Branching morphogenesis of *Cladonema* medusa tentacles

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The interaction between the epithelial cell layer and its underlying mesoderm-derived tissues plays a critical role in shaping the tissues/organs in many triploblastic animals. Inductive signals, such as receptor tyrosine kinase (RTK) signaling, act on cells of the epithelium to initiate 3-dimensional changes. However, how tissues are shaped in a diploblastic animal with no mesoderm remains largely unknown. In this study, the jellyfish *Cladonema pacificum* was used to investigate branch formation. Its medusa tentacles undergo branching, which increases the epithelial surface area carrying nematocytes, thereby maximizing prey capture. It was found that new branches were successively created one after another at the proximal region of the main tentacle while the main tentacle grows. At the new branching sites, hydrozoan-specific pluripotent stem cells, namely interstitial cells (I-cells), were periodically accumulated. During branch elongation, the accumulated I-cells remained located at the tip of the growing branches, while proliferating and leaving behind their differentiating descendant cells. Finally, fibroblast growth factor (FGF) signaling was found to regulate branch elongation. This study highlights an essential role for I-cells in the tissue-shaping morphogenesis of a diploblastic animal. In addition, it identifies patterning through repeated applications of a single rule, a mechanism involving RTK signaling and cell proliferative activity at the branch tip for branching morphogenesis apparently conserved across the animal kingdom.

Fujiki, A., Hou, S., Nakamoto, A., and Kumano, G. (2019). Branching pattern and morphogenesis of medusa tentacles in the jellyfish *Cladonema pacificum* (Hydrozoa, Cnidaria). Zoological Lett. 5: 12.

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