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An Investigation into the Genomic Evolution of the Histone Gene Family

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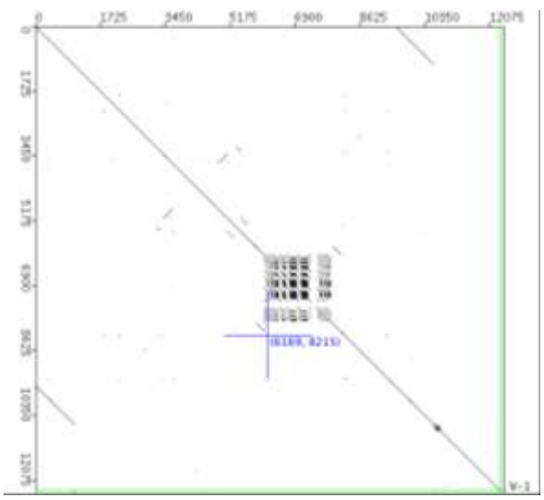

The extremely high level of within and between species similarity of the histone gene family has lead to the proposal that the histone gene family is subject to concerted evolution. Both mechanisms of concerted evolution – unequal crossing over and gene conversion - have been documented to occur, and are understood in molecular detail, but their role in concerted evolution is primarily based on theoretical and/or mathematical models with limited data from actual genome sequence to support them. It is the hypothesis of this research that if unequal crossing over is the main mechanism of concerted evolution, then the edges of the histone gene clusters are more likely to show mutation than the interior of the clusters. The adjacent regions to the histone gene clusters may therefore be informative about the evolutionary history of the histone gene family. This investigation into the genomic evolution of the histone gene family was conducted using genomic analysis of DNA sequence adjacent to the histone gene clusters in *Drosophila melanogaster* and *Drosophila virilis*. DNA sequence was downloaded from the public FlyBase database. Sequence analysis programs were used to search for previously unidentified informative sequence. After several rounds of comparison and analysis, many interesting elements were identified. These include eight previously identified histone pseudogenes that were typed in terms of the class of histone protein they used to code for and two previously unidentified histone pseudogenes. Two transposable elements in the histone gene region, Roo and Pogo, were determined to have led to the separation of the histone gene clusters and to the development of an H4 histone pseudogene. From these results and others, inferences can be made about the evolutionary events that have occurred to generate and maintain the histone gene family.

Kristin Kaupp graduated from Cobequid Educational Centre in Truro, Nova Scotia in 2009. She is currently completing her honours thesis in her 4th year at Acadia and will graduate in May 2013. During her time at Acadia, Kristin has been the recipient of several scholarships including the Dr. Francis M. Archibald Scholarship, the Acadia excellence scholarship and the Acadia residence scholarship. Kristin has held teaching assistant positions in Microbiology, Heredity and Genetics. She has also volunteered as an Acadia ambassador and as a student instructor with the S.M.I.L.E program for the last two years. After graduating from Acadia Kristin plans to continue her education and pursue a career in health care.