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# Laser to Activate Genes

*This allows to study genes in "non model" species*

Researchers at University of Buffalo have developed an innovative method for studying the function of certain genes even in the absence of the genome sequencing in "non-model" organisms. The researchers used lasers to turn on fluorescent marker genes in very precise pattern but otherwise the butterflies were unaffected. Exploring functional genetics in "model" organisms - like the fruit fly or the mouse - is much easier, as the amount of research made on them provides highly sophisticated and efficient tools. Discovering how genes work in other organisms is particularly difficult as the regulatory code of such organisms is still poorly understood. "With this research, we have developed a tool to test gene function in an animal where these kinds of tools were not available before," said Diane Ramos, a doctoral candidate in the UB Department of Biological Sciences in the College of Arts and Sciences. "We hope to inspire other researchers working in non-model organisms to use these kinds of techniques to answer fundamental questions about what genes do, which will allow interesting comparisons between species."The method consists in introducing a heat-sensitive fragment of regulatory DNA into the genome of butterflies, along with the genes aimed to be activated at precise loci and times during wing development. "As the laser heats up specific cells on the butterfly wing, genes that sit next to this regulatory sequence get turned on, allowing for specific clusters of cells on the wing to fluoresce," said Antonia Monteiro, assistant professor of ecology and evolutionary biology at Yale University. The team wants to apply the method to the genes involved in encoding the intricate patterns on butterfly wings. "We want to be able to turn on or shut down specific genes on the developing butterfly wing in order to test their function in coloring the wing," said Monteiro. This method could be applied to assessing color patterns of other insects, fish, birds or plants. "Now they may be able to attempt to use a laser beam to direct gene expression to particular clusters of cells," she said. The method was first used in a transgenic strain of the butterfly species Bicyclus anynana (photo) containing the GFP reporter gene, a common jellyfish marker gene, attached to a Drosophila heat shock promoter, which reacted similarly to heat in butterflies.