ABSTRACT

Algal Symbiosis in Sea Anemones of the Genus Bunodeopsis

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This research concerns the symbioses between two species of the sea anemone genus Bunodeopsis, B. antilliensis and B. globulifera, and their algal endosymbionts. B. globulifera occurs at greater depth than B. antilliensis and therefore experiences lower irradiances. Bunodeopsis has vesicles, protrusions of the lower column, containing high densities of symbiotic algae. The vesicles are significantly larger, containing a higher proportion of the symbiont population, in B. antilliensis than B. globulifera. The symbionts of Bunodeopsis are closely similar to Symbiodinium microadriaticum in their cell size, cell division cycles and ultrastructural characteristics. The regular expulsion of algal pellets does not make a significant contribution to regulation of the symbiont population.

Expansion/ contraction behaviour of the anemones is directly linked to ambient irradiance and symbiont distribution and enhances symbiont exposure to light. Under illumination, B. antilliensis contracts, maximising vesicle inflation, whereas B. globulifera remains expanded. In darkness both species have expanded tentacles for heterotrophic feeding.

Photoadaptive responses to habitat irradiance are demonstrated by variation in symbiont chlorophyll content and photosynthesis versus irradiance relationships. Symbionts from B. globulifera have a higher chlorophyll a content and ratio of chlorophylls $a:c_2$ than from B. antilliensis. Localised responses within the body are shown by symbionts from B. globulifera, as those from the base have a higher chlorophyll a content than from the upper column. Also, B. antilliensis has a higher photosynthetic capacity and saturation irradiance than B. globulifera. Carbon budgets suggest that both species of Bunodeopsis are potentially autotrophic with respect to carbon available for animal respiration and that a similar contribution is made by symbiont autotrophy to their nutritional requirements.