

Green sea turtle, *Chelonia mydas*, feeding on *Synapta maculata* (Holothuroidea: Synaptidae) on a seagrass bed (*Syringodium isoetifolium*) at Reunion Island, western Indian Ocean

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Abstract

Young green turtles, *Chelonia mydas*, frequent the *Syringodium isoetifolium* seagrass beds on Reunion's inner reef flats of fringing reefs, where they come to feed. Photographs of a green turtle looking for and eating the snake sea cucumber, *Synapta maculata*, were taken for the first time at Reunion Island. *S. maculata* is a sea cucumber species that was frequently observed on the inner reef flats and on the back-reef depression, but these abundances seem to be decreasing in recent years. Studies of *S. maculata* populations are needed to monitor changes in densities of this species, which has an important ecosystem role, as well as other observations to determine whether this case of green sea turtle predation is an isolated one or whether *S. maculata* may occasionally be part of the diet of young *C. mydas* in Reunion.

Introduction

Green sea turtles, *Chelonia mydas*, are regularly observed on the west coast of Reunion Island where they feed mainly on the red algae *Carpopeltis* sp. and *Amansia* sp. at depths of 10 to 30 m (Ciccione 2001). To a lesser extent, young individuals are observed on *Syringodium isoetifolium* seagrass beds in the inner flats where they feed (Ballorain 2010; Cuvillier 2016).

Synapta maculata is a species that is typically observed on certain areas of the back-reef depression or on inner reef flats of Reunion Island's fringing reef, particularly on sandy areas or in seagrass beds (Conand and Mangion 2002; Flammang and Conand 2004; Conand and Frouin 2007; Conand et al. 2010; Conand et al. 2016; Bourjon 2017). *Synapta maculata* feeds in particular on organic matter trapped by the epiphytic community that develop on the leaves of *Syringodium isoetifolium* (Hendriks et al. 2008). Sea cucumbers are essential organisms for the functioning of reef ecosystems and are one of the most important groups in the recycling of organic matter and bioturbation of coral reef sediments (Purcell et al. 2016).

Remains of holothurians (Holothuroidea) have previously been found in the stomach contents of some sea turtle species, such as the loggerhead turtle *Caretta caretta* (Thompson 1980; Casale et al. 2008) and cases of holothurian predation by this turtle species have been photographed on a reef in Belize (Rogers et al. 2020). To our knowledge, there has not yet been any published direct evidence showing *Chelonia mydas* feeding on a holothurian on the reef of Reunion Island.

An observation had already been made in 2010 of a *C. mydas* individual feeding on *S. maculata* on the inner reef flats south of La Saline Les Bains at Reunion Island, without, unfortunately, photographic evidence (Stéphane Ciccione, pers. comm.). Similar observations have been made in Polynesia but are not published and concern other holothurian species (A. Carpentier, Te mana o te moana, pers. comm.).

This article presents pictures of *Chelonia mydas* feeding on *Synapta maculata* in *Syringodium isoetifolium* seagrass beds and in coral heads.

Methodology

The observation was made while snorkelling on 6 January 2019 at 17:15 on a seagrass bed located on an inner reef flat of the fringing reef of La Saline Les Bains at Reunion Island (S21°05'02.5 and E55°14'17.9). This particular *Syringodium isoetifolium* seagrass bed is located at a depth of 1.0 to 1.5 m, and had an average surface area of 1100 m² in 2015 (Cuvillier 2016). The observation lasted 10 minutes and the photos presented were taken from several videos.

This observation was made inside the area of the Reunion Island Marine Nature Reserve in a level 2b protection zone.⁴

Results

The green sea turtle was observed eating two specimens of *Synapta maculata* during the time of the observation. The turtle first searched for this prey by swimming over the seagrass

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or coral blocks. It then pulled the holothurian out of the seagrass and coral blocks, and used its beak and fins to cut it up and eat it (Fig. 1). The observation also shows that the turtle does not seem to eat the holothurians in their entirety; some pieces were left over, but this may be due to the proximity of the divers. Furthermore, it is interesting to note that the turtle looked for and specifically chose to eat *S. maculata*, and not another species of holothurian such as *Holothuria leucospilota*, which was observed on the videos but which does not seem to be of interest to the turtle, although it is abundant in this area of the inner reef flat.

Discussion

The observation of a green sea turtle, *C. mydas*, looking for and eating *S. maculata* had never been documented at Reunion Island. Green sea turtles feed mainly on red algae on outer reef slopes (Ballorain 2010). However, young *C. mydas* visit the *Syringodium isoetifolium* seagrass beds where they are protected by the marine nature reserve⁵ (Jean et al. 2010b).

The young turtle observed in these photos has been observed (Jean et al. 2010a) on this seagrass bed of the La Saline flat since September 2018, and was also seen (only once) on another seagrass bed of a reef flat 800 m to the north. All of these observations (n = 14) were made while the sea turtle was feeding on *S. isoetifolium* beds, except for the one mentioned here, where it was feeding on *Synapta maculata*.

Other research suggests that immature green turtles are not strictly herbivores and adapt to local food resources (Gonzales et al. 2012).

