CDB SEMINAR

Date:	Tuesday, January 11
Time:	16:00 P.M. - 18:00 P.M.
Place:	7F Conference Room of Building A, CDB

17:00-18:00

Speaker2: **Carrie Cowan**

< Max Planck Institute of Molecular Cell Biology and Genetics, Dresden >

Title: "Establishing cell polarity in the one-cell *C. elegans* embryo"

Summary:

Three steps are required for a successful asymmetric cell division. First, a polarity cue determines the position of an axis. Second, the polarity axis is established by the formation of cortical domains. Finally, cortical polarity is communicated to the downstream cytoskeleton in order to polarize the cytoplasm. We are interested in understanding how asymmetric division of the one-celled *C. elegans* embryo is achieved. *C. elegans* oocytes are apolar and the newly fertilized embryo polarizes rapidly along one axis defined by the sperm-supplied centrosome. The establishment of this first polarity axis is revealed by the asymmetric distribution of PAR proteins and cortical activity in one-celled embryos. The molecular mechanisms of both centrosome-cortex signaling and cortical domain formation remain unknown. We have taken several approaches to understand how *C. elegans* embryos establish asymmetry. In a genetic approach, approximately 150 genes were depleted by RNAi and analyzed for their roles in polarity establishment using time-lapse imaging of GFP::PAR-2. The phenotypic categories arising from the screen reveal several important aspects of polarity establishment, including thresholds of contractility in the embryo and temporal regulation of axis establishment. In an effort to understand the physical changes in the cortex during polarity establishment, we have used micromanipulations to disrupt the cortex. Cortical ablations support a model in which breaking a tensile meshwork can provide the force required to establish distinct cortical domains and drive cortical flow.

ref.) *Nature*;431:92-6 (2004).
Cowan CR, Hyman AA. "Centrosomes direct cell polarity independently of microtubule assembly in C. elegans embryos"