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

Nick Everin, Class of 2025

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 chromotiton 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 assistion, resulting in rates of expression that are 2% of the expression seendis expression at the same genomic sites (Bateman et. al, 2012).

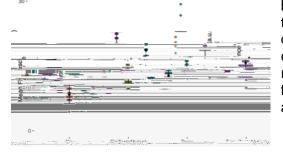


A site of particular interest for transvection in the Bateman lab is 96C which was discovered by King et. in 2019. It was found that at sen of eight sites examined for both transvection and is expression, transvection expression was at most one tenth of thecis expression at the same site, but at 96C, 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 (GFeen fluorescent protein) containing p element into sites throughout the melanogastegenome, 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 transvestion 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, **dutse** methods. One of these methods was exploring is expression and transvection in estemutant background, which makes the Zeste proteins nonfunctional, preventing the proteins from binding to the Zeste binding sites. To get the desired flies, performed cosses and selected for certain genes. I then dissected eye imaginal discs from four varieties of D. melanogaster third instar larvaecis expression transvection zestemutant



background is expression, and estemutant background transvection. Using the issected 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 zestemutant background, transvection appears to decrease, implying that the Zeste binding sites

without having to use a stemutant background. Based on thestemutant background data, I would expect transvection in the Zeste binding site deletion flies to decrease relative to the normal 96C transvection flies.

Faculty Mentor: Professor Jack Bateman

Funded by the Kufe Family Research Fellowship

## Works Cited

Bateman, J. R., Johnson, J. E., & Locke, M. N. (2012). Comparing Enhancer Action in Cis and in Trans. Genetics191(4), 1143±