GALAXEA
Journal of Coral Reef Studies
Journal homepage: http://www.jstage.jst.go.jp/browse/galaxea/-char/en
Japanese Coral Reef Society

Photogallery

Galaxea, Journal of Coral Reef Studies 25: 39–40 (2023)

Observation of the sea cucumber *Stichopus horrens* during fission in eastern Guadalcanal, Solomon Islands

Iwao Tanita*[1,2], Ken Okaji[2,3], Toru Komatsu[2,4], and Christain Ramofafia[4]

The peanutfish, *Stichopus horrens* Selenka, 1867, is a sea cucumber found in coral reefs in the Indian and western (North and South) Pacific Oceans. This species is exploited by fisheries in these regions, including Solomon Islands. An adult-sized (roughly 20 cm long) individual of *S. horrens* was observed undergoing fission on July 27th, 2011, in the Ma'au reef (9° 51′ 59″ S, 160° 49′ 41″ E) of Hatare, Marau, Guadalcanal, Solomon Islands. The individual was found on a sand-rubble flat in the back-reef. At the time of discovery, fission had already begun (Fig. 1A). After 6 minutes, the transverse fission plane became narrower (Fig. 1B). The observation was done from 17:14 to 17:20, but the entire process of the fission was not continuously observed. During the observation, this individual was locomoting on the rubble, without body-twisting behavior.

Several previous studies have reported that *S. horrens* reproduces asexually through fission (Harriott 1982; Kohtsuka et al. 2005; Charan-Dixon et al. 2019). While Harriott (1982) and Charan-Dixon et al. (2019) only briefly noted that *S. horrens* undergoes fission, Kohtsuka et al. (2005) provided detailed reports and photographs of the process. However, Byrne et al. (2010) pointed out that the individuals reported by Harriott (1982) and Kohtsuka et al. (2005) were misidentified and actually corresponded to *S. monotuberculatus* and *S. naso*, respectively.

The present fissiparous individual was identified to be *S. horrens*, referring to Byrne et al. (2010), which introduced molecular phylogeny to the taxonomy of the family Stichopodidae. Byrne et al. (2010) clearly distinguished *S. horrens* from those similar species, *S. monotuberculatus* and *S. naso*, by the molecular phylogeny and also found some morphological differences between them. Morphologically, *S. horrens* is characterized by the distinct conical papillae on the dorsal surface, and the presence of tack-like ossicles in those dorsal papillae (Byrne et al. 2010). Although the present study did not inspect ossicles, the individual shown in Fig. 1 has numerous conical papillae, consistent with the above description about the external morphology of *S. horrens*. The observed individual also showed cream color with

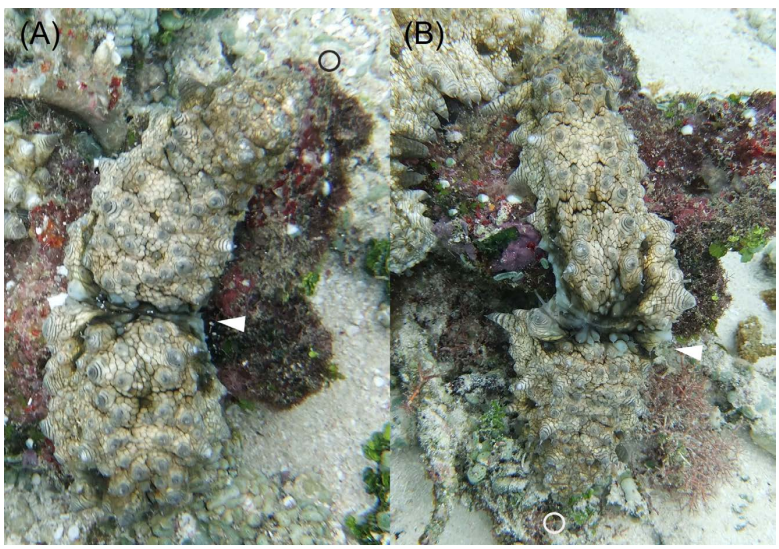

Fig. 1 An individual of *Stichopus horrens* during fission, photographed at 17:14 (A) and 17:20 (B). White arrowheads and black/white circles indicate the transverse fission plane and the anterior end (head) of the body, respectively. Photographer: Ken Okaji.

dark mesh-like pattern on the dorsal surface, well consistent with photographs of *S. horrens* shown in Byrne et al. (2010). Moreover, the authors previously read sequences of mitochondrial cytochrome oxidase subunit I of the warty sea cucumber individuals called "peanutfish" within the same Ma'au reef population (but not including the present fissiparous individual). As a result, all individuals whose external morphology coincided with that of the present fissiparous individual as described above had sequences corresponding to those of *S. horrens* reported by Byrne et al. (2010) (Tanita et al. unpublished data).

In conclusion, the present observation suggests that *S. horrens* is likely capable of fission, as well as other *Stichopus* species with relatively small body sizes (＜30 cm), namely *S. chloronotus*, *S. monotuberculatus*, and *S. naso* (Byrne et al. 2010).

Acknowledgment

This work was conducted in a sea cucumber resource management project between the Hatare community and the Ministry of Fisheries and Marine Resources of the Solomon Islands Government, technically supported by Overseas Fishery Cooperation Foundation of Japan. We thank Ms. Loretta Mane of the Hatare Marine Protected Area monitor members for her assistance with the fieldwork. The present study was funded by the Ministry of Agriculture, Forestry and Fisheries of Japan ("Kaigai gyogyō kyōryoku kyōka suishin jigyō").

Compliance/Conflict of interest

No permission was required for the conduct of the present study. The authors declare that they have no conflicts of interest to disclose. The contents of this paper are solely the responsibility of the authors and do not necessarily represent the official views of the funders.

References

Byrne M, Rowe F, Uthicke S (2010) Molecular taxonomy, phylogeny and evolution in the family Stichopodidae (Aspidochirotida: Holothuroidea) based on COI and 16S mitochondrial DNA. Mol Phylogenet Evol 56: 1068–1081

Charan-Dixon H, Goldstien SJ, Vanderhaven BJ, Halafihi T, Tuiano TL, Gaw S, Glover CN (2019) Effects of traditional fishing techniques on internal organ regeneration, physiology, and biochemistry in the tropical sea cucumber *Stichopus horrens*. J Exp Mar Biol Ecol 510: 15–22

Harriott V (1982) Sexual and asexual reproduction of *Holothuria atra* Jaeger at Heron Island Reef, Great Barrier Reef. Aust Mus Mem 16: 53–66

Kohtsuka H, Arai S, Uchimura M (2005) Observation of asexual reproduction by natural fission of *Stichopus horrens* Selenka in Okinawa Island, Japan. SPC Beche-de-mer Inf Bull 22: 23

Keywords Asexual reproduction, Fission, Autotomy, Holothurian, Holothuroidea, Stichopodidae

Author information

[1] Yaeyama Field Station, Fisheries Technology Institute, Japan Fisheries Research and Education Agency, 148, Fukai-Ohta, Ishigaki-shi, Okinawa 907−0451, Japan

[2] Overseas Fishery Cooperation Foundation of Japan, Toranomon 30 Mori BLDG., 3−2−2, Toranomon, Minato-ku, Tokyo 105−0001, Japan

[3] Coralquest Inc., 1−34−10, Asahi-cho, Atsugi-shi, Kanagawa 243−0014, Japan

[4] Ministry of Fisheries and Marine Resources, Solomon Islands Government, Kukum Highway, P.O. Box G2, Honiara, Solomon Islands

* Corresponding author: I. Tanita E-mail: tanita_iwao39@fra.go.jp

Communicated by Hironobu Fukami (Editor-in-Chief)

Received: 25 July 2023, Accepted: 2 October 2023
Published online: 24 October 2023