

Observations of juvenile *Actinopyga echinites* and *Actinopyga mauritiana* (Echinodermata: Holothuroidea) near the reef crest in a lagoon of Réunion

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Introduction

Continuous fishing pressure on holothurian populations (Purcell et al. 2014) has led to the collapse of stocks in many places around the world (Anderson et al. 2011; Conand 2004), and to a potential risk of extinction for commercial species in some areas (e.g. Hasan 2005). To ensure the success of replenishing efforts for overexploited commercial species from farm-raised individuals, it is necessary to understand the habitat preferences and ecological requirements of juveniles in their natural environment (Dance et al. 2002) and the role and importance of their predators (Francour 1997). *In situ* observations can improve our understanding of juvenile sea cucumber habits and help direct research efforts. This contribution is part of a series of field observations on size and habitat preferences of juveniles and recruitment that was initiated by Conand and Shiell in the SPC *Beche-de-mer Information Bulletin* (Shiell 2004a). It brings new data on two *Actinopyga* species that are abundant on Réunion reefs.

Observations

Several juveniles of *Actinopyga echinites* and *A. mauritiana* have been observed on the inner reef flat near the reef crest of the fringing reef of St Gilles, Réunion (21°07'S and 55°32'E), between 26 September 2015 and 10 October 2015 (i.e. at the end of the austral winter). The juveniles were in an area adjoining the reef front that was about 50 m in length and 10 m in width, outside of which no other juveniles of either species were observed. Small-sized individuals of other species were, however, spread out over this area of the reef flat (*Stichopus chloronotus*, *S. monotuberculatus*, *Holothuria pervicax*, *H. impatiens*, *Euapta godeffroyi*). These observations were made by the authors while snorkelling between 09:00 and 12:30 over three mornings spread over three to four days. For each day of observation, different sections of the reef, 10 m apart, were surveyed to avoid sampling the same individuals multiple times. Three transects of about 10 m x 10 m

were explored. Additional observations targeting the northern and southern sections flanking this area of the reef flat (respectively 170 m and 130 m in length) were made to verify the absence of juveniles of the two *Actinopyga* species.

Four juveniles of *A. echinites* (Fig. 1A) and three juveniles of *A. mauritiana* (Fig. 1B) were observed. Their size ranged between 2.5 cm and 3.0 cm. The individuals were spread out, and the density was very low: the seven individuals were found in an area of approximately 300 m² (i.e. a density of 0.023 ind. m⁻²). All individuals were found on the underside of dead coral blocks. None of the observed juveniles bore indications of lesions that could have been induced by predation, except for one juvenile of *A. mauritiana*, which had a small circular lesion on the bivium. A single adult of *A. mauritiana* and two adults of *A. echinites* were observed in this area. The occurrence of adults on a recruitment site has been documented for the same two species, but their abundances were not recorded (Shiell 2004b). Other juveniles of *A. echinites* of the same size were observed in other areas of the reef flat that are characterized by similar hydrodynamism.

Discussion

Except for *A. mauritiana*, none of the juveniles observed on the reef flat belonged to a species characteristic of a high hydrodynamics habitat (Purcell et al. 2013). It seems, therefore, that the recruitment of many sea cucumber species in reef environments begins with a period of time spent in the proximity of the reef front (see Bourjon and Morcel, p. 41 of this bulletin).

The hypothesis of a temporary recruitment site can be corroborated by previous observations: juveniles of *A. echinites* were abundant in the seagrass around the St Gilles reefs close of the shore (Kohler et al. 2009), and remain there until they reach a given size. The size of the smallest juvenile measured at this site is 4.2 cm (contracted individual, Fig. 1C). At this site we also found some juveniles of *A. mauritiana*

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(minimum size 7 cm, contracted individual, Fig. 1D). These juveniles presented the same morphology as the adults. These observations suggest that both species recruit in a microhabitat that is exposed to high hydrodynamics, before migrating towards a nursery area as juveniles, finally returning to the adult biotope.

