

Dr. Kadlec  
Senior Research Projects 2009

### **Egf Receptor Signaling and Genetics in *Drosophila* Development**

Broadly speaking, I am interested in cellular signaling pathways and the roles they play both in normal development and in abnormal situations such as cancer. Research in my laboratory focuses on a specific signaling pathway, the epidermal growth factor receptor (Egfr) pathway, and its role in development, with a particular interest in the development of the fruit fly (*Drosophila melanogaster*) egg. In *Drosophila*, the Egfr is involved in many signaling events important at various stages of development. Understanding the regulation and the targets of this pathway in a model organism such as fruit flies can not only help us to understand fly development, but also give us insight into the workings of similar pathways in “higher” organisms (e.g. mammals), where unregulated signaling can contribute to various types of cancer. There are several related projects in the lab, both on-going and new, all of which investigate the general theme of Egfr signaling in *Drosophila* development using a variety of molecular, cell biological, and genetic techniques. The following are brief descriptions of the main current project area in the lab, and a project we hope to initiate in the future (in all projects in the lab, students would gain experience in methods and strategies of developmental genetics.):

- 1) **Analysis of Egfr signaling target genes in the *Drosophila* ovary.** We have identified a number of potential downstream targets of Egfr signaling during egg development (i.e. genes whose expression is up- or down-regulated in response to activation of the receptor in the ovary), and are studying the expression and function of these genes. Techniques used may include DNA isolation, PCR/RT-PCR, *in vitro* transcription, *in situ* hybridization, genetic crosses, targeted RNA interference and analysis of mutant phenotypes (e.g. by microscopic examination of eggshells).
- 2) **Examination of the evolution of Egfr pathway targets.** A major area of research in development and genetics is “evo-devo,” or the evolution of developmental processes. We are interested in the identification, cloning and study of homologues of possible Egfr pathway targets in other insect species. This work would involve using available genome project databases to find genes, cloning genes of interest, and studying where/when the genes are expressed.