Corals through the light: phylogenetics, functional diversity and adaptive strategies of coral-symbiont associations over a large depth range

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Figure 1.1 General structure of the coral polyp and underlying skeleton (after Veron 2000). Note the endocytic symbionts (gold) in the gastrodermis layer.
Figure 1.3 *Madracis* spp. planulae under increasing magnification (from left to right). Note a brown ring consisting of symbiont cells on the oral end of the two uppermost planulae, evidence for vertical symbiont transmission mode between coral generations. Maximum diameter is c. 400 μm (pictures by P. Bongaerts).
Figure 1.6 *Madracis* spp. The six currently recognized photosymbiotic morphospecies in the Caribbean region. (a) *M. pharensis*, (b) *M. senaria*, (c) *M. decactis*, (d) *M. mirabilis*, (e) *M. carmabi*, (f) *M. formosa*. Species distinction is based on colony shape and skeletal septal numbers (see inserts representing corallites).
Figure 2.6 Symbiodinium spp. population ITS2-diversity for six Madracis morphospecies, four depths and two within-colony positions. For each species-depth combination, graphs represent: (left) horizontal top colony position ($\alpha = 0^\circ$) and (right) seaward-facing vertical side colony position ($\alpha = 90^\circ$). Note that at 40 m only the top positions ($\alpha = 0^\circ$) were sampled. Number of replicates (number of colonies) is shown over each data point. Black bars represent percentage of similarity between $\alpha = 0^\circ$ and $\alpha = 90^\circ$ for colonies sampled on both positions. Presence of two symbiont types within the same sample represented by mixed pattern of respective colours.
Figure 4.1 *Madracis pharensis* colour morphs included in the study: (a, b) – brown morph; (c, d) – purple morph; (e, f) – green morph. Note that Vermeij *et al.* (2002) identified 25 colour morphs based on colour variation of several polyp features. The present classification, which is less detailed, is based on visual observations of the overall colour of the coenosarc. Present green morph corresponds to green polyp colour morphs in Vermeij *et al.* (2002); present brown morph corresponds to brown polyp morphs and part of the grey polyp morphs in Vermeij *et al.* (2002) (see insert a for a brown colony with grey polyps); present purple colour morph corresponds to part of the grey polyp morphs in Vermeij *et al.* (2002) (see insert c for a purple colony with grey polyps).
Figure 6.2 Maximum likelihood trees of the Madracis genus for (a) the mitochondrial \( \text{nad5} \) intron, (b) the nuclear \( \text{ATPS_\alpha} \) intron and (c) the nuclear \( \text{SRP54} \) intron. Values above the branches are bootstrap values for 1000, 500 and 500 replicates, respectively. Sequence codes refer to: Species\text{a} \text{Depth}\text{Location}\text{b} \text{Sample}\text{c}.

\text{aSpecies codes: } Mmir, M. mirabilis; Mfor, M. formosa; Mdec, M. decactis; Msen, M. senaria; Mpha, M. pharensis; Mmyr, M. myriaster; Ssid, Siderastrea siderea.

\text{bLocation codes: Bu1, Buoy One (Curaçao); Kal, Playa Kalki (Curaçao); Ber, Bermuda; Aru, Aruba; Tri, Trinidad & Tobago. Location not indicated for } \text{ATPS_\alpha} \text{ and } \text{SRP54} \text{ topologies (all samples from Buoy One, Curaçao).}

\text{cSample codes as in Table 6.1 ("a" and "b" added to distinguish alleles in heterozygotes).}
Figure 6.2 (continued)
Figure 6.2 (continued)
Figure 7.1 Measuring photosynthetic activity of the *Madracis mirabilis* coral transplants fixed at the 10 m transplantation rack, at CARMABI Buoy One, Curaçao.