部門公開セミナー

共催：新学術領域研究「配偶子産生制御」

Developmental plasticity: A broad utilization of germ line molecules in multipotent cells of the sea urchin

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The sea urchin is a member of echinoderms, a close relative to chordates, and has a long history as an experimental animal. In this talk, I will first give a brief overview of recent research activities in our sea urchin community, including studies in Gene regulatory network (GRN), Neurogenesis, Ecology and Evolution. Additionally, I will go over recent findings made in the Wessel lab as a group, which includes Nanos regulation in germline, post transcriptional mechanisms for germ line segregation, and evolutionary modifications of germ line among echinoderms, and cADPR and NAADP Ca2+ signaling and the role of ARCs and TPCs in fertilization. Followed by this introduction, I will introduce a summary of my past and ongoing researches in multipotent cell regulation of the sea urchin.

Echinoderms are classically known for having remarkable regulative capabilities. Adults can regenerate entire segments, including arms, digestive organs, gonads, and even a germ line. Similarly, some cells of the embryo maintain multipotency until late in development. Cells from other lineages can even transfate and compensate for a missing part of the embryo. The mechanisms that regulate this amazing plasticity of echinoderm cells are not yet clear, but we recently found that transient use of the classic germ line molecules may play a critical role in facilitating cellular multipotency and in regeneration tissues including the germ line. In this talk, I focus on a conserved germ line molecule, Vasa, and demonstrate that in addition to its presence in the germ line, it is transiently expressed during early somatic cell cycle progression, and regulates general protein synthesis for embryogenesis, developmental re-programming, and/or regeneration. From our results, Vasa appears to have broader functional roles in mRNA regulation, and I will discuss how this broader utilization of germ line molecule(s) in the somatic lineage may directly contribute to developmental potential of the cells.

Relevant references:

Yajima, M. and Wessel, G.M. (2011). The DEAD-box RNA helicase Vasa functions in embryonic mitotic progression in the sea urchin. Development, 138, 2217-2222.

Yajima, M. and Wessel, G.M. (2011). Small micromeres contribute to the germline in the sea urchin. Development, 138, 237-243.

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