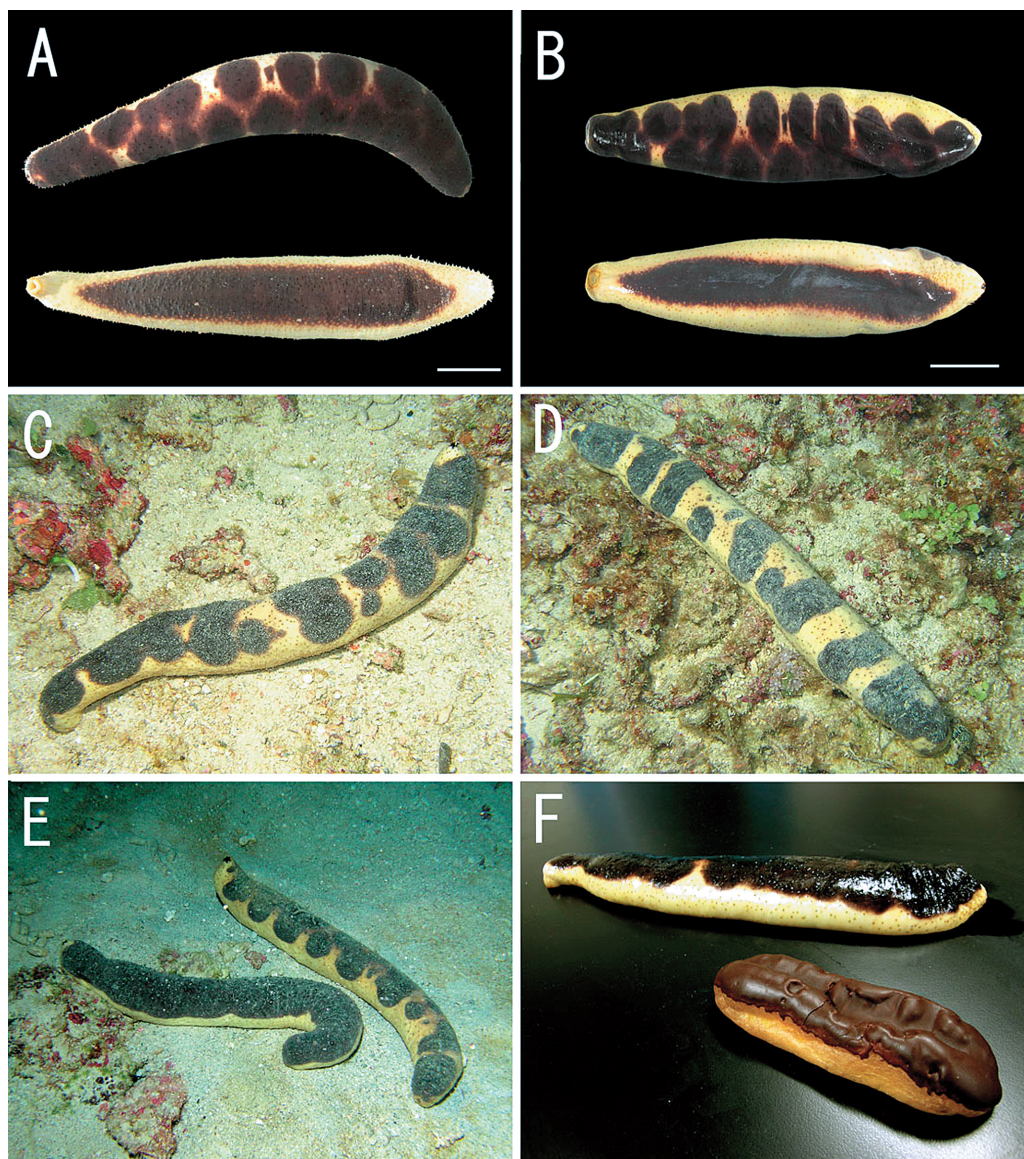


Fig. 1. A-E) *Holothuria* (*Halodeima*) *nigralutea* O'Loughlin, in O'Loughlin, Paulay, Vandenspiegel and Samyn, 2007. A. Live specimen (RUMF-ZE-00070) collected from off Cape Maeda; upper, dorsal view; lower, ventral view. B. Same, preserved specimen (RUMF-ZE-00070); upper, dorsal view; lower, ventral view. C. Live specimen (UF10565) from off Cape Maeda, 45 m depth. D. Live specimen (UF10564) from off Cape Maeda, 45 m depth. E. Two live specimens from Cape Maeda, 50 m depth, 1 November 2004 (not collected). F. Éclair and live specimen collected from Cape Maeda, 30 m depth, 14 April 2011. Scales: 50 mm.

