Using cytogenetic parameters of mitosis and the expression of reporter genes in environmental studies

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The work is devoted to a biosensor development based on the Drosophila melanogaster reporter gene their properties being similar to a microbiological optosensor, but can exceed them by sensitivity and specificity. In the experiments there were used the Drosophila melanogaster M. lines with a genetic design of UAS-GFP-Gadd45-Gal4 where UAS acts as a promotor, and Gadd-45 is a driver. The construction contains a gene of a green fluorescent protein (GFP) which gives an opportunity to analyze its expression in various tissues and bodies of the drosophila larva. The GADD45 driver in this genetic construction is a gene of protein which is produced in response to any stress and starts a Gal-4 gene expression. In it's turn a yeast protein Gal4 protein initiates a synthesis of the fluorescent GFP protein.

The purpose of a biosensor is sensitivity to some stressful factors which can visually be shown and measured in many cases. In our case such factor is α-radiation, and its source is radon. In our experiments we used larvae of II and III age, were applied Pu238, Pu239 as sources α-radiation. As a result, the luminescence of a green fluorescent protein in imaginal disks, intestines and ganglion have been found.

It demonstrated that the GFP reporter gene is induced by α-radiation. In spite of the fact that addiction between the degree of a luminescence and a dose of radiation hasn't been established the reporter, thresholds induction in tissues have been found revealed. Therefore the reaction to a stress of salivary glands is noticeable can be observed beginning with a dose of 200 rad. whereas in imaginal disks it starts with 300 rad. Thus, various reporter induction thresholds in a biosensor tissues make it possible to estimate radiation dose.