Exploring the Role of Zeste in a Case of Elevated Transvection in Drosophila melanogaster

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Transvection is a specific type of gene expression where two chromosomes are involved in the expression of one gene. Transvection can best be explained in the context of cis expression where the enhancer and promoter sequences reside on the same chromosome, with the enhancer activating the promoter. In transvection, the activation occurs in the same manner, but the enhancer and promotor are instead on separate chromosomes. Transvection is generally not as effective as cis expression, resulting in rates of expression that are ~1% of the expression seen in cis expression at the same genomic sites (Bateman et. al, 2012).

A site of particular interest for transvection in the Bateman lab is 96C which was discovered by King et. in 2019. It was found that at seven of eight sites examined for both transvection and cis expression, transvection expression was at most one-tenth of the cis expression at the same site, but at 96C, transvection expression levels were 1.6 times those seen in cis expression.

King et al. explored how chromosomal location affects transvection but in the process of randomly inserting a (GFP (green fluorescent protein) containing p element into sites throughout the D. melanogaster genome, additional genomic changes to 96C occurred. One of these unintended effects was the insertion of Zeste binding sites into the genome at 96C. The presence of Zeste binding sites has been shown to increase transvection when they are present at a gene and therefore may be resulting in the increased transvection seen at 96C (2019). The goal of my project WKLV VXPPHU ZDV WR UHPRYH =HVWH¶V LQIOXHQFH DW & WR L reason why transvection is elevated there.

To remove the effect of the Zeste binding sites, I used two methods. One of these methods was exploring cis expression and transvection in a zeste mutant background, which makes the Zeste proteins nonfunctional, preventing the proteins from binding to the Zeste binding sites. To get the desired flies, I performed crosses and selected for certain genes. I then dissected eye imaginal discs from four varieties of D. melanogaster third instar larvae: cis expression, transvection, zeste mutant background cis expression, and zeste mutant background transvection. Using the dissected eye discs, I performed quantitative visual analysis of GFP expression using confocal microscopy and FIJI. This allowed me to compare relative levels of expression between the four groups. I found that in a zeste mutant background, transvection a

Works Cited

Bateman, J. R., Johnson, J. E., & Locke, M. N. (2012). Comparing Enhancer Action in Cis and in Trans. Genetics, 191(4), 1143±

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