図1. A-E) 沖縄島で採集および観察されたエクレーアナマコ (新称). A. 真栄田岬沖より採集された個体 (RUMF-ZE-00070) の生鮮時の体色: 上, 背面; 下, 腹面. B. 同個体 (RUMF-ZE-00070) の固定後の体色: 上, 背面; 下, 腹面. C. 真栄田岬沖の水深45mより採集された個体 (UF10565). D. 真栄田岬沖の水深45 mより採集された別個体 (UF10564). E. 2004年12月1日に真栄田岬の水深50 mにおいて撮影された2個体 (未採集). F. エクレーと2011年4月14日に真栄田岬の水深30 mで採集された個体. スケール: 50 mm.

brown and yellow-brown over citrine yellow (Fig. 1A, C, D). Color in preservation similar to color in life, but faded to pale yellow and pale brown (Fig. 1B).

Ossicles. The ossicles from the dorsal body wall match that illustrated in the original description of the species (O'Loughlin et al., 2007).

Remarks. O'Loughlin et al., (2007) discussed in the original description of *Holothuria nigralutea* that the species is very similar to *Holothuria (Halodeima) edulis* Lesson, 1830, in morphology. Molecular analyses also show that these two species are closely related to each other (O'Loughlin et al., 2007; Borrero-Pérez et al., 2010). However, the two species are readily distinguished by the coloration of the body in life. In *H. nigralutea*, the dorsal side is discontinuously black on yellow ground color and the ventral side has a wide black stripe along the midline; whereas in *H. edulis*, the dorsum is usually black-gray or (rarely) dark fuchsia and the venter is uniformly fuchsia. Dark brown spots are conspicuous around the papillae and tube feet in *H. nigralutea*, but they are indistinct in *H. edulis*. One of the authors (DU) has often found *H. nigralutea* around the coast of Cape Maeda, and some individuals have the dorsal blotches which are fused into a single, broad stripe (Fig. 1E).

Holothuria nigralutea was originally described from off Point Cloates, (22.86 °S, 113.51 °E) and Dampier (19.79 °S, 115.47 °E), Western Australia (O'Loughlin et al., 2007). In Okinawa Island, this species has been observed in Cape Maeda as well as Cape Zanpa, about 10 km northeast of Cape Maeda. Our discovery as the second record of *H. nigralutea* also represents the

first record of the sea cucumber from Japanese water and the north hemisphere. The type specimens of *H. nigralutea* were collected from 90-100 m depth on the continental slope, while our specimens were collected from coastal waters between 40 and 50 m depth, on sand substrata covered with patches of algae.

Holothuria nigralutea also occurs in the northern Great Barrier Reef in Australia as one of us (FM) identified a specimen belonging to this species in the collections of the Queensland Museum (SBD502105), Brisbane, Australia (PO Box 3300, South Brisbane BC, Queensland 4101, Australia). The specimen was collected near Barnett Patches (18 04'S, 146 56'E) at 45 m depth by a trawl during the Great Barrier Reef Seabed Biodiversity Project.

These new records indicate that *H. nigralutea* might be widespread in the tropical Indo-West Pacific. To date, about 200 species of sea cucumbers have been recorded from Japanese waters (Motokawa et al., 2003), and many of them occur in the Ryukyu Islands. However, local SCUBA divers have recently observed many unreported sea cucumber species in the Ryukyu Islands, indicating that further detailed surveys on the sea cucumber fauna in this archipelago are strongly needed.

Since the color pattern and shape of the entire body of *Holothuria nigralutea* are similar to those of the pastry éclair (Fig. 1F), we created the new Japanese name "Éclair-namako" for the species, which is derived from an arbitrary combination of "Éclair" and "namako" (general name for sea cucumber in Japanese).

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要約

琉球列島中部の沖縄島の沿岸域、水深40から50 mから採集された5個体、及び野外において観察された個体に基づき、楯手目クロナマコ科のエクレアナマコ（新称）*Holothuria (Halodeima) nigralutea* O'Loughlin, in O'Loughlin, Paulay, Vandenspiegel and Samyn, 2007を報告する。本種の原記載は、オーストラリア西部の大陸斜面上、水深100 m付近から採集された標本に基づいて行われた。本種はアカミシキリ *Holothuria (Halodeima) edulis* Lesson, 1830に類似するが、体色および斑紋の分布様式によって容易に区別することが出来る。本報告は、標本に基づいた記録としては原記載以降2例目であり、日本のみならず北半球からのエクレアナマコの初記録となる。

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