The main factor determining the site of recruitment could be predation. Regarding the reef where these observations took place, the shallow water depth after the reef front (rarely more than 80 cm) and the strong water flow (or hydrodynamics) could be correlated with a low density of potential juvenile holothurian predators compared to the back reef. This part of the reef is, moreover, overwhelmingly occupied by coral rubble providing a multitude of shelters. Apart from *Stichopus chloronotus*, all juveniles were hidden under dead coral plates. The cryptic behaviour of juveniles was discussed by Cameron and Fankboner (1989), who consider that it probably lasts until individuals reach a size allowing them to escape many predators. These authors show that this strategy determines the recruitment of at least seven species of echinoderms. Wiedemeyer (1994) has shown that the cryptic behaviour of

juvenile *A. echinites* could be attributed to the risk of predation, and that an increase in mortality due to predation accompanies the timing of the change in behaviour observed in juveniles.

More comprehensive observations of recruitment and juvenile migration patterns are necessary to better understand the factors determining the habitat choice for these species during their development stages.

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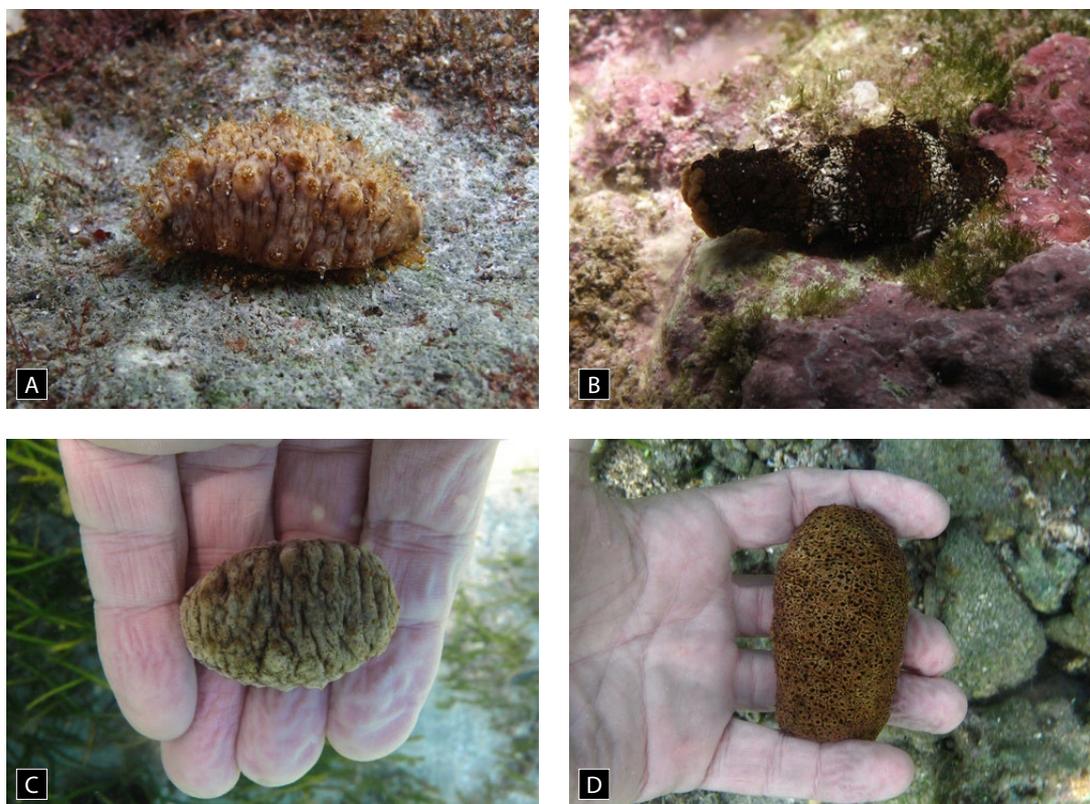


Figure 1. Juvenile sea cucumbers found on the reef crest – A: *A. echinites* (26 September 2015), and B: *A. mauritiana* (3 October 2015); and juveniles found in the seagrass bed – C: *A. echinites* (22 June 2013), and D: *A. mauritiana* (30 March 2013). (Identification by F. Michonneau).

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