

High predation by the corallivore sea snail *Jenneria pustulata* in a high-latitude reef in the Gulf of California

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*High predation by the corallivore gastropod Jenneria pustulata was observed in July 2011 in a high-latitude reef at Bahía de Los Angeles in the northern Gulf of California. Porites panamensis corals were infested by 15 to 40 sea snails per colony (22 ± 7.25 ind 0.1 m^{-2} of Porites surface). Coral colonies were 20–30 cm tall and the average size of the sea snails were 1.7 cm ($SD \pm 0.238$, $N = 152$). These data indicate a change in the daily pattern of movement and feeding of the gastropod in this reef. Despite high density of *J. pustulata* on the reef, no soft corals were observed as damaged by the sea snail.*

Keywords: Eastern Pacific, Gulf of California, Bahía de Los Ángeles, high-latitude reef, corallivore sea snail, *Jenneria pustulata*, scleractinian coral, *Porites panamensis*, predation

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INTRODUCTION

The coral-eating gastropod *Jenneria pustulata* (Lighfoot, 1786: Jenner's cowry, pustulated cowry) is found in the Eastern Pacific from California to Peru and west to Hawaii and the Galápagos (Lorenz & Fehse, 2009). *Jenneria pustulata* inhabits rocky coasts and coral reefs, feeding at night and resting during the day, clustered around the coral being consumed (Bertsch, 1984; Glynn, 1985).

Jenner's cowry has a strong feeding preference for branching corals of the genus *Pocillopora* (Glynn, 2004; Navas-Camacho *et al.*, 2010), a coral that is widely distributed in the Indo-West Pacific and Eastern Tropical Pacific regions, but absent in the upper Gulf of California. On rare occasions, *J. pustulata* has been observed feeding on other corals, such as *Porites* and *Psammocora* (Glynn, 1985).

High predation by this sea snail was reported only during bleaching events in the 1980s in Panama, where aggregations exceeded 50–100 individuals on a single coral colony of the genus *Pocillopora* ($15–28$ ind m^{-2}) and with a rate of coral tissue consumption about twice that of the crown-of-thorns starfish (*Acanthaster planci*). However, these densities varied widely, depending on the abundance of corallivore populations (Glynn, 1985, 2004). In this report, we describe the first observation of high depredation by *J. pustulata* of coral colonies distinct from *Pocillopora*, in a high-latitude reef in Bahía de Los Ángeles in the northern part of the Gulf of California.

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MATERIALS AND METHODS

Observations were recorded on 7 July 2011 at 2–5 m in Bahía de Los Ángeles ($29^{\circ}2.024'N$ $113^{\circ}29.874'W$). Jenner's cowries on colonies of the emerald coral *Porites panamensis* were photographed during undersea studies in this area. Photographs were taken with a waterproof digital camera during eight diurnal dives. Size of the snails and infested coral surface area were measured using ImageJ analysis software (<http://rsb.info.nih.gov/ij/>).

RESULTS AND DISCUSSION

Porites panamensis corals were infested by 15 to 40 snails per colony (22 ± 7.25 ind 0.1 m^{-2} of *Porites* surface; Figure 1A). Coral colonies were 20–30 cm tall; average size of the snails were 1.7 ± 0.238 cm ($N = 152$). Density of the sea snails was less than in Panama in the 1980s (50–100 per colony; Glynn, 2004) on *Pocillopora* during bleaching events, but higher than in Colombia (up to 24 ind m^{-2} ; Glynn *et al.*, 1982) and the Pacific side of Panama (average 1.8 ind m^{-2} ; Glynn *et al.*, 1972) on unbleached *Pocillopora*.

This sea snail is nocturnally active and hides during the day (Bertsch, 1984; Glynn, 1985), but during the immersions, individuals were always on the top of the coral colonies, moving and feeding at midday (10:00–13:00). Our observations recorded changes in the daily pattern of movement and feeding in this reef. Snails left oval scars on the coral (Figure 1B) that extend as trails through the colony (Figure 1C). High predation by this snail severely injured the coral; dead colonies were present in the reef. Blue sea stars (*Phataria unifascialis*) and anemones (*Anthopleura* sp.) were present on dead colonies (Figure 1D), indicating that colonies died several weeks earlier.

