

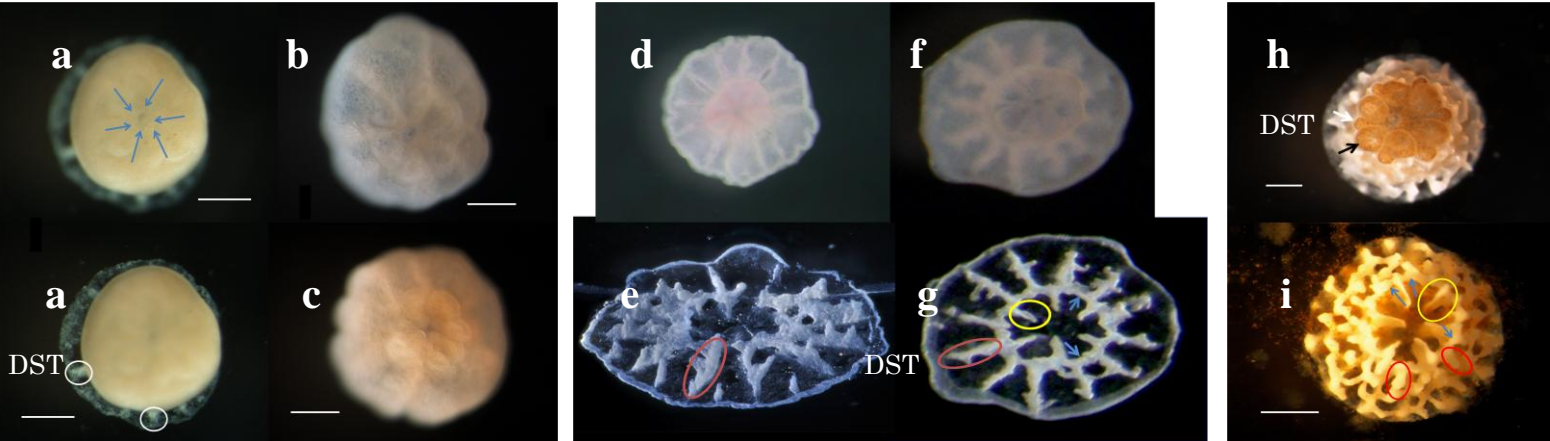
Polyp Skeleton Calcification for Polyp-Algae Symbiosis

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Target: Coral colony is one of the optimization factors of marine ecology. Since the coral colony of *Acropora tenuis* constitutes of coral polyps and skeletons, the study on the relationship between single polyp growth and polyp skeleton formation is relevant and essential for coral colony.

Results:



Scale : 200µm for a-c and h, and 250µm for i

Single Polyp Growth and Polyp Skeleton Formation

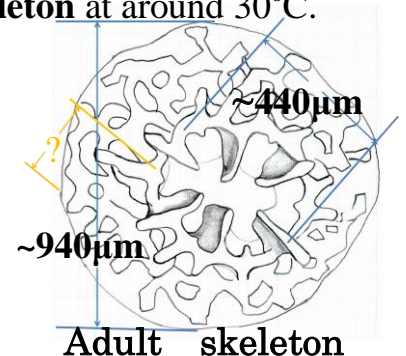
- I) A primary polyp (a) just after the **settlement** of planula larvae in culture dish.
- II) At the first skeletongenetic stage (b-e) the **12 calcium carbonate-made branches** (○ in e, g) were built up beneath the 12 mesenterial septa (d) on a basal disk substrate (DST in, e, g-i) made of CaCO₃-including secretion from a primary polyp (a).
- III) At the second skeletongenetic stage (f) the sclerosepta arose from the DST, with their final ends fixed by generating a CaCO₃-made **ring** (pointed out by blue arrows in g, i).
- IV) At the third stage (g) a sheet of **6 vertical branches** (○ in g, i) were built up from the ring towards the central axis of coelenteron to fix a container of a living polyp.
- V) A profusion of algae-capturing living polyp (h) with mature and immature tentacles (black and white arrows), was tightly secured in a **6 spaces-separated container**.
- VI) The artful skeleton (i) of adult polyp after its expulsion from a **skeleton** at around 30°C.

Material energetic controls carbonate chemistry and the reversible calcification process of $\text{CaCO}_3 + \text{H}^+ \leftrightarrow \text{HCO}_3^- + \text{Ca}^{2+}$.

The coevolutional of coral polyps and symbiotic algae, and the calcification are essentially physiological.

Ichikawa K. (2007), Chemistry European J., **13**.10176-10181.

Ichikawa K. (2010), European J. Chemistry, **1** (4) 246-251.



Adult skeleton

Conclusions and Prospect: A coral polyp created a coral polyp skeleton, during which a profusion of unicellular algae were accumulated in the host polyp (h). The controlled growth process of single polyp produced its adult artful skeleton (i).