

Report on Sightings of the Potential Invasive Species *Ophiothela mirabilis* (Echinodermata, Ophiuroidea) in Tobago, W.I.

Ophiuroids (brittle stars) are evolutionarily adapted to thrive in marine habitats. Their high species diversity, generalist nature, ability to reproduce asexually and sexually and to employ anti-predator mechanisms, make them ideal invaders (Beatty 2015).

The identified epizoic brittle star *Ophiothela cf. mirabilis* (Verrill, 1867) originated in the eastern Pacific where it densely inhabits its hosts (Araújo *et al.* (2018). While several epizoic ophiuroids demonstrates host octocoral-specificity (Mosher and Watling, 2009), *O. mirabilis* is a seemingly opportunistic generalist. They inhabit several host species including sponges, gorgonians, zoanths, bryozoans, hydrozoans and long-spined sea urchins (*Diadema antillarum* Philippi, 1845) (Hendler and Brugneaux 2013, Mantelatto *et al.* 2016). Using fissiparity, they are able to densely colonise its host with clones of itself, while broken limb fragments may be transported by currents to a new host (Hendler and Brugneaux 2013).

The first observation of *O. mirabilis* in the Atlantic was in 2000 in Brazil off Ilha do Pai, Rio de Janeiro and was further reported in St. Vincent, French Guiana and Tobago (Hendler *et al.* 2012, Hendler and Brugneaux 2013, Mantelatto *et al.* 2016, Lawley *et al.* 2018). Tobago's first documented confirmation of its presence was in 2013 at Store Bay, Goat Island and Little Tobago (Fig.1), possibly introduced through coastal currents or marine vessels

(Hendler and Brugneaux 2013). While there has been no further publication of their presence in the wider Caribbean, it is possible they have dispersed to other islands.

Observations of the yellow-orange morphotype of *O. mirabilis* (Araújo *et al.* 2018) were recorded during Reef Check belt transect and roving underwater turtle surveys from July 2016 to January 2018 (Fig. 2). A total of 111 dives were performed across 19 sites in Tobago at depths ranging between 8 to 18 m (Fig. 1).

Specimens were collected and identified using Humann, DeLoach and Wilk (2013) and Granja-Fernández *et al.* (2014), whilst Hendler (1995) was used to validate the identification against other regional species. Host species identification were confirmed using Humann, DeLoach and Wilk (2013) and Sánchez and Wirshing (2005). All species names were verified with WoRMS (2018). *O. mirabilis* specimens were submitted to and accessioned at The University of the West Indies Zoology Museum (Accession number UWIZM.2019.5).

Ophiothela mirabilis was found at 15 of the 19 survey sites and detected during 22 of the 111 dives. The species was undetected at sites 10, 12, 16 and 18 (Fig. 1, Table 1). They most commonly inhabited sea whips (at eight sites, 53% of all sites) followed by the octocoral *Antilloorgia bipinnata* (Verrill, 1864) (at five sites, 33% of all sites). In Site 1, *O. mirabilis* showed the greatest host diversity by