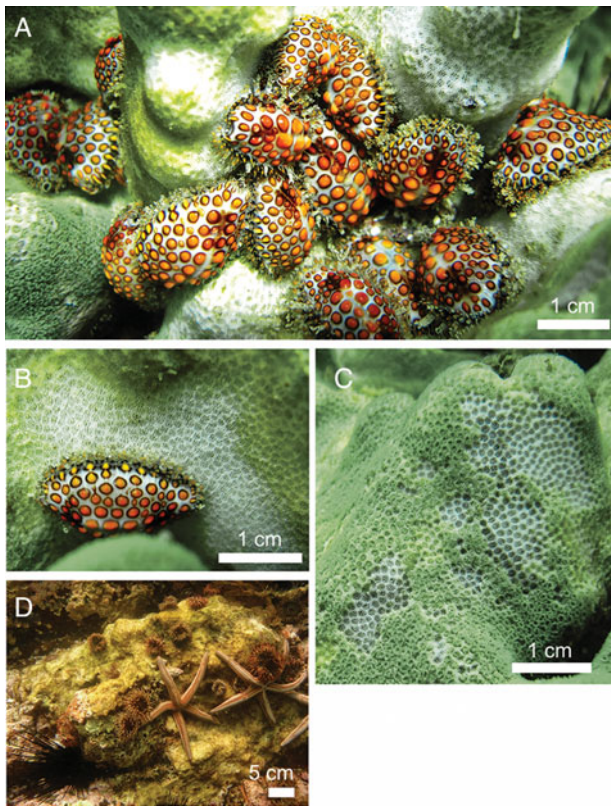


Fig. 1. Predation by the corallivore gastropod *Jenneria pustulata* on colonies of emerald *Porites panamensis*: (A) group of snails on coral; (B) and (C) feeding scars left by snail; (D) dead coral colony inhabited by the blue sea star (*Phataria unifascialis*) and anemone (*Anthopleura* sp.). Scale bars: A–C, 1 cm; D, 5 cm.

Despite the high density of *J. pustulata* and soft corals in the reef, soft corals were not eaten by the sea snails; only *Porites panamensis* corals were consumed. To date, 13 species of stony corals have been recorded in the Bahía de Los Ángeles and adjacent waters, but by far, the most common (over 90% of the colonies occur on rocks) is *Porites panamensis* (Reyes-Bonilla *et al.*, 2008). Colonies of *Pocillopora* corals are absent in the northern part of the Gulf of California.

This unusual aggregation of *J. pustulata* contrasts with surveys at 24 sites in the Bahía de Los Ángeles in 2004 and at several other locations in the Gulf of California between 2004 and 2012. In this time frame, Jenner's cowries were not present at these densities on or around coral colonies (Reyes-Bonilla *et al.*, 2008; D.A. Paz-García, personal observation). High densities and aggregation of these snails, as a consequence of the reproductive season, is discarded since most cowry species reproduce most of the year (Katoh, 1989; Osorio *et al.*, 1999; Kawai, 2009), but there is no study of Jenner's cowry.

Remarkably, this outbreak of *J. pustulata* does not seem to be associated with coral bleaching events, as occurred in Panama (Glynn, 1985). Morton *et al.* (2002) suggested that the increased release of mucus and other cellular products by injured corals attracts the predatory snails and leads to high, local coral mortality. Causes of this high predation remain unknown. There is no evidence of anthropogenic or environmental disturbances at the Bahía de Los Ángeles.

As the first observation of high predation of *J. pustulata* in a reef in the northern Gulf of California, this finding emphasizes that regular monitoring is necessary to determine the

effects of feeding activity by this snail on coral populations in this region.

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