Model Organism in Genetics: Induction of Ectopic Eyes by Targeted Expression of the Eyeless Gene in Drosophila Melanogaster

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ABSTRACT

Drosophila melanogaster, fruit fly, is organism which is one of best and oldest organisms used in genetics researches, actually whole genetic is based on *Drosophila* experiments. Reasons why *Drosophila* is the most used organism in genetic are: they are very cheap, short generation time (two weeks) and the most important, results on them are transferable to human because of 287 known human disease genes, and 197 have homologs in *Drosophila melanogaster* to human. The main idea of experiment performed by Georg Halder and his colleagues is that they wanted to prove that gene for eyeless, *ey,* is master control gene for eye morphogenesis. In this experiment GAL4 system activator was used to target *ey* expression to imaginal discs other than normally expressed eye discs and GAL4 was regulated by a promoter region, and upstream activating sequence UAS. They wanted to express eyeless gene, *ey*, on *Drosophila melanogaster* head, wings, legs and antenna. Ectopic eyes were induced, but also they were functional. Using electron microscope they observed that ommatidia of ectopic eyes were full complement to the different types of cells structures. On antennal ectopic eyes they distinguished cornea, pseudo cone, cone cells, primary, secondary and tertiary pigment cells and photoreceptors. The neuronal differentiation of photoreceptors by ELAV antibodies, and clusters of photoreceptor cells were clearly detected at ectopic sites in imaginal discs and with this analysis they proved that ectopic eyes are functional. This experiment was really important for understanding genetics, because they proved that *ey* is master control gene for eye morphogenesis, and that is almost universal for all organisms. But *ey* doesn't control initial steps of morphogenesis but it is necessary for later steps.

Ey gene also have influence in developing of nervous system, because null mutations are lethal for *Drosophila melanogaster*, and loss of eye structure don't cause lethality.