

Insertion of the GAL4/UAS Binary System in *Aedes aegypti* for the Production of Mutagenic Lines

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The *Aedes aegypti* mosquito is a health threat to the human population as it is a major vector of disease. One method of studying this species and its attraction to human host is through genetic manipulation resulting in mutant lines of mosquitos to study the importance of specific genes. To facilitate this strategy of investigation, it is important that mutant lines can be quickly generated to study a larger variety of mutations. This project will establish a genetic toolkit that can be used to manipulate any gene of interest in *Aedes aegypti*. In the Gal4/UAS system, a transcription factor from yeast, GAL4, is inserted randomly into the mosquito genome, so that the gene will be expressed throughout the entire body. GAL4 will be expressed under a heat activated promoter "heat-shock"(HGM) and bind to upstream activating sequences (UAS), also inserted and expressed in the genome of every cell, turning on transgene expression within all cells. To test the feasibility of this method, GFP will be inserted into the system under the UAS for expression in the mosquito tissue. When present in a double mutant for the system, the Gal4 will be produced and will bind to the UAS promoter to express any sequential genes. Through staining with immunohistochemistry to amplify the GFP signal, tissue samples of mutants can be mounted and observed for expression. The GAL4/UAS system will allow for manipulations such as increasing or decreasing gene expression, the insertion of markers to detect cell activity, and RNAi. The results of this system can contribute to further mosquito research leading to greater insight into mosquito behavior and the genes are responsible for their attraction to humans.