CDB SEMINAR

Date:	Monday, October 3
Time:	3:30 P.M.～5:30 P.M.
Place:	1F Auditorium of Building C, CDB

1. Speaker: **Mary Mullins**

< Department of Cell and Developmental Biology
University of Pennsylvania, School of Medicine >

Title: "Maternal effects and the BMPs of vertebrate development"

Summary:

A Bone Morphogenetic Protein (BMP) signaling pathway patterns the dorsal-ventral embryonic axis in vertebrates. Our BMP signaling component mutants in the zebrafish provide molecular-genetic means to study the role of BMP signaling in establishing the different cell fates along the dorsal-ventral axis in vertebrates. Our studies implicate a low BMP signaling level as part of a gastrula BMP signaling gradient to be critical in specifying the neural crest and intermediate-positioned interneurons of the neural tube. These studies, along with the temporal action of BMP signaling in dorsoventral patterning, will be discussed.

Vertebrate embryos depend not only on zygotic gene products produced by the embryo itself, but on factors that are provided by the mother and are deposited into the egg for later embryonic development. In contrast to invertebrates, little is known about the nature and genetic requirements of these factors in vertebrates. To understand the molecular control played by maternal factors in vertebrate development and identify and study key genes involved, we are performing a large-scale maternal-effect mutant screen in the zebrafish. We have identified over 100 maternal-effect mutants with specific defects in egg development, egg activation, blastodisc formation, egg and embryonic polarity, cell cleavage, the mid-blastula transition, embryonic morphogenesis, and body plan formation. Most mutants exhibit unique phenotypes, not previously observed in zygotic mutants, indicating specific maternal controls in vertebrate development. Molecular-genetic studies of a subset of these mutants will be discussed.

2. Speaker: **Michael Granato**

< Department of Cell and Developmental Biology
University of Pennsylvania, School of Medicine >

Title: "Motor axon guidance and motor behavior regulation in the zebrafish"

Summary:

In the vertebrate embryo, different populations of spinal motor neurons initially share common paths, and at choice points diverge onto a cell type specific path. The zebrafish embryo is an excellent model system in which to study pathway selection of spinal motor neurons. As in other vertebrates, zebrafish spinal motor neurons have distinct identities and targets. Each somitic hemisegment is typically innervated by three pioneering motor neurons. On their way towards their synaptic targets, their growth cones encounter choice points, where they are confronted with trajectory choices. We have used a genetic approach to identify genes critical for motor axon guidance. We now have cloned several of the mutants and their phenotypic and molecular analysis reveals that 1. a distinct group of mesodermal cells provides multiple cues to migrating motor axons; 2. guidance of motor axons into the periphery requires carbohydrate modifications along the future axonal path; 3. receptor tyrosine kinase signaling in mesodermal cells causes changes in the extracellular environment and enables motor growth cones to select their path at choice points.

The startle response is a very fast, whole body reaction to sudden auditory, tactile or vestibular stimuli. In higher vertebrates, acoustic stimuli reproducibly elicit a startle response whose latency and magnitude are easily quantified. This startle response behavior is modulated by environmental context. For example, the display of a sub-threshold stimulus (i.e. a stimulus too weak to elicit a response on its own) just prior to a startling stimulus, suppresses the magnitude of the startle response. This phenomenon of prepulse inhibition has been described in pigeon, mice and human. In human, prepulse inhibition is impaired in several cognitive disorders including schizophrenia, and returns after administration of antipsychotic drugs. Yet, only little is known about the genes and neural circuits underlying prepulse inhibition. We have used zebrafish larvae to ask if they exhibit prepulse inhibition. Our data show that larval zebrafish is an exquisite system in which to study the neural circuits underlying the regulation of defined motor behaviors.

Host **Masahiko Hibi** Vertebrate Axis Formation, CDB
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