

Evidence of cyanobacteria-like endosymbionts in Acroporid corals from the Great Barrier Reef

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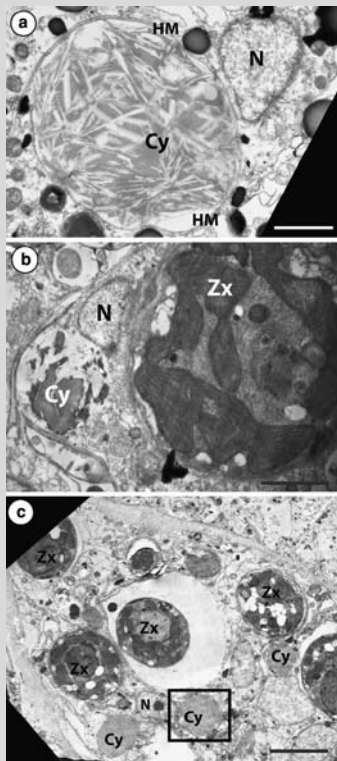


Fig. 1 Representative transmission electron microscopy photographs, (a) intracellular cyanobacteria-like cell enclosed in a host membrane (scale bar = 1 µm), (b) *Symbiodinium* and cyanobacteria-like structure within a single host cell (scale bar = 2 µm), (c) overview of *Symbiodinium* and cyanobacteria-like cells in the host gastroderm (scale bar = 4 µm). Key: cyanobacteria-like structures (Cy), host nucleus (N), *Symbiodinium* (Zx), host membrane (HM)

The coral host is associated with a diverse microbial community, including zooxanthellae, bacteria, protists, fungi and algae (Rohwer et al. 2002). Lesser et al. (2004) describe a novel cyanobacterial endosymbiont in the Caribbean coral *Montastraea cavernosa* capable of nitrogen fixation. Evidence is now presented from transmission electron microscopy of similar cyanobacteria-like cells from two species of tabular Acroporid (*Acropora hyacinthus* and *Acropora cytherea*) from the Heron and Wistari Reefs (southern Great Barrier Reef).

These intracellular cyanobacteria-like structures were characterised by irregular layered thylakoid membranes (Fig. 1a), and bear remarkable similarity to those described by Lesser et al. (2004). The cells were consistent in size (1–4 µm) and enclosed in an apparent host membrane (Fig. 1a). In several samples, cyanobacteria-like structures were observed adjacent to *Symbiodinium* within a single host cell (Fig. 1b) and were often in high densities throughout the gastrodermal tissues (Fig. 1c). The implications of such high densities and close association of these cyanobacteria-like structures and *Symbiodinium* are considerable, considering that *Symbiodinium* preferentially uptake the products of nitrogen fixation over host tissues (Lesser et al. 2007).

These cyanobacteria-like cells were observed in 14 out of 16 samples collected in both summer (March) and winter (July) months of 2004, implying temporal stability of the association. These observations expand upon previous reports of intracellular cyanobacteria from the Caribbean region (Lesser et al. 2004) and suggest that this association may be more widespread than previously assumed. Further research is currently being conducted to determine the taxonomic identity of these structures and the implications for intracellular nitrogen fixation in Indo-Pacific Acroporids.

References

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Reef sites

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