QSB/BEST Research Seminar Series
Presents

_Ciona:_ A Model Chordate for Embryonic and Regenerative Morphogenesis

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**ABSTRACT:** Research in my laboratory focuses on the mechanisms of animal morphogenesis using a unique and emerging model organism, the tunicate. Tunicates are marine invertebrate chordates, and they occupy the unique position of being the closest extant relative of the vertebrates. Although there are several thousand tunicate species, only a handful are used experimentally. The most widely studied tunicate is the ascidian _Ciona_. As chordates, the tunicates and vertebrates share a common body plan that incorporates a set of organs which defines the chordates, including the notochord and the dorsal/hollow central nervous system. What sets the tunicates apart from the vertebrates is their relative simplicity. The free-swimming _Ciona_ larva is composed of only 2,000 cells. The larval organs and tissues typically contain only dozens to hundreds of cells. Equivalently-staged vertebrate embryos have more than an order of magnitude more cells. This reduced cellular complexity has important implications for developing a systems-level understanding of morphogenesis. Most simply, it allows us to image, manipulate, and model the morphogenesis at a whole-organ or whole-embryo level. For example, the _Ciona_ neural plate and notochord each consist of only 40 cells at the neurula stage. Tunicate genomes are also smaller and less complex than vertebrate genomes. _Ciona_ is predicted to have a about half the number of genes as humans (about 15,000; which is similar to such model organisms as _Drosophila_ and _C. elegans_), while having only about 5% the amount of genomic DNA (=180 Mb). Thus tunicates share many features with model organisms such as _C. elegans_ in terms of simplicity, yet have a chordate body plan.

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