Densities of *S. maculata* in 2014 on this seagrass bed where the observation was made were $0.3 \text{ ind. m}^{-2} \pm 0.05$, other Holothuroidea species are frequently observed there such as *Holothuria leucospilota* and *S. chloronotus* (Cuvillier 2016). Several scientists report that densities of *S. maculata* appear to be decreasing in recent years in the seagrass beds and the reef depression (pers. obs.), but there are no robust data to confirm this hypothesis. Recent observations indicate that *S. maculata* can also be found under coral blocks during the day and come out at night to feed. Studies of *S. maculata* populations in the back-reef depression and the inner reef flat of the fringing reef of Reunion Island are needed to monitor changes in densities of this species with an important ecosystem role (Purcell et al. 2016). Further observations and/or the studies of stomach contents of *C. mydas* are necessary to enable us to say whether this observation is an isolated case or whether *S. maculata* may occasionally be part of the diet of young *C. mydas* at Reunion. In this case, it might be interesting to assess the impact on *Synapta maculata* populations.



Figure 1. An individual of *Chelonia mydas* observed eating *Synapta maculata* on *Syringodium isoetifolium* seagrass beds on a coral reef at Reunion Island

⁵ See <https://torsooi.com/about>

References

- Ballorain K. 2010. Ecologie trophique de la tortue verte *Chelonia mydas* dans les herbiers marins et algues du sud-ouest de l'océan Indien. These, CNRS-IPHC, Kélonia, Ifremer, Université de La Réunion. 297 p.
- Bourjon P. 2017. Field observations on the regeneration in *Synapta maculata*. (Holothuroidea : Synaptidae). SPC Beche-de-mer Information Bulletin 37:105–106.
- Casale P., Abbate G., Freggi D., Conte N., Oliverio M. and Argano R. 2008. Foraging ecology of loggerhead sea turtles *Caretta caretta* in the central Mediterranean Sea: Evidence for a relaxed life history model. *Marine Ecology Progress Series* 372:265–276.
- Ciccione S. 2001. Autopsie de tortues marines *Chelonia mydas*, retrouvées mortes à la Réunion. *Bulletin Phaethon* 13:14.
- Conand C. and Mangion P. 2002. Sea cucumbers on La Reunion Island fringing reefs: Diversity, distribution, abundance and structure of the populations. SPC Beche-de-mer Information Bulletin 17:27–33.
- Conand C. and Frouin P. 2007. Sea cucumbers in La Reunion. p. 21–29. In: Conand C. and Muthiga N. (eds). *Commercial sea cucumbers: A review for the Western Indian Ocean*. WIOMSA Book Series No. 5. 66 p.
- Conand C., Michonneau F., Paulay G. and Bruggemann H. 2010. Diversity of the holothuroid fauna (Echinodermata) at La Réunion (Western Indian Ocean). *Western Indian Ocean Journal of Marine Science* 9(2):145–151.
- Conand C., Ribes S., Trentin F., Mulochau T. and Boissin E. 2016. Oursins, étoiles de mer et autres échinodermes. Les éditions du cyclone. 168 p.
- Cuvillier A. 2016. Dynamique et fonctionnement des herbiers marins dans un complexe récifal anthropisé (île de la Réunion, océan Indien). *Ecologie, Environnement*. Université de la Réunion. 213 p.
- Flammang P. and Conand C. 2004. Functional morphology of the tentacles in the apodid holothuroid *Synapta maculata*. p. 327–333. In: Heinzeller T. and Nebelsick J. (eds). *Echinoderms: München. Proceedings of the 11th Echinoderm Conference, Munich, Germany*. London: Taylor and Francis Group.
- Gonzales Carman V., Falabella V., Maxwell S., Albareda D., Campagna C. and Mianzan H. 2012. Revisiting the ontogenetic shift paradigm: The case of juvenile green turtles in the SW Atlantic. *Journal of Experimental Marine Biology and Ecology* 429:64–72.
- Hendriks I.E., Sintes T., Bouma T.J. and Duarte C.M. 2008. Experimental assessment and modeling evaluation of the effects of the seagrass *Posidonia oceanica* on flow and particle trapping. *Marine Ecology Progress Series* 356:163–173.
- Jean C., Ciccione S., Talma E., Ballorain K. and Bourjea J. 2010a. Photo-identification method for green and hawksbill turtles and first results from reunion. *Indian Ocean Turtle Newsletter* 11:8–13
- Jean C., Ciccione S., Ballorain K., Georges J.Y. and Bourjea J. 2010b. Ultralight aircraft surveys reveal marine turtle population increases along the west coast of Reunion Island. *Oryx* 44:223–229.
- Purcell S.W., Conand C., Uthicke S. and Byrne M. 2016. Ecological roles of exploited sea cucumbers. *Oceanography and Marine Biology: An Annual Review* 54:367–386.
- Rogers A., Caal W., Hamel J.F. and Mercier A. 2020. Loggerhead sea turtle *Caretta caretta* found preying on a sea cucumber on a reef in Belize. SPC Beche-de-mer Information Bulletin 40:17–19.
- Thompson S.M. 1980. A comparative study of the anatomy and histology of the oral cavity and alimentary canal of two sea turtles: The herbivorous green turtle *Chelonia mydas* and the carnivorous loggerhead turtle *Caretta caretta*. BSc thesis, James Cook University, Townsville, Australia. 430 p.