Mentor Interest Handout

Dr. Renee Dickie

This project investigates the role of blood vessel formation in limb regeneration. Techniques include small animal anesthesia and minor surgery, chemical genetic inhibition of developmental signaling pathways, immunohistochemistry and other histological techniques, and image analysis.

Dr. Matt Hemm

My lab is focused on identifying and functionally characterizing proteins containing fifty or fewer amino acids. The prevalence and physiological function of such small proteins are poorly understood in any organism. To address these biological questions, we are using the model bacterium *Escherichia coli*. We have recently found that *E. coli* contains many more small proteins than had been previously predicted. Further analysis has shown that many of these proteins are expressed under specific environmental conditions, suggesting that they have interesting functions in the cell. Our current goals include continuing to characterize small protein function in *E. coli*, in particular those small proteins that are predicted to span the membrane with a single hydrophobic a-helix. These transmembrane small proteins make up the majority of small proteins identified in *E. coli*, and could be performing a wide range of functions at the membrane. Ultimately, the information we learn about *E. coli* small proteins will provide a foundation for investigating small protein abundance and function in both other bacteria species and eukaryotes.

Dr. Barry Margulies

We are looking for students to work on two projects in our lab, both related to better long-term therapies for genital herpes infections. The first involves creating poly (ethylene-vinyl acetate) rings impregnated with anti-herpetic drugs to be used intravaginally to prevent acquisition of herpes viruses. The second looks at the use of three anti-herpetic drugs and their ability to work together to combat herpes viruses that may be resistant to the first-line drugs being used for standard treatment.

Dr. Chris Oufiero

In terms of research, really this summer I am hoping to, as they say in Finding Nemo, “Just keep swimming.” We have been working on cichlid species that vary in their diet and habitat, comparing various aspects of their swimming performance. If a student were interested in exercise physiology, this would be relevant as we test sprinting abilities, endurance, and energetics. We have also been working on determining muscle fiber type proportions, which would be another aspect of the research. Right now, we are staining, but I am curious about other (genetic) techniques.

Dr. Vonnie Shields

The student(s) would be running two-choice (test versus control) olfactory (smell) experiments using different test parameters using crickets.

Dr. Michelle Snyder

This summer students will be working on projects related to host-pathogen interactions. We are using the social amoeba *Dictyostelium disodium* as a model for mammalian macrophages, and we have identified mutant *E. coli* bacterial strains that have increased survival upon phagocytosis. We will be using various techniques such as Western blot, transcriptional reporter assays, and protein expression assays to characterize mutant genes associated with bacterial evasion of killing upon phagocytosis.

Dr. Jed Weldon

Projects in Dr. Weldon's lab include engineering protein toxins as cancer therapeutics and studying the unique diphthamide amino acid. Basic and advanced techniques in molecular biology, biochemistry, and cell biology are utilized in the lab, including PCR, gel electrophoresis, protein expression and purification, enzyme activity assays, tissue culture, and the design and implementation of CRISPR genetic engineering methods.

Dr. Cynthia Zeller

Developing new methodologies for identifying the origin of DNA obtained as forensic evidence.

Dr. Elana Ehrlich

The ubiquitin proteasome system is frequently co-opted by viruses to target either cellular or viral proteins for proteasome degradation. RTA is the key activator of the switch from latency to lytic replication in Kaposi's sarcoma herpesvirus. In addition to activating lytic gene expression, RTA has intrinsic ubiquitin ligase activity and interacts with members of the ubiquitin proteasome system. Current projects are focused on the interplay between RTA and latent protein vFLIP and their interaction with the cellular Itch/A20 ubiquitin editing complex in the transition between latency and lytic replication.