

NOCTURNAL HERBIVORY ON *THALASSIA TESTUDINUM* AS A FUNCTION OF DISTANCE FROM THE REEF

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Abstract. We investigated nocturnal herbivory on *Thalassia testudinum* in Discovery Bay, Jamaica. The experiment was a replicate of a diurnal study conducted by the authors the previous week. Together, these studies suggest that *Tripneustes ventricosus* and *Lytechinus variegatus* migrate at night into the dense *Thalassia* patches of the rear zone. We found no evidence of nocturnal fish herbivory. Despite a significantly higher amount of urchin grazing, overall herbivory on *Thalassia* is substantially less at night than during the day. (ABS)

INTRODUCTION (JJB)

As our previous study indicated, *T. testudinum* is an important food source for parrotfish and urchins in the back reef adjacent to Discovery Bay Marine Laboratory, Jamaica (Bizzarro, et al. 1992). However, this pattern might not be expected to continue nocturnally. Nocturnal fish communities differ greatly from day communities in species composition and number of individuals, with a much lower percentage of herbivorous fish and fewer fish present overall (P. Hunt, pers. comm.). However, grazing intensity of *Diadema antillarum* and *Tripneustes ventricosus* increases at night, coinciding with nocturnal migrations from the reef to the turtle grass beds (Ogden 1980). Based on this information, we predicted that urchin grazing would be higher during the night than during the day and that grazing intensity would increase with distance from the reef. We also predicted that total herbivory would be higher during the day.

METHODS (JJB)

This study was a nocturnal replicate of a previous diurnal study (Bizzarro, et al. 1992). It was conducted from 2300 to 0500 on 29 February 1992.

RESULTS (JJB)

Urchin grazing was significantly higher at the rear zone (site 2) than at either the reef flat (site 3) or the lagoon (site 1; $\chi^2=11.3$, $p < 0.005$; Table 1).

Table 1. Contingency table for numbers of leaves grazed by urchins at each site.

	Site 1	Site 2	Site 3	Total
#leaves grazed	6	21	11	38
#leaves not grazed	51	38	48	137
Total	57	59	59	175

Table 2. Contingency table for total numbers of leaves grazed by urchins (day and night).

	Day	Night	Total
# leaves grazed	16	38	54
#leaves not grazed	155	137	292
Total	171	175	346

Table 3. Contingency table for total number of leaves experiencing herbivory (day and night).

	Day	Night	Total
# leaves w/bites	127	38	165
# leaves w/o bites	44	137	181
Total	171	175	346

In a diel comparison, herbivory by urchins was more intense at night (Table 2; $\chi^2=10.1$, $p<0.005$), while total herbivory was higher during the day ($\chi^2=95.8$, $p<0.005$). Parrotfish and urchins accounted for total herbivory during the day while only urchin grazing was observed at night.

DISCUSSION (ABS)

Our previous study of herbivory on *Thalassia testudinum* showed that urchin grazing intensity is highest on the reef flat during the day. The present study found that at night, however, the highest levels of grazing occur in the rear zone followed by the lagoon. *Tripneustes ventricosus* and *Lytechinus variegatus* actively feed in

the rear zone at night while during the day they are much less active and tend to congregate near the reef flat (pers. obs.). Thus, it appears as if these species are making nocturnal migrations, of ~25m, off of the reef flat and into the dense surrounding patches of turtle grass to feed. Most likely, this diel migration pattern evolved in response to the threat from diurnal visual predators. During the day this threat is probably lower on the reef flat than in the rear zone, where there are fewer available shelter sites. The abundant patches of *Thalassia* in the rear zone provide energetic benefits that apparently outweigh the costs of locomotion and the higher risk of predation.

Urchin grazing intensity was significantly higher at night than during the day. This pattern of behavior probably evolved in response to diurnal visual predators, similar to the diel migration pattern.

Our night samples provided no evidence of nocturnal fish herbivory. Thus, despite increased urchin grazing, overall herbivory was substantially less at night.