BDR SEMINAR in Kobe

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Monday, December 09, 2019

14:30-15:40, 7F Seminar Room, DB Building A

Avian pigment pattern formation by a combination of two patterning mechanisms (Masafumi Inaba)

The pigment patterns on animal skin are excellent models to study the mechanism of biological self-organization. Theoretical approaches developed mathematical models of pigment patterning and molecular genetics has brought progress, however, the responsible cellular mechanism is not fully understood. I examined embryonic development of Japanese quail, which has black and yellow alternating stripes along their head-tail axis. Transplanted melanocytes could form periodic pigment patterns cell-autonomously, and developing melanocytes directly connect with each other via filopodia to form a network in culture and in vivo. This melanocyte network is reminiscent of zebrafish pigment cell networks, where connexin is implicated in stripe formation via genetic studies. My data collectively suggest that both melanocyte periodic patterning and agouti longitudinal stripe patterning are required for making Japanese quail pigment pattern. Such combinatory mechanisms may stabilize the pattern formation and allow birds to give rise to extraordinary variety of color patterns. Reference: Inaba M, et al. Instructive role of melanocytes during pigment pattern formation of the avian skin. PNAS 116(14):6884-6890 (2019).

The Actin-Keratin linker proteins direct microridge morphogenesis on zebrafish periderm cells (Yasuko Inaba)

Cell shapes are determined by the cytoskeleton. Both microtubules and actin filaments have well known roles in the morphogenesis of cellular protrusions, like cilia and microvilli, but the third major class of cytoskeletal filaments, intermediate filaments (IFs), are not known to play direct roles in morphogenesis. To investigate potential roles for IFs in morphogenesis, I am investigating microridges, beautiful actin-based structures that protrude from the apical surfaces of mucosal epithelial cells and form fingerprint-like patterns. With RNAseq, I have identified several genes highly expressed in periderm cells, including Envoplakin (Evpl), Periplakin (Ppl) and several Keratins. Surprisingly, Structured Illumination Microscopy revealed that keratins are located not only below, but also within microridges, suggesting that keratins play a direct role in their morphogenesis. My current results suggest that Plakins link IFs with F-actin to dictate microridge length, and that IFs and Plakin cytolinkers have new roles in epithelial morphogenesis. Reference: Inaba Y, et al. unpublished.

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