COMMEN

Feeding activity by the blenny *Exallias brevis* causes multifocal bleaching in corals: Comment on Zvuloni et al. (2011)

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ABSTRACT: The shortbodied blenny *Exallias brevis* is an obligate corallivore. Studies on Hawaiian reefs and casual observations on other Pacific reefs reveal that *E. brevis* feeds on a wide variety of scleractinian corals, including the hydrocoral *Millepora* spp. This blenny produces distinctive circular feeding marks of ca. 2 cm² on corals; the marks can persist for 50 d or more. *E. brevis* is indigenous to the Red Sea and may be responsible for the multifocal bleaching syndrome in Red Sea *Millepora dichotoma* described by Zvuloni et al. (2011; Mar Ecol Prog Ser 441:25–32).

KEY WORDS: *Exallias brevis* · Shortbodied blenny · Corallivore · *Millepora* spp. · Multifocal bleaching · Red Sea

INTRODUCTION

The shortbodied blenny *Exallias brevis* (Kner) is a combtooth blenny in the tribe Salarini (Hastings & Springer 2009). Combtooth blennies are characterized by a single row of elongate incisiform teeth in each jaw that are used like brushes while grazing on rocky surfaces. The majority of these blennies feed on algae and detritus, but a few species such as Ecse-nius sp. have been observed feeding on coral tissue (Randall et al. 1997, Carlson & Awai 2008).

Hiatt & Strasburg (1960) reported that *Exallias brevis* at Enewetak Atoll is an herbivore, but Hobson (1974) stated that in the Hawaiian Islands it feeds on coral polyps. Carlson (1978) and Sano et al. (1984) confirmed Hobson’s conclusions that *E. brevis* is a corallivore. Carlson (1992) obtained quantitative data on the diet and feeding behavior of *E. brevis*, and these previously unpublished data form the basis of this Comment.

Zvuloni et al. (2011) described an apparently new ‘multifocal bleaching’ (MFB) syndrome in hydro-corals *Millepora dicotoma* and *M. platyphyllia* in shallow waters off Eilat in the Gulf of Aqaba, Red Sea. Photographs and descriptions published by Zvuloni et al. (2011, their Fig. 1c) bear a remarkable resemblance to the spots on Hawaiian corals resulting from the feeding activity of *E. brevis*.

OBSERVATIONS AT THE HAWAIIAN ISLANDS

Feeding was recorded over 63 h for 15 tagged male and 5 tagged female *Exallias brevis* on Hawaiian coral reefs at Hanauma Bay and Kahe Point on the island of Oa’hu, from October 21, 1980 through May 9, 1982 (Table 1). Feeding was exclusively on living corals, at rates of 13.9 and 28.4 bites h⁻¹ for males and females, respectively. A total of 10 feeding marks were photographed and measured. Feeding bites on *Porites lobata* produced circular marks 2.04 ± 0.42 cm² (mean ± SD) in area (ca. 1.6 cm diameter) (Fig. 1a,b). Macro-photographs revealed that superficial coenosarc tissue was removed while the polyps remained
mostly intact within calyces. A total of 6 feeding marks were tracked over time and remained visible (pale or white) for as long as 50 d before the coral regenerated. Thus, over a 50 d period, a single *E. brevis* could produce white marks on *P. lobata* covering an aggregate area up to 1.57 m² before the oldest marks disappear.

A video of *Exallias brevis* (www.youtube.com/watch?v=Ymk8e_1YJGi) reveals that the mouth is wide open when feeding, and has the appearance of a small suction cup. During a feeding bite, the less flexible lower jaw with rigid teeth remains anchored in the coral, while the highly extensible upper jaw, with flexible teeth, sweeps across the surface of the coral removing coral tissue. The lower jaw creates a small crescent-shaped mark while the upper jaw produces a larger, nearly circular mark (Fig. 1a).

Males with nests defended areas of 9.0 ± 2.7 m² (mean ± SD; n = 8); territories of males without nests and of females averaged 20.3 ± 12.0 m² (n = 5) and 24.6 ± 8.2 m² (n = 6), respectively. Males caring for eggs fed in a smaller area, and thus feeding marks were more concentrated in those areas (Fig. 1b).

My observations of *Exallias brevis* on other Pacific island reefs were consistent with the corallivorous diet reported for the Hawaiian Island blennies, except that a wider variety of corals were included in the diet. One male *E. brevis* observed for 1 h near Motupore Island, Papua New Guinea, fed upon *Acropora* sp., *Porites* sp., *Montipora* sp., *Pocillopora eydouxi*, and *Goniastrea* sp. At Enewetak Atoll in the Marshall Islands, I observed a female *E. brevis* perched among the branches of fire coral *Millepora* sp., and after 5 min of observation, it fed on the coral (Fig. 1c,d).

**DISCUSSION**

*Exallias brevis* is widespread on coral reefs throughout the Indo-Pacific region, from the Hawaiian Islands in the east to the Red Sea in the west, but it is infrequently observed due to its cryptic coloration and sedentary behavior. Biologists surveying reefs may observe *E. brevis* feeding marks on corals without knowing what produced them.

The marks produced by Hawaiian *Exallias brevis* are identical to the MFB spots illustrated by Zvuloni et al. (2011, their Fig. 1c): many of the latter spots show the diagnostic crescent on the lower edge. Furthermore, the concentrated pattern of the MFB spots is consistent with the territorial feeding and nesting activity of *E. brevis*. Zvuloni et al. (2011) considered MFB as a bleach-
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ing event, partly because they observed intact zooids within the bleached areas. However, this too is consistent with E. brevis feeding, which removes mostly coenosarc tissue and misses many of the polyps in their calices.

Randall (1983) listed Exallias brevis as indigenous to the Red Sea and noted that it is smaller in size there compared to other locations. This would explain the slightly smaller size of the MFB spots reported by Zvuloni et al., compared to the marks produced by larger E. brevis in the Hawaiian Islands. Feeding activity of this blenny appears to have gone unnoticed in the Red Sea until recently, but Christian Alter (Red Sea Environmental Centre, Dahab, Egypt) has confirmed that Red Sea E. brevis feeds on Millepora dichotoma (pers. comm.).

Zvuloni et al. (2011, p 30) correctly noted that ‘pattern analysis does not usually suffice to determine the pattern-generating processes, and in the absence of microbiological data we cannot explicitly state that MFB is a syndrome caused by an infectious disease.’ MFB in Red Sea Millepora dichotoma is more parsimoniously explained by the feeding activity of Exallias brevis.

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LITERATURE CITED


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