

Student Manual

pGLO Transformation

Lesson 1 Introduction to Transformation

In this lab you will perform a procedure known as genetic transformation. Remember that a gene is a piece of DNA, which provides the instructions for making (codes for) a protein. This protein gives an organism a particular trait. Genetic transformation literally means "change caused by genes," and involves the insertion of a gene into an organism in order to change the organism's trait. Genetic transformation is used in many areas of biotechnology. In agriculture, genes coding for traits such as frost, pest, or spoilage resistance can be genetically transformed into plants. In bioremediation, bacteria can be genetically transformed with genes enabling them to digest oil spills. In medicine, diseases caused by defective genes are beginning to be treated by gene therapy; that is, by genetically transforming a sick person's cells with healthy copies of the defective gene that causes the disease.

You will use a procedure to transform bacteria with a gene that codes for Green Fluorescent Protein (GFP). The real-life source of this gene is the bioluminescent jellyfish *Aequorea victoria*. Green Fluorescent Protein causes the jellyfish to fluoresce and glow in the dark. Following the transformation procedure, the bacteria express their newly acquired jellyfish gene and produce the fluorescent protein, which causes them to glow a brilliant green color under ultraviolet light.

In this activity, you will learn about the process of moving genes from one organism to another with the aid of a plasmid. In addition to one large chromosome, bacteria naturally contain one or more small circular pieces of DNA called plasmids. Plasmid DNA usually contains genes for one or more traits that may be beneficial to bacterial survival. In nature, bacteria can transfer plasmids back and forth allowing them to share these beneficial genes. This natural mechanism allows bacteria to adapt to new environments. The recent occurrence of bacterial resistance to antibiotics is due to the transmission of plasmids.

Bio-Rad's unique pGLO plasmid encodes the gene for GFP and a gene for resistance to the antibiotic ampicillin. pGLO also incorporates a special gene regulation system, which can be used to control expression of the fluorescent protein in transformed cells. The gene for GFP can be switched on in transformed cells by adding the sugar arabinose to the cells' nutrient medium. Selection for cells that have been transformed with pGLO DNA is accomplished by growth on ampicillin plates. Transformed cells will appear white (wild-type phenotype) on plates not containing arabinose, and fluorescent green under UV light when arabinose is included in the nutrient agar medium.

You will be provided with the tools and a protocol for performing genetic transformation. Your task will be to:

1. Do the genetic transformation.
2. Determine the degree of success in your efforts to genetically alter an organism.

Pglo Transformation Lab Answers Student Manual

**Warren Dolphin, David Vleck, Linda
Westgate, James Colbert**



Pglo Transformation Lab Answers Student Manual:

Biological Investigations Lab Manual Warren Dolphin, David Vleck, Linda Westgate, James Colbert, 2010-01-27 The lead author of eight successful previous editions has brought together a team that combined has well over 60 years experience in offering beginning biology labs to several thousand students each year at Iowa State University Their experience and diverse backgrounds ensure that this extensively revised edition will meet the needs of a new generation of students Designed to be used with all majors level general biology textbooks the included labs are investigative using both discovery and hypothesis based science methods Students experimentally investigate topics observe structure use critical thinking skills to predict and test ideas and engage in hands on learning Students are often asked what evidence do you have that in order to encourage them to think for themselves By emphasizing investigative quantitative and comparative approaches to the topics the authors continually emphasize how the biological sciences are integrative yet unique An instructor s manual available through McGraw Hill Lab Central provides detailed advice based on the authors experience on how to prepare materials for each lab teachings tips and lesson plans and questions that can be used in quizzes and practical exams This manual is an excellent choice for colleges and universities that want their students to experience the breadth of modern biology

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