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PG-13 Onset of symbiosis in coral larvae: do the larvae acquire symbionts from the natural environments?

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The establishment of symbiosis in early developmental stages is important for reef-building corals to ensure photosynthetically derived nutrition. Some coral eggs or planulae receive symbiotic dinoflagellates (*Symbiodinium* spp.) directly from their parents, while others acquire them from the environment. Acquisition of symbionts in latter larvae usually occurs after they metamorphose into polyps, although some of them can acquire symbionts in experimental conditions. However, the detailed process of onset of symbiosis in early stage of corals has received little attention so far. We have been studying the onset of symbiosis in acroporid larvae and found they acquire symbionts from 5 or 6 days after fertilization when the oral pore and coelenteron develop (Harii et al. in prep.). In this study, we extend our work on symbiosis to compare onset of symbiosis in different species and to know whether the acquisition of symbionts by the larvae occurs under natural conditions or not. We examined 1) the uptake of symbionts by larvae in the coral *Ctenactis echinata*, which has smaller eggs than *Acropora*, under the laboratory condition and 2) symbiont acquisition in the *A. tenuis* larvae kept in running seawater tanks and on the reef flat (2m depth) in Sesoko Is, Okinawa. We identified *Symbiodinium* spp. clade using nuclear molecular marker (28SrDNA). Our results show that the uptake of symbionts occurred 2 days after spawning in *C. echinata* which is 3 or 4 days earlier than acroporid corals. The difference between the species might be due to differences in the developmental stages of larvae. In the second experiments, the larvae of *A. tenuis* took *Symbiodinium*-like dinoflagellates both in the tanks and the reef flat conditions (3 and 33 cells per larva in average, respectively). The algal density in the larvae which was kept in the reef flat increased after 2 weeks laboratory incubations (160 cells per larva in average). This suggests that the larvae acquired *Symbiodinium* spp. and established their symbiosis. The band patterns of PCR-RFLP showed that the algae were *Symbiodinium* (Clade C) which was the same clade as adult colonies. We suggest that larvae of many coral species have the potential to acquire symbionts during the planktonic phase and the symbiotic dinoflagellate may provide energy to the larvae and may allow higher larval survivorship.