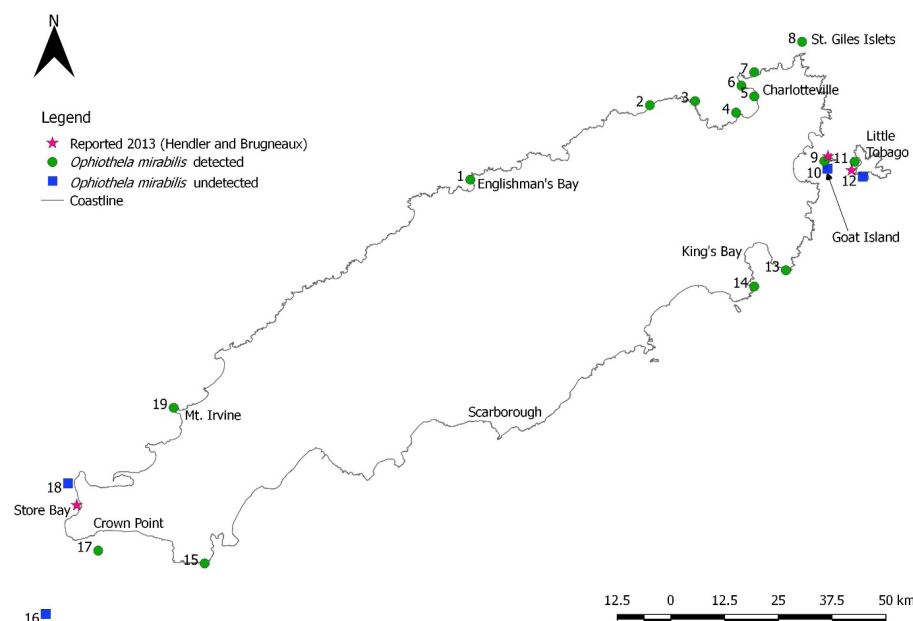


Fig. 1. Survey sites and *O. mirabilis* occurrence in Tobago, including the sites reported in Hendler and Brugneaux, 2013.



Fig. 2. *Ophiothela mirabilis* (yellow-orange) on host sea plume, *Muriceopsis flavida*.

Table 1. Observed host species of *Ophiothela mirabilis* at 19 survey sites in Tobago from July 2016 to January 2018.

General host	Host species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	<i>Antillogorgia acerosa</i>					x								x						
	<i>Antillogorgia bipinnata</i>		x		x	x	x	x												
	<i>Eunicea tourneforti</i>					x														
Sea whips and sea plumes	<i>Muriceopsis flavida</i>	x																		
	<i>Plexaura homomalla</i>	x																		
	<i>Pseudoplexaura flagellosa</i>															x				
	<i>Pterogorgia citrina</i>														x					
	Sea whip spp.	x		x		x				x		x				x		x		x
	<i>Gorgonia flabellum</i>	x												x						
Sea fans	<i>Gorgonia</i> sp.						x							x		x		x		
	<i>Gorgonia ventalina</i>	x												x						
Fire coral	<i>Millepora alcicornis</i>				x		x		x							x				
	<i>Millepora</i> spp.									x		x								
	Total host species richness*	4	1	1	2	3	3	1	1	2	0	2	0	4	2	2	0	2	0	1

*Includes all hosts identified to species but excludes *Gorgonia* sp., *Millepora* sp. and Sea whips. These three are only included in the total host species richness count when they were the lone host organism type at the survey site.

populating at least five species (all octocorals). For most sites, the species was found mostly inhabiting just one host structure. However, at Englishman's Bay (Site 1) there was an increase from one host structure during July 2017 to six, represented by four host species in December 2017. *Ophiothela mirabilis* was previously undetected at Flying Reef (Site 17) from May 2017 to July 2017, but there was a first occurrence in August 2017 on 12 colonies of sea whips (10 unidentified).

Ophiothela mirabilis was found inhabiting on octocorals (sea whips and sea fans) and fire corals (*Millepora* spp.). There were also observed on the Branching vase sponge (*Callyspongia vaginalis*) and Red cushion sea stars (*Oreaster reticulatus*) (pers. obs. prior to data collection). At sites 10, 12, 16 and 18, the potential hosts were present, but uninfested. Despite the literature indicating that *O. mirabilis* are generalists (e.g. Hendler and Brugneaux 2013), from the data, there seems to be a stronger preference for the octocorals and fire corals identified. There is no clear pattern of dispersal for Tobago.

Research is slowly expanding to better understand *O. mirabilis*, such as its host preference and host selection mechanism (Ribeiro *et al.* 2009, Mantelatto *et al.* 2016). Notwithstanding, knowledge gaps in its sexual reproductive and larval dispersal behaviour, feeding

habits, and environmental requirements and interactions, underscores the need to bolster research effort (Hendler, 2013). As with all potential alien invasive species, there is an inherent need to discern the impacts of *O. mirabilis* to native epizoic symbionts, its hosts and ultimately the reef environment particularly as it pertains to already existing stressors. With the information presented here, we now have a baseline to support future monitoring and research into *Ophiothela mirabilis* in Tobago.

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