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SHORT COMMUNICATION

Overgrowth of reef organisms by benthic cyanobacteria in the Colombian Caribbean

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Abstract

Blooms of marine benthic cyanobacteria seem to be recurrent at various reef sites of the Colombian Caribbean. However, their effect on local reef communities has not been assessed. In this note we document some interactions between cyanobacteria and reef organisms.

Keywords: benthic cyanobacteria, reef organisms, Colombian Caribbean.

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Resumen

Los afloramientos de cianobacterias marinas bentónicas parecen ser recurrentes en varias localidades arrecifales del Caribe colombiano. Sin embargo, su efecto sobre las comunidades locales aún no se han dimensionado. En esta nota documentamos algunas interacciones entre cianobacterias y organismos arrecifales.

Palabras clave: cianobacterias bentónicas, organismos arrecifales, Caribe colombiano.

Cyanobacteria are bacteria with photosynthetic capabilities, widespread in aquatic and some terrestrial environments. Marine benthic cyanobacteria can, under the right environmental conditions, grow profusely in various kinds of marine ecosystems (Albert *et al*., 2005; Ritson-Williams *et al*., 2005, Kuffner *et al*., 2006). Cyanobacterial blooms are currently a major concern to the public, researchers and environmental agencies due to their recurrence and potential detrimental effects on benthic communities.

In the course of our current research we have witnessed dense cyanobacterial blooms at the San Andres archipelago and Rosario islands in the Colombian Caribbean. Depending on location, cyanobacterial mats grow over sand, sea grasses or algae but also over soft and hard corals causing bleaching and tissue necrosis. We have also determined that those blooms are generally composed of at least two species of cyanobacteria and that organic extracts from many of those blooms show high feeding deterrence against fishes and urchins, therefore limiting potential control by herbivores (Prato, 2013).

The growth of marine benthic cyanobacteria in coral reefs is recurrent in the Colombian Caribbean especially during warm months (July-August, September-November). During the last four years, reef surveys at the Colombian Caribbean (Islas del Rosario and San Andres and Old Providence Islands) have revealed that benthic cyanobacterial mats overgrow and negatively affect hard and soft corals. Tissue necrosis is evident after removal of cyanobacterial mats overgrowing gorgonians (Fig. 1 a,b) and hard corals (Figs. 1 c,d). We have also observed that coral bleaching is a common result of direct contact between benthic cyanobacteria and corals (Fig. 1e). In other cases, overgrowth of red filamentous cyanobacteria seems to be particularly severe on some gorgonians, rapidly growing and displacing live tissue leaving behind the exposed gorgonin matrix, which is in turn rapidly fouled by hydroids and algae (Fig. 1 f).

Adverse effects of cyanobacteria overgrowing live corals and gorgonians may be a combined result of abrasion, decrease of oxygen levels, light obstruction, recruitment disruption, and allelopathic mechanisms leading to coral bleaching. The production and release of allelopathic substances which we are currently investigating, may be an important mechanism involved in the success of cyanobacteria overgrowing reef organisms or affecting larval recruitment of potential competitors (Ritson-Williams *et al*., 2005; Kuffner *et al*., 2006; Titlyanov *et al*., 2007).

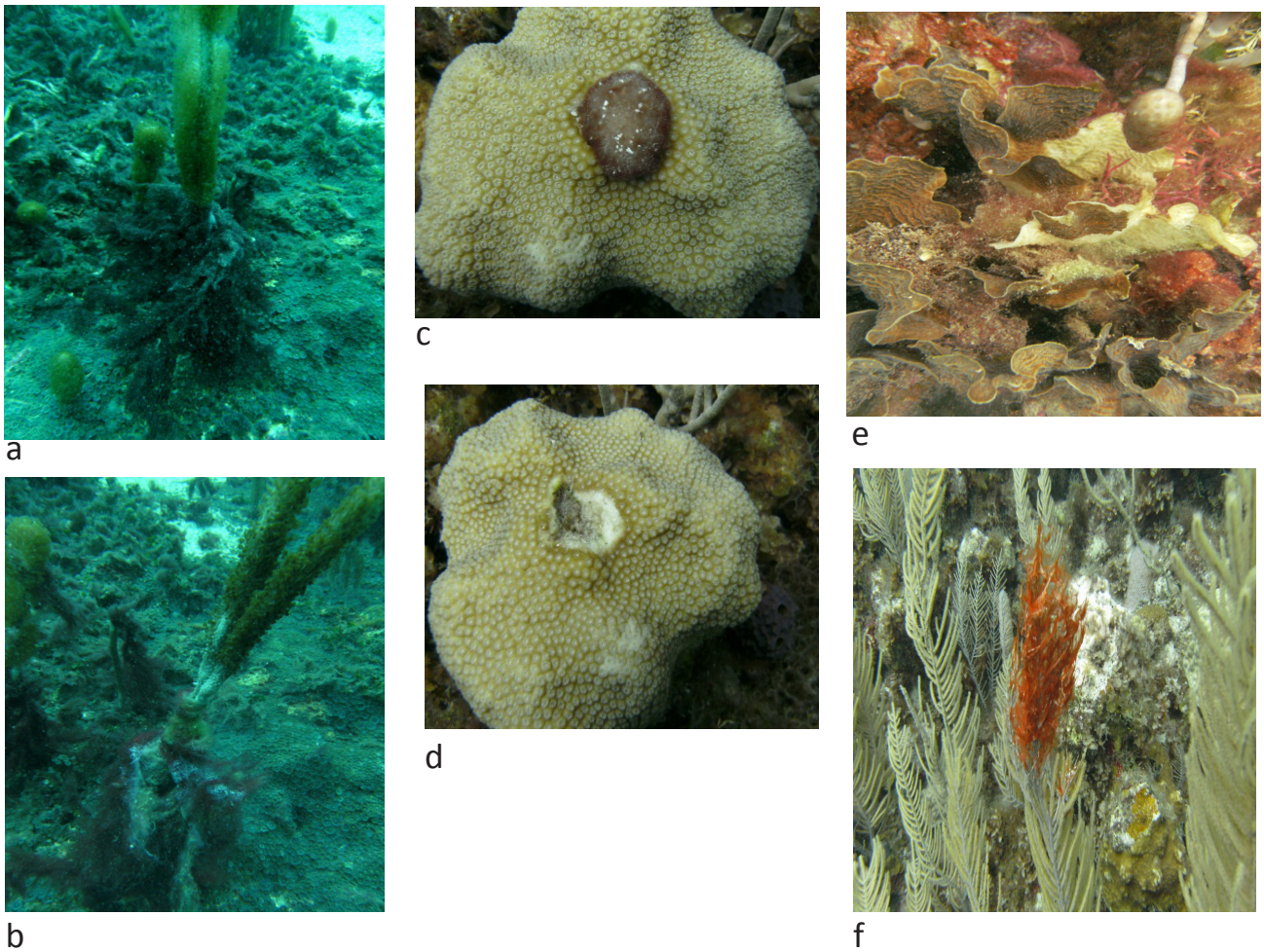

Figure 1. (a, b). An assemblage of *Lyngbya majuscula* and *L. sordida* overgrowing the base of a sea rod *Eunicea* sp. Bleaching and tissue damage became apparent after the cyanobacterial mat was removed. (b, c). An assemblage of *Symploca hydnoides* and *Phormidium submembranaceum* overgrowing a *Montastrea franksi* colony. Tissue death was evident after the cyanobacterial mat was removed. (e). Bleaching of *Agaricia tenuifolia* after a cyanobacterial mat composed by *Lyngbya majuscula* and *L. sordida* was detached. (f). Red encrusting biofilm (assemblage of *Oscillatoria* spp. *Lyngbya* spp. and *Phormidium* sp.) rapidly overgrows gorgonian corals exposing the gorgonin matrix which is rapidly fouled.

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