

Confirmation and extended range of *Holothuria spinifera* in the Abrolhos Islands, Western Australia

Dave Murphy¹* and Anthony Hart

Abstract

This is the first known reporting of *Holothuria spinifera* from Western Australia. An individual sample was collected by fishers and researchers from the Abrolhos Islands on 30 January 2023, at a depth of 18 m and a GPS location of S28° 25.7, E113° 46.7. A morphological, anatomical and endo-skeletal description was carried out on the individual. This study extends the known distribution of *Holothuria spinifera* to the southwestern part of Western Australia.

Keywords: *Holothuria spinifera*, Abrolhos Islands, Western Australia, trawl fisheries, ossicles

Introduction

Holothuria spinifera Théel, 1886 is a filter feeding scavenger, sifting through the sediment on the seabed with its tentacles. It can completely burrow in the daylight and is generally more active at night or on incoming tides. The animal reproduces bi-annually. Reproduction peaks in September and October, with a minor peak in February and March. It is known to have prolonged spawning in India from November to March. *Holothuria spinifera* is a sea cucumber species that is commercially harvested and reported from East Africa, Middle East, India, Southeast Asia, Indo-Pacific, and northern Australia. Its common name is brown sandfish. In India it is known as *cheena attai* or *raja attai*.

Methodology

A collaboration with Australia's Department of Primary Industry and Regional Development fisheries researchers and fishers of the Abrolhos Islands Mid-West Trawl fishery allowed the collection and study of bycatch within this fishery. Samples were sent to the laboratory in Perth for further identification and analysis. The specimen was caught in a

fishing trawl and immediately sorted on deck, individually bagged and labelled, and then frozen.

A small slice of flesh (15 mm x 3 mm) from the specimen's dorsal side, anus, mouth and body wall papillae (spots) were placed into separate Eppendorf vials and soaked in bleach for 20 minutes. After 20 minutes, the bleach was drained and the remaining sample washed about five times with fresh water. Using a pipette, the ossicles were extracted and drops then placed under a compound microscope. High-definition photos were taken of the ossicles in each sample. These photos were used to compare the descriptions of ossicles from the published species identification paper "Commercially Important Sea Cucumbers of the World, FAO Species Catalogue for Fishery Purposes No. 6".

Results and discussion

Description

Holothuria spinifera can reach 30 cm (live length), with an average wet weight of 300 g. This species has a cylindrical, sausage shape, with a pimpled, rough dorsal surface, and a

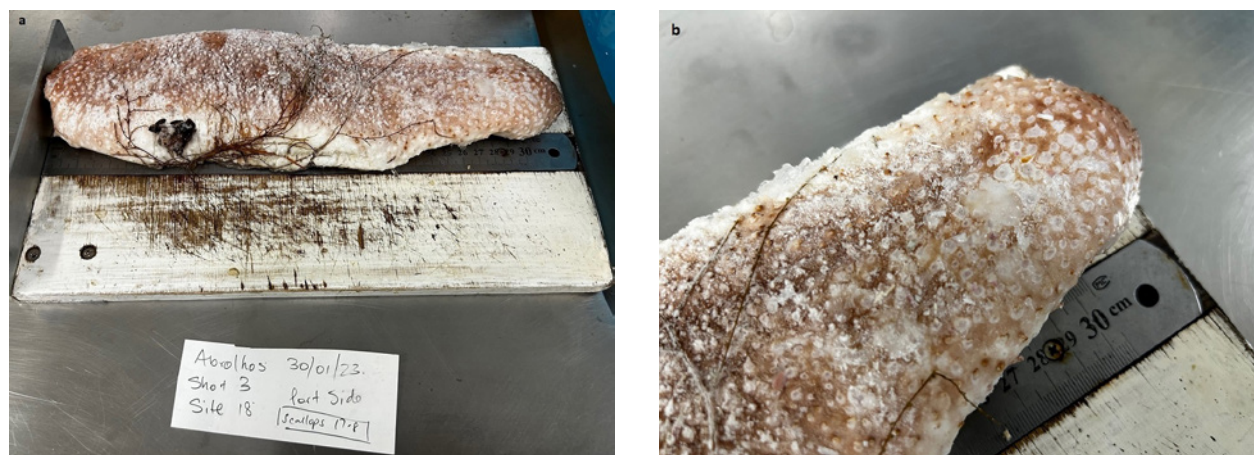


Figure 1. (a) Dorsal view of a *Holothuria spinifera* specimen from the Abrolhos Islands in Western Australia. (b) Close-up view of the dorsal surface texture and colouration.

¹ Department of Primary Industry and Regional Development - Fisheries. Dave.Murphy@dpird.wa.gov.au

smoother ventral surface. The dorsal surface ranges in colour from tan to darker brown, which may have a slightly mottled appearance; the ventral surface is cream coloured to white.

This species is generally found in shallow waters from 2 m to 10 m in sandy and coral rubble bottoms but have also been recorded in other areas of the Indo-Pacific Ocean in depths ranging from 10 m to 60 m. This report identifies *Holothuria spinifera* from outside of its known distribution at about 60 km off the west coast of Western Australia in the Abrolhos Islands (S28° 25.7', 1E 13° 46.7'). It was found at a depth of 18–20 m in a substrate consisting primarily of sand.

This specimen was caught on 30 January 2023 as bycatch in the Abrolhos Islands Mid-West Trawl fishery, which is a significant fishery operating off the coast of Western Australia (see Figs 2 and 3). Situated in the ecologically diverse Abrolhos Islands, this fishery focuses on harvesting the highly valued Abrolhos scallops (*Amusium balloti*). With scallop trawling as the primary fishing method, the industry contributes to the local economy and sustains fishing communities while striving to balance economic benefits with environmental sustainability.

On return to the laboratory, the sample maintained its composition and good quality until it was slightly thawed, photographed, processed and analysed under a compound microscope. Its identification as *Holothuria spinifera* was confirmed by comparing the ossicles of compound microscope photos (Fig. 4) with the descriptions in the FAO guide as shown in Figure 5. Photographs of the ventral mouth and anal ossicles, as shown in Figure 4a and 4d, match the plates of ventral podia from the FAO guide (see Fig. 5a, areas circled in red). Also, supporting evidence shows the photographs of the dorsal side and dorsal wall

ossicles (Fig. 4b and 4c), showing the smooth buttons of the dorsal body wall, with six to eight internal segments within the ossicles matching the description shown in the FAO guide.

The Western Australian Sea Cucumber Fishery comprises eight sea cucumber species that inhabit the tropical shallow continental shelf waters of Australia's North Coast Bioregion, and are taken predominately by diving and wading (Hart et al. 2022). However, >99% of the harvest consists of two main species, *Holothuria scabra* (sandfish) and *Actinopyga echinites* (deepwater redfish). The brown sandfish, *Holothuria spinifera*, has not been recorded from catches in the Western Australian Sea Cucumber Fishery.

Sandfish and redfish stocks are assessed each year using annual indices of biomass derived from a population model that uses fine-scale catch, effort and fishery-independent

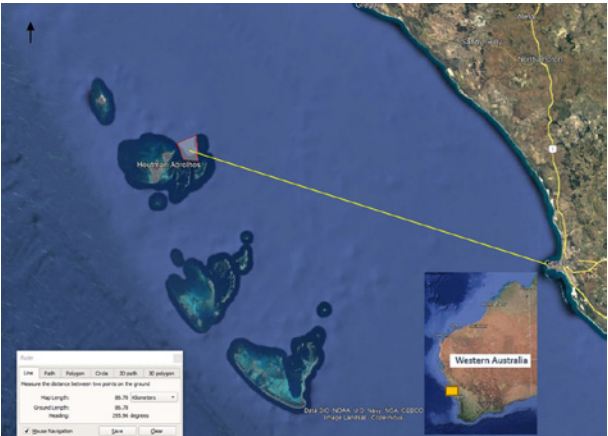


Figure 3. Location of site at the Abrolhos Islands where this specimen of *Holothuria spinifera* was caught in a scallop trawl.

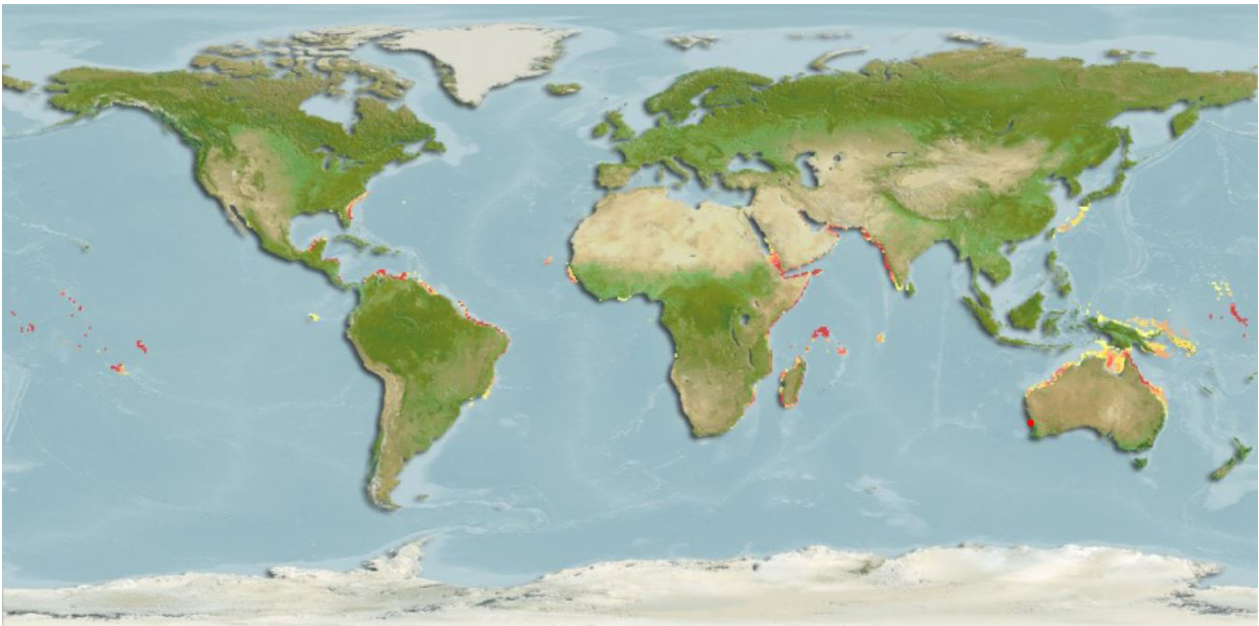


Figure 2. Computer-generated native distribution map for *Holothuria spinifera*, indicating suitability of habitat for probable occurrence from SeaLife Base (Palomares and Pauly 2023).

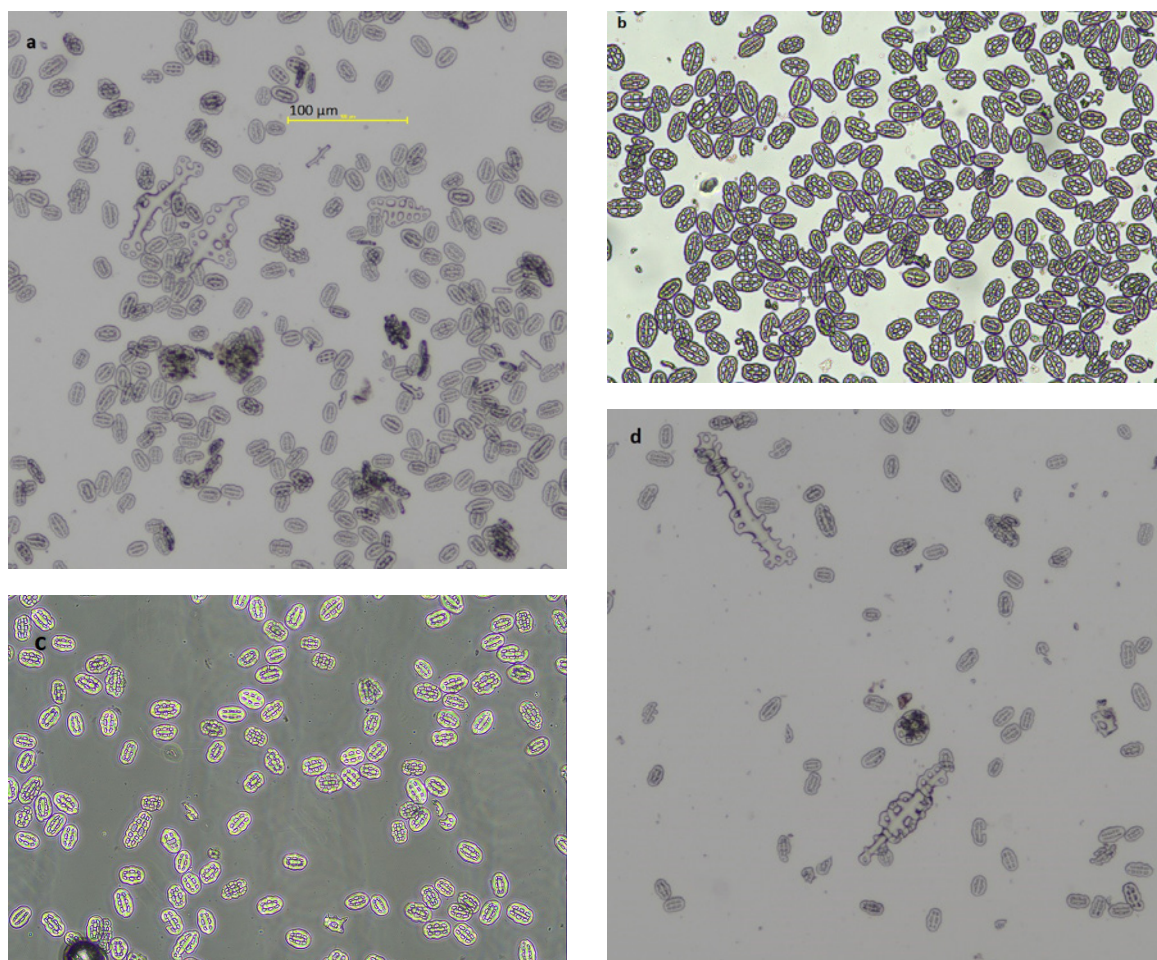


Figure 4. Photographs of ossicles from the specimen *Holothuria spinifera* that was caught in a scallop trawl; a. mouth ossicles, b. dorsal ossicles, c. dorsal wall ossicles, and d. anal ossicles.

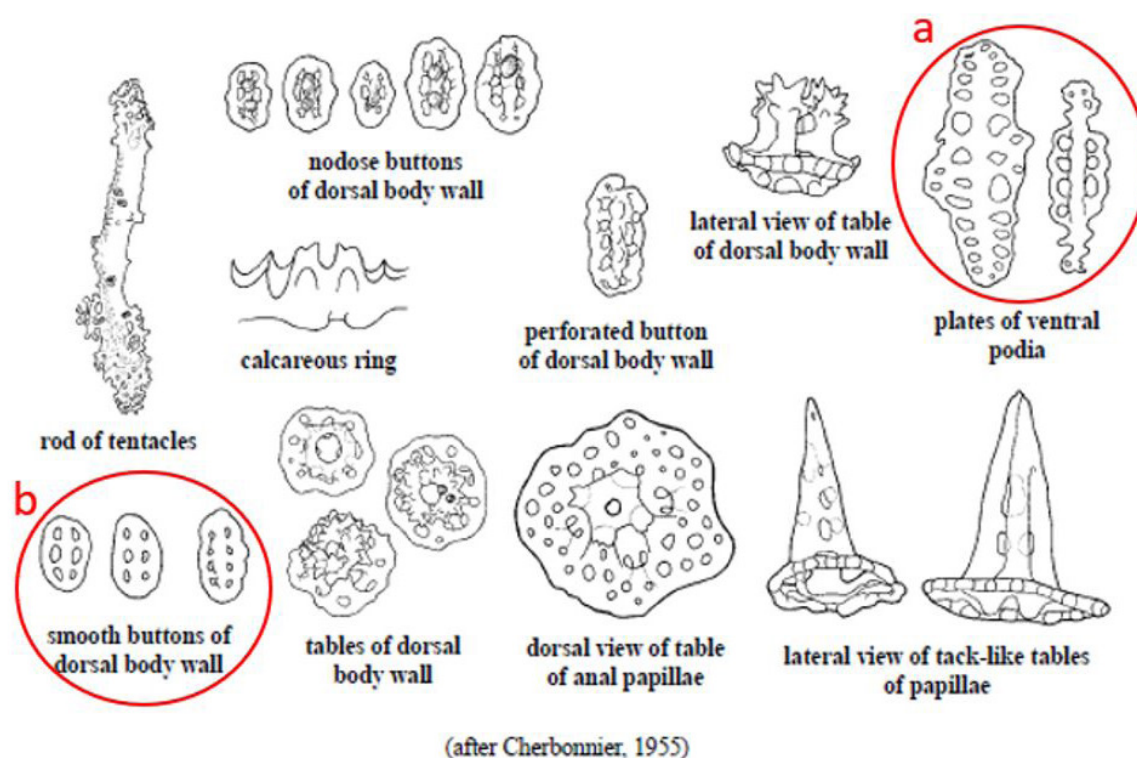


Figure 5. Artist impressions and descriptions of ossicles from *Holothuria spinifera* as described in Purcell et al. (2012). The ossicles enclosed by the red circles were the key identifiers for the sample of *Holothuria spinifera* for this study.

survey abundance data. These are compared with specified reference points, such as biomass targets, thresholds and limits developed using the population models. If the threshold or limit reference points are breached, the prescribed management action (involving fishery closures) is implemented according to the harvest strategy. More information on these stocks can be found here: <https://fisheries.msc.org/en/fisheries/western-australia-sea-cucumber/@@assessments>

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