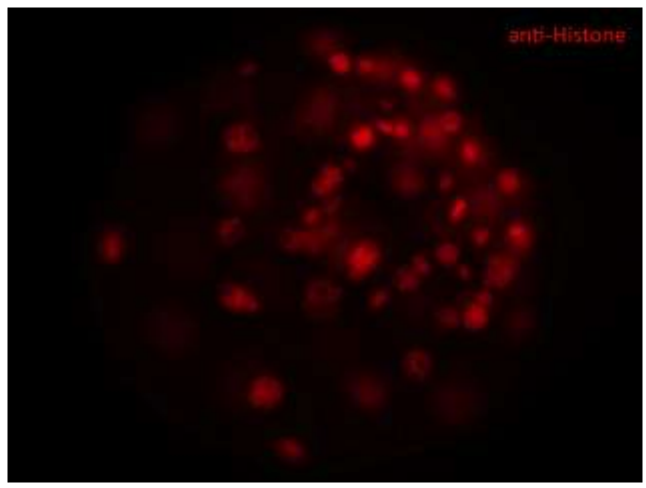
Biology @ Acadia

WATCHING THAT DIET & GETTING ON THOSE GENES: EPIGENETIC MODIFICATIONS AND DEVELOPMENTAL PLASTICITY IN *POLYDORA CORNUTA*

Hart, Corban and Dr. Glenys Gibson
Department of Biology, Acadia University, Wolfville, NS



Many organisms exhibit developmental plasticity, whereby the environment affects development and generates alternate phenotypes in young. The developmental mechanisms that lead to this plasticity are largely unknown. My hypothesis is that epigenetic modifications (e.g., histone methylation) lead to changes in gene transcription during embryonic development that result in alternate phenotypes, and that these modifications are altered by environmental factors such as maternal diet. The spionid polychaete *Polydora cornuta* is an excellent model for this investigation: these worms produce two distinct larval morphs within a single egg capsule. Adelphophagic young are large, quick to develop, and eat non-developing nurse eggs within the capsule, whereas planktotrophic young are small, slow to develop, and eat plankton only after hatching. My objective was to use immunofluorescence to screen for several epigenetic modifications throughout development in the two larval morphs. Furthermore, I tested for changes in epigenetic modifications in young whose mothers were fed diets rich in methyl donors (e.g., folate/vitamin B_{12}). Major results included: (1) detection of histones in the nuclei of all cells of both morphs at all stages of development, validating my method; (2) variation in onset and distribution of some epigenetic modifications (e.g., H3K14 acetylation) among different tissues throughout development, suggesting a link with cell differentiation; (3) earlier onset of one modification (H3K9 monomethylation) in planktotrophic larvae; and (4) hypermonomethylation (e.g., of H3K9) in young produced by females fed enhanced diets. These results indicate that changes in the onset of specific epigenetic modifications (e.g., H3K9 monomethylation) at certain ontogenetic stages may lead to developmental plasticity, and that these modifications may indeed be influenced by maternal diet.

Corban Hart graduated from LRHS in Liverpool NS in 2007. He is currently completing his Honours thesis in his fourth year of Biology at Acadia. Corban has worked as a Teaching Assistant for several labs, including Histology and Developmental Biology, and as a subject tutor for several biology courses. He also works as a writing tutor at the Acadia Writing Centre. Corban has been involved in the S.M.I.L.E. and Student Ambassador programs during his time at Acadia. Corban is continuing his research, and considering his options to pursue grad studies or medicine next year.