

Sponges as secondary hosts for Christmas tree worms at Curaçao

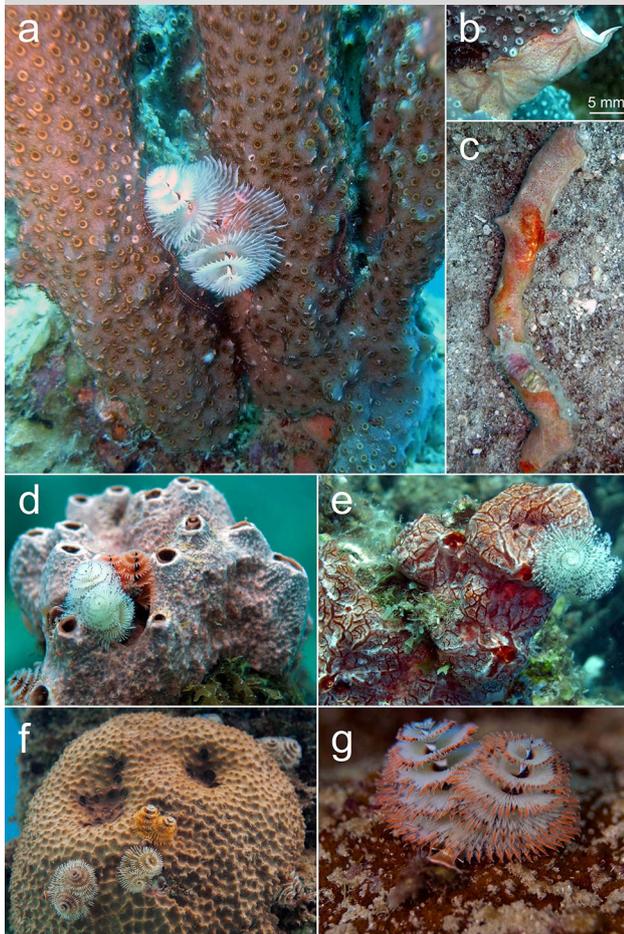


Fig. 1 Sponges hosting Christmas tree worms. **a** Vase sponge *Callyspongia vaginalis* in association with the parazoanthid *Umimayanthus parasiticus*. **b** Close-up of tube containing retracted worm (**a**) and covered by an encrusting orange-veined sponge, *Clathria curacaoensis*. **c** Isolated tube containing the worm (**a**, **b**). **d–g** Massive sponges: *Desmapsamma anchorata* (**d**), *Monanchora arbuscula* (**e**), *Ircinia felix* (**f**), *Neofibularia nolitangere* (**g**)

Sponges are known to host a variety of invertebrates, including polychaete worms (Koukouras et al. 1996). Host sponges offer space and can serve as a refuge for such animals if they excrete chemical compounds, which may serve as defense against predators (Waddell and Pawlik 2000). Some encrusting sponges on coral reefs use toxins as an aid to overgrow and kill live corals to create suitable substrate space, but they are not necessarily lethal to the Christmas tree worms that live inside the corals (Hoeksema et al. 2016). Christmas tree worms are polychaetes of the genus *Spirobranchus* (Serpulidae), which produce calcareous tubes as dwellings that are attached to hard substrate or embedded inside the coral skeletons.

During a survey on sponge–coral interactions at Curaçao (southern Caribbean) in June 2017, the serpulid *Spirobranchus giganteus* (Pallas, 1766) was observed as associate of at least 10 sponge species with various growth forms (Fig. 1; Electronic supplementary material Figs. S1–15). A worm tube attached to a vase sponge (Fig. 1a) was covered by an orange-veined encrusting sponge (Fig. 1b, c). Dissection of the sponges revealed that worm tubes could be tracked down to the corals that acted as original substrates for the worms. Apparently, the sponges had overgrown the corals that contained the worms. As substitute hosts, they allowed the worms to continue their growth. *Spirobranchus* worms have also been reported from various Mediterranean sponges, but the nature and mechanism of their association was not explained (Koukouras et al. 1996).

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References

- Hoeksema BW, ten Hove HA, Berumen MI (2016) Christmas tree worms evade smothering by a coral-killing sponge in the Red Sea. *Mar Biodivers* 48:15–16
- Koukouras A, Russo A, Voultsiadou-Koukoura E, Arvanitidis C, Stefanidou D (1996) Macrofauna associated with sponge species of different morphology. *Mar Ecol* 17:569–582
- Waddell B, Pawlik JR (2000) Defenses of Caribbean sponges against invertebrate predators. I. Assays with hermit crabs. *Mar Ecol Prog Ser* 195:125–132

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