

TAKING GENES OUT OF ONE ORGANISM AND PLACING THEM INTO ANOTHER!!

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 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 be transforming 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 lab, you will not be taking the gene for GFP directly from the jellyfish. This has already been done for you. We have placed the gene for GFP on a plasmid, a circular piece of DNA carried by bacterial cells which contains genes for one or more traits that may be beneficial to bacterial survival. You will be taking the plasmid containing the GFP gene and transforming it into colonies of E. coli bacteria. This plasmid will also contain a gene for resistance to the antibiotic ampicillin. In nature, bacteria can transfer plasmids back and forth allowing them to share antibiotic resistance genes. Today the gene for ampicillin resistance will actually help us to only allow the growth of bacteria that has been transformed with the gene for GFP. HAVE FUN!!

PRE LAB PREPARATIONS

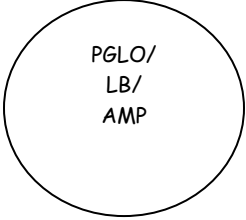
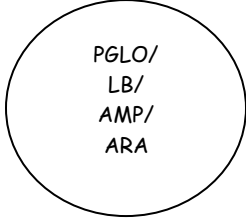
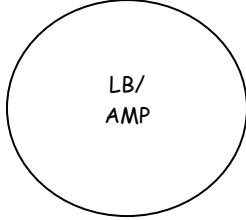
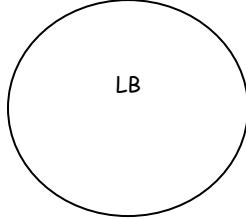
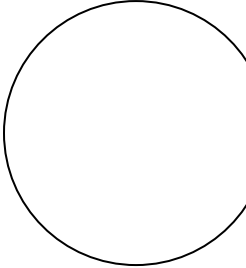
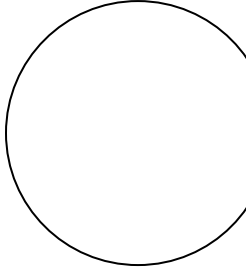
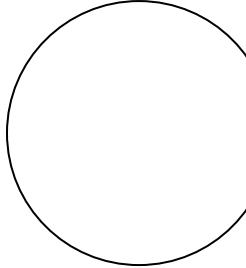
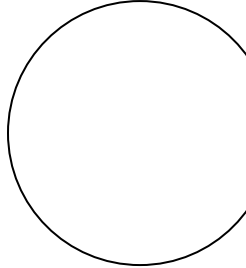
Describe the purpose of the following materials in the transformation lab.

<p>TRANSFORMATION SOLUTION (CaCl₂)</p>	<p>PGLO PLASMID DNA</p>	<p>HOT WATER BATH</p>
<p>STERILE LOOP (3 PURPOSES)</p>	<p>ECOLI BACTERIA</p>	<p>NUTRIENT AGAROSE PLATES</p>

IN THIS EXPERIMENT YOU WILL GROW BACTERIA ON FOUR DIFFERENT NUTRIENT AGAR PLATES. EXPLAIN THE PURPOSE OF EACH DIFFERENT PLATE LISTED BELOW. ADDITIONALLY, DESCRIBE WHAT YOU EXPECT TO HAPPEN ON EACH PLATE. **WHICH PLATE(S) MAY ACT AS A CONTROL IN THIS LAB???**

<p>PGLO= PLASMID DNA LB= NUTRIENT AGAR AMP= AMPICILLIN ANTIBIOTIC ARA= ARABINOSE SUGAR</p>			
<p>PGLO/ LB/AMP</p>	<p>PGLO/ LB/AMP/ ARA</p>	<p>LB/AMP</p>	<p>LB</p>
<p>PURPOSE??</p>	<p>PURPOSE??</p>	<p>PURPOSE??</p>	<p>PURPOSE??</p>
<p>WHAT YOU EXPECT TO SEE ON THIS PLATE?</p>	<p>WHAT YOU EXPECT TO SEE ON THIS PLATE?</p>	<p>WHAT YOU EXPECT TO SEE ON THIS PLATE?</p>	<p>WHAT YOU EXPECT TO SEE ON THIS PLATE?</p>

POST LAB COMPREHENSION CHECK

1 	2 	3 	4 
DRAW WHAT YOU SEE ON THIS PLATE AFTER THE 24 HOUR INCUBATION!! 	DRAW WHAT YOU SEE ON THIS PLATE AFTER THE 24 HOUR INCUBATION!! 	DRAW WHAT YOU SEE ON THIS PLATE AFTER THE 24 HOUR INCUBATION!! 	DRAW WHAT YOU SEE ON THIS PLATE AFTER THE 24 HOUR INCUBATION!! 

1. WAS THE PLASMID CONTAINING THE GFP GENE SUCCESSFULLY TRANSFORMED INTO THE ECOLI BACTERIA DURING OUR EXPERIMENT? HOW DO YOU KNOW? MAKE SPECIFIC REFERENCES TO SPECIFIC EXPERIMENTAL RESULTS IN YOUR ANSWER!!

2. WHY DIDN'T THE ECOLI ON PLATE #1 GLOW? EXPLAIN IN DETAIL!!

3. WAS THERE ANY BACTERIAL GROWTH ON PLATE #3. WHY OR WHY NOT? EXPLAIN WHY OR WHY NOT WITH DETAIL!!

4. WHY DIDN'T THE ECOLI ON PLATE # 4 GLOW? EXPLAIN IN DETAIL!!

5. GENE REGULATION IS A TOPIC WE CONSIDERED IN OUR DNA UNIT EARLIER THIS SCHOOL YEAR. HOW IS THE EXPRESSION OF THE GFP GENE REGULATED IN THIS EXPERIMENT? EXPLAIN YOUR ANSWER IN DETAIL!!

6. MANY BIOTECHNOLOGISTS WOULD DESCRIBE BACTERIAL CELLS AS THE PERFECT CANDIDATES FOR GENETIC TRANSFORMATION. LIST AND DESCRIBE SOME REASONS YOU CAN THINK OF THAT MAKE BACTERIAL CELLS THE PERFECT CANDIDATES FOR GENETIC TRANSFORMATION.

NOW FOR THE HUMAN GENETