Juvenile "black teatfish" in Maldives

Michael Sweet[1], Frédéric Ducarme[2] and Chantal Conand[3]*

Introduction

Juvenile holothurians remain poorly understood globally. This is likely the result of two main factors: they are rarely observed, and they are difficult to identify once found (given the changes in colouration of the body wall and ossicle morphology during growth).

We report on the discovery of four holothurian individuals that have been provisionally described as juvenile "black teatfish", *Holothuria* cf. *nobilis*. These juveniles were observed in August 2015 within the patch reef off Vavvaru on Lhaviyani Atoll in Maldives.

Observation

Although DNA analysis has yet to be undertaken, the observed individuals exhibited the classical morphology of "teatfish". These species, namely *Holothuria nobilis, H. fuscogilva, H. whitmaei* and the "pentard type" (Purcell et al. 2012) are among the most heavily fished and poached sea cucumbers in the world. The characteristics of these teatfish are, among the classical Holothuria body plan: an arched and stout shape, very firm sub-oval body, lateral rounded protrusions (called "teats"), and the presence of anal teeth. The individuals observed were black on their dorsal side and light brown or orange on the sides and the teats, with a white sole on the ventral face, which was covered with numerous grey podia. Individuals were also covered with fine sediment, and did not expel Cuvieran tubules when rubbed. Individuals ranged in length from 15–20 cm (Fig. 1A, B), suggesting that individuals were not adults, thus explaining the juvenile colour patterns observed (Conand 1981).

Identification

The above characteristics have led us to the identification of these individuals as belonging to either *H. nobilis* or *H. fuscogilva* (Purcell et al. 2012), although, given the general aspect, the former is more plausible. However, regardless of a definitive identification, as both species are equally targeted by fishermen and came under similar dramatic stock crumbling (James and Manikfan 1994), the information reported herein is equally important. Although the adults of *H. nobilis* are relatively easy to identify (black dorsal surface with white lateral protrusions ('teats'), the juveniles show similarities to three other species: *Holothuria* sp., *H. fuscogilva* and *H. whitmaei* (Conand 1981). Traditionally, destructive sampling is often preferred for identifying species; however, the careful documentation of the external anatomy can lead to quick identification without sacrificing an animal when populations are scarce (as in this instance). For visual identification, a series of images is needed, showing the whole animal (with a scale for reference), the anal cavity (exposing the anal teeth), and the buccal

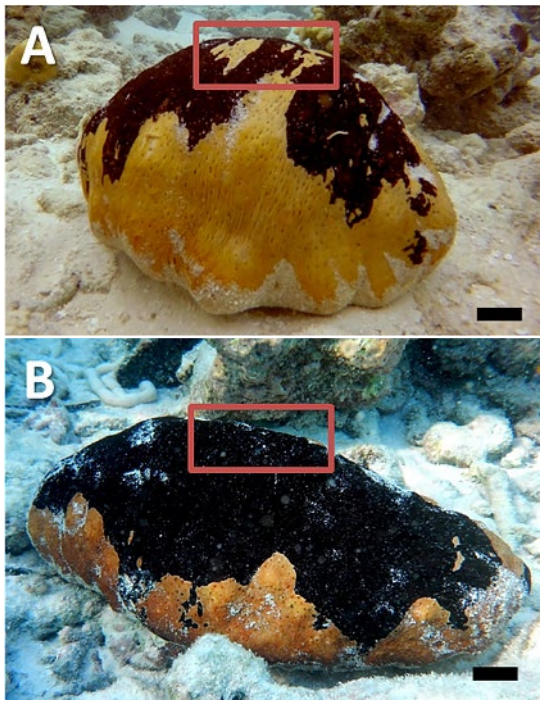

Figure 1. Variation in colour patterns (red square inserts) used to identify different individuals of *H.* cf. *nobilis* juveniles present at the site. Scale bars = 2 cm.
(Images: M.J. Sweet)

[1] College of Life and Natural Sciences, University of Derby, Derby, United Kingdom, DE22 1GB
[2] Centre d'Écologie et des Sciences de la Conservation, UMR 7204, MNHN, 75005 Paris, France
[3] Milieux et Peuplements aquatiques, MNHN, 75005 Paris, France and UMR 9220 UR CNRS IRD ENTROPIE, Université de la Réunion, France
* Author for correspondence: m.sweet@derby.ac.uk

tentacles (if present and/or obviously feeding). Preparing ossicles is not always helpful (specifically in this instance) because these have been observed to change during the development of many species. Nevertheless, non-lethal DNA sampling and analysis must still be conducted for final determination of the species, and this is currently underway.

Significance

This is a rare record of any species of teatfish (*Holothuria [Microthele] nobilis* or *fuscogilva)* because severe overexploitation has left both of these species particularly scarce. In Maldives specifically, *H. fuscogilva* was previously described as being the most abundant in the country before overharvesting occurred (Reichenbach 1999). *H. nobilis*, in contrast, has been rare for many years with only one record published in scientific surveys since 1988 (Ducarme 2015; Muthiga 2008). Furthermore, both species are rare throughout their entire home range (East Africa eastward to French Polynesia) and are classified as "endangered" by the International Union for Conservation of Nature Red Data List. This trend is reflected in the majority of teatfish, largely due to overharvesting, with the exception of the "pentard" in the Seychelles (Conand and Muthiga 2008; Muthiga and Conand 2014).

The discovery of adults in any location is worthy of note, although the discovery of juveniles, albeit in low numbers, may suggest that recovery in certain sites is underway. To assess this recovery, work is currently being undertaken to assess the prevalence of *H.* cf. *nobilis* throughout Maldives using a network of resort-based marine biologists. However, as of yet, no additional confirmed observations have been reported. If this remains the case, with no further sightings being reported, this specific location deserves immediate protection to conserve the site as a nursery for this endangered species, with the hope that it may help recovery on surrounding islands and atolls.

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References

Conand C. 1981. Sexual cycle of three commercially important holothurian species (Echinodermata) from the lagoon of New Caledonia. Heron 31(3):523–543.

Conand C. and Muthiga N. 2008. Commercial sea cucumbers: A review for the Western Indian Ocean. WIOMSA Book Series No. 5.

Ducarme F. 2015. Field observations of sea cucumbers in the north of Baa Atoll, Maldives. SPC Beche de Mer Information Bulletin 35:26–31.

James D.B.B. and Manikfan M.A. 1994. Some remarks on the present status of beche-de-mer industry of Maldives and its lesson for the Lakshadweep. Bulletin of the Center for Marine Fishery Resources Institute 46:101–105.

Muthiga N. 2008. Field observations of sea cucumbers at north Male Atoll in the Maldives. SPC Beche de Mer Information Bulletin 27:33–37.

Muthiga N. and Conand C. 2014. Sea cucumbers in the western Indian Ocean: Improving management of an important but poorly understood resource. WIOMSA Book Series No. 13.

Purcell S., Samyn Y. and Conand C. 2012. Commercially important sea cucumbers of the world. FAO Species Catalogue for Fishery Purposes (FAO Specie.). Rome: FAO Species Catalogue for Fishery Purposes.

Reichenbach N. 1999. Ecology and fishery biology of *Holothuria fuscogilva* (Echinodermata: Holothuroidea) in the Maldives, Indian Ocean. Bulletin of Marine Science 64(1):103–113.