Branching morphogenesis of medusa tentacles in the jellyfish species *Cladonema pacificum*

Shiting Hou[1], Akiyo Fujiki[1], Saki Shibata[1], Ayaki Nakamoto[1,2], Gaku Kumano[1]

[1] Asamushi Research Center for Marine Biology, Graduate School of Life Sciences, Tohoku Universtiy
[2] Faculty of Pharmaceutical Sciences, Aomori University

Branching of tissues/organs increases their epithelial surface area to maximize their function in association with their environment. In well-studied branching model animals, such as mammals and *Drosophila*, branching is known as a common mechanism to rely on the interaction between the epithelial cell layer and its underlying mesoderm. However, it remains largely unknown how tissues/organs become branched in other animals, in particular, those mesoderm-free diploblastic animals. In this study, the jellyfish *Cladonema pacificum* was used to investigate branch formation. It was found in *C. pacificum* medusa tentacles 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 repetitively 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. This study highlights an essential role for I-cells in branching morphogenesis of a diploblastic animal. In addition, it identifies patterning through repeated applications of a single rule as a conserved mechanism across the animal kingdom, a possible mechanism of which will be presented in this talk.