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First record of the genus *Sphenopus* (Anthozoa: Hexacorallia: Zoantharia) from Japan

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Abstract. A single specimen of *Sphenopus marsupialis* (Gmelin, 1791) was discovered within a reserve aquarium at the Okinawa Churaumi Aquarium in February 2016. Although the exact collection locality is not known the specimen clearly came from a sandy area of shallow coral reef waters around Motobu, Okinawa, Japan. Previously reported from the Central Indo-Pacific up to Taiwan, this specimen represents the first recorded occurrence of *Sphenopus* from Japanese waters based on a specimen with certain identification, as well as the northernmost record of the genus.

Introduction

The genus *Sphenopus* is distinct among zoantharians. Placed within the family Sphenopidae along with the genus *Palythoa*, *Sphenopus* species are morphologically distinct from all other genera and species as they are unitary (=monostomatous, solitary, not colonial or modular unless budding) and generally not attached to any substrate. In this regard, they are similar to the scleractinian mushroom corals (family Fungiidae), and may also have limited mobility (Soong et al. 1999). Most *Sphenopus* have large polyps of up to 3 cm in diameter and ~5 cm in length, and usually have a rounded and bulbous aboral end that is loosely anchored in sand or rubble in coral reef environments. They are azooxanthellate.

Records of *Sphenopus* spp. are not common, but they are known from the Seychelles (Den Hartog, 1997) to the central Indo-Pacific (Colin & Arneson, 1995; Erhardt & Knop, 2005; Reimer et al., 2012; 2014), and from both eastern (Zann, 1980) and western Australia (Burnett et al., 1997), with the northernmost records from Taiwan (Soong et al., 1999). Currently, there are three species within the genus. The type species *Sphenopus marsupialis* (Gmelin, 1791) is by far the most-well known, gray to tan in color with a rounded aboral end, and records exist from a variety of locations, and there have been some studies on their reproductive ecology (Soong et al., 1999) and phylogenetic position (Reimer et al., 2012) as well. *S. arenaceus* Hertwig, 1882, is described from Cape York in northwestern Australia and before Reimer et al. (2012) had not been mentioned in scientific literature for more than 100 years. This species is morphologically similar to *S. marsupialis* but rusty red in color. The third species is *S. pedunculatus* Hertwig, 1888, from the Philippines. Unlike the other two species, this species has a 'peduncle', which is a long 'foot' or 'stalk' that is attached to small pieces of stone or rubble (see Erhardt & Knop, 2005; Reimer et al., 2014). Thus, all three species are easily distinguishable from each other and from other zoantharian species.

It is believed that *Sphenopus* species, similar to *Palythoa* species, are limited to subtropical and tropical waters. Currently, the northernmost records of *Sphenopus* are of *S. marsupialis* from Dashi, Taiwan, although this is a fishing port, and the exact locality is not exactly known (Soong et al., 1999). Additionally, there is an undocumented specimen from the East China Sea between Taiwan and the Yaeyama Islands in Uchida (2001) identified as *S. marsupialis*, but its identity is uncertain due to almost no information given on the specimen and only one small image of a single closed polyp. Despite *Sphenopus* spp.'s distinctive appearances, the relatively high number of recent investigations into the Zoantharia diversity of Okinawa (Reimer & Fujii, in press), and the relatively high Zoantharia species diversity of southern Japan (Reimer & Fujii, in press), until now there have been no records of *Sphenopus* from Japan.

Results and discussion

During a visit to Okinawa Churaumi Aquarium in

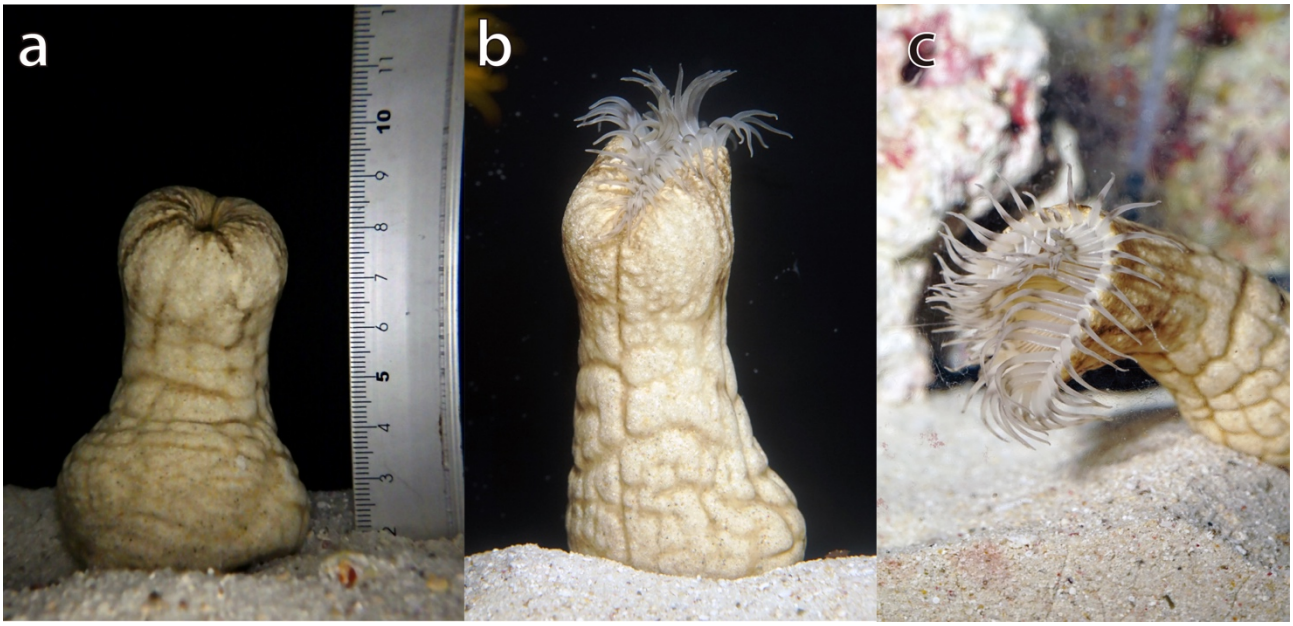

Fig. 1. Images of *Sphenopus marsupialis* specimen OCA-Cn20160220 in an aquarium at Okinawa Churaumi Aquarium, Motobu, Japan. a) Side view of specimen with polyp closed and scale (cm), b) side view at nighttime with partial opening of polyp and tentacles partially visible, and c) mostly open polyp showing two rows of tentacles.
図 1. 沖縄美ら海水族館 (沖縄県本部町) の水槽内におけるダルマスナギンチャク *Sphenopus marsupialis* の生体標本 (OCA-Cn20160220). a) ポリプを閉じた側面 (スケールは cm), b) 夜間ややポリプを開いた側面, c) 二列の触手が確認できるほぼ完全に開いた状態.

Motobu, Okinawa, Japan on February 3, 2016, a single large zoantharian polyp was noticed in a reserve (=non-display) aquarium tank by the first author. The polyp was tan in color, with a rugged exterior (=tubercules), and a rounded aboral end (Fig. 1a). The polyp was approximately 5 cm in diameter and almost 9 cm in length, and was closed, with no tentacles visible (Fig. 1a). Subsequent attempts to capture images at nighttime of open polyps often failed, with a partially open oral disk with tentacles partially extended usually being observed (Fig. 1b), and only occasionally was a generally open polyp observed (Fig. 1c). The specimen is currently being housed alive in the same aquarium at Okinawa Churaumi Aquarium, and has been given specimen number OCA-Cn20160220.

Based on the polyp having a rounded aboral end, its coloration and large size, and unitary (non-colonial) morphology, the specimen was identified as *S. marsupialis* (Japanese name: daruma-sunaginchaku; Uchida, 2001). A subsequent search of collections records showed that the specimen was collected from waters nearby Motobu, Okinawa-jima Main Island (approximately 26° 42' N, 127° 52' E), although the exact location and depth are not known. *Sphenopus marsupialis* and other *Sphenopus* are known to inhabit sandy environments, and this specimen appears to be no exception, as it was collected via dredging from a sandy area.

The discovery of *S. marsupialis* from Okinawa-jima Main Island is not surprising given the species' affinity for sandy tropical and subtropical environments, and also the distribution of other zoantharian species. Currently, at least 20 species of zoantharians are known from the Ryukyu Islands (Reimer & Fujii, in press; Kise & Reimer, 2016), and there are no known instances of formally described zoantharian species found in Taiwan that have not also been found in Okinawa or southern Japan. On the other hand, some Sphenopidae species are known to have their northern distributional limits in the Ryukyus, such as *Palythoa heliodiscus* (Ryland & Lancaster, 2003) with a northern limit of Amami Oshima Island (Reimer & Fujii, in press), *P. mizigama* Irei, Sinniger & Reimer, 2015 with a northern limit of Okinawa-jima Main Island, and *P. umbrosa* Irei, Sinniger & Reimer, 2015 with a northern limit of the Yaeyama Islands, while other species such as *P. tuberculosa* (Esper, 1805) and *P. mutuki* (Haddon & Shackleton, 1891) are found as far north as Miyake-jima Island in the Izu Islands south of Tokyo (Reimer et al., 2006). Future investigations should focus on examining sandy or sheltered bay regions for additional records of *Sphenopus*, as research attention has not been proportionally paid to these kinds of environments,

and they may harbor unrecorded and/or undescribed species from a wide variety of taxa (Obuchi et al., 2010; Fujii & Reimer, 2011).

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ダルマスナギンチャク属（花虫綱：六放サンゴ亜綱：スナギンチャク目）の日本初記録

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要旨. 2016 年 2 月, 沖縄美ら海水族館の予備水槽にてダルマスナギンチャク *Sphenopus marsupialis* (Gmelin, 1791) の生体が確認された. 当該標本は沖縄県本部町周辺の浅い砂礫底で採集されたが, その詳細な位置は定かではない. ダルマスナギンチャク属はこれまでに中央インド太平洋から台湾まで採集の記録があるが, 日本より標本を基にして正確に同定されたのは, 本報が初めてであり, かつ属の北限の記録である.

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