

Control of embryogenesis of ascidians by localized mRNAs and embryonic induction

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【 Outline of survey 】

Eggs of the ascidian (*Halocynthia roretzi*), which is a lower chordate, develop into tadpole larvae. Fertilized eggs start to divide to generate various yet restricted types of cell, such as epidermis, nervous system, notochord, muscle, mesenchyme, and endoderm. In this project, we aim to analyze how embryonic cell fate is specified in early embryos. We focus on two issues. One is localized maternal factors in fertilized egg, especially, localized maternal mRNAs. The other is embryonic induction that is initiated as early as the 32-cell stage. Factors that control the way of response to signaling molecules, and mechanisms of asymmetric cell division that is promoted by directed signaling will be analysed. To understand the mechanisms of early embryogenesis, we are going to use micromanipulative, molecular biological, and cell biological techniques, that involve cytoplasmic transfer, blastomere isolation and recombination, overexpression and knockdown of gene expression, and microscopic imaging.

【 Expected results 】

Embryogenesis of ascidians has been analysed for a long time, and recently ascidian becomes to be recognized as a model system in developmental biology field because of accomplishment of cell lineage description, state of art in understanding of developmental mechanisms, genome project, and extensive cDNA project. In this project, detailed analysis of cell fate specification by maternal factors and embryonic induction would contribute to enrichment of ascidian as a model system, as well as further understanding of principles of development of chordates and of evolutionary processes to vertebrates.

【 References by the principal researcher 】

Nishida, H., and Sawada, K. *macho-1* encodes localized mRNA in ascidian eggs that specifies muscle fate during embryogenesis. **Nature** 409, 724-729 (2001)

Nishida, H. Patterning the marginal zone of early ascidian embryos: Localized maternal mRNA and inductive interactions. **BioEssays** 24, 613-624 (2002)

【 Term of project 】 FY 2004 - 2008

【 Budget allocation 】 80,500,000 yen

【 Homepage address 】 http://www.bio.sci.osaka-u.ac.jp/bio_web/lab_page/nishida/index.html