



第 1 回 2013 年 10 月 11 日 (金) 14:50 ~ 16:30

Turing pattern formation in biological systems

Shigeru Kondo / 近藤 滋

Faculty of Frontier Biosciences

Osaka University

大阪大学大学院 生命機能研究科

Using the pigmentation pattern of zebrafish as the experimental system, we have been studying the mechanism of skin pattern formation. Recent findings of the cellular interactions among the two types of pigment cells, melanophores and xanthophores, are uncovering the cellular and molecular mechanisms. With these data, we now can answer the crucial question, “Is this a Turing mechanism or not?” We have identified the molecular basis of three interactions between the pigment cells. All of them are transferred at the tip of the dendrites of cells. In spite of the expectation of many theoretical biologists, there is no diffusion of the chemicals involved in the patterning mechanism. However, we also found that the lengths of the dendrites are different among the interactions, which makes it possible to generate the conditions of Turing pattern formation, “local positive feedback and long range negative feedback”. Although it does not contain “diffusion”, it may be appropriate to be called as a Turing mechanism.

Keywords: pattern formation, zebrafish, skin marking, Alan Turing, reaction-diffusion system