Continuous *in-situ* observation of reef-associated Echinodermata

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Echinoderms represent an ecologically important group of reef-associated invertebrates that could profoundly affect reef structures in both tropical and subtropical waters (Tokeshi and Tanaka 2010; Tokeshi and Daud 2011). The direct observation of echinoderm movements and behaviour under the natural setting, however, can be problematic as the majority of these organisms are slow-moving most of the time and the conditions under which direct observation is possible are inevitably limited in reef environments with variable currents and often complex habitat topography (Tokeshi and Arakaki 2011). Consequently, quantitative data on the diel behaviour of reef-associated organisms are remarkably scarce to date. To rectify this situation, we have been developing a system of *in-situ* continuous field observation (time-interval photography of minimum 24h duration) of reef-associated organisms for gathering information on their diel behaviour. For echinoderms we have found a recording interval of 5–10 minutes most convenient for efficient detection of movement patterns on a small spatial scale. For example, *Diadema setosum* (Fig. 1) demonstrated a conspicuous nocturnal behaviour, being active throughout night hours (from 20:00–21:00 to 4:00–5:00 in May–June at the study site in Amakusa), moving at an average speed of 0.2–1.8 cm min$^{-1}$ within a patch of rock surface enclosed by scleractinian corals. Most of the time *D. setosum* was observed to graze along the edges of acroporan colonies. One *D. setosum* individual visited the same patch on two consecutive nights, while on the third it made an excursion to another patch. During daytime *D. setosum* was immobile underneath an acroporan table coral. This implies that rock surfaces adjacent to Acroporid corals which *D. setosum* can use as a shelter tend to be regularly grazed by the echinoids that undertake nightly excursions, thereby preventing the settlement of sessile organisms such as algae and other corals which might compete with existing Acroporids. In contrast,

![Fig. 1](image1) *Diadema setosum* grazing on a patch of rock surface bounded by acroporan colonies at 03:59 on 23 May 2011 in Amakusa

![Fig. 2](image2) A comatulid (Mariametridae) species (to the right of the number tag) emerging from underneath to the upper surface of an acroporan colony at 19:09 on 21 May 2011. The same individual is visible in Fig. 1
an individual of *Anthocidaris crassispina* was observed to remain within c. 5 cm radius at the edge of an acroporid colony for three consecutive days. Our study has also revealed that a comatulid (Mariametridae, probably *Stephanometra aff. spicata*) reacts precisely to day-night changes in light level by emerging on the upper-side of an acroporid colony at dusk (Fig. 2) and disappearing underneath the same colony at dawn.

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**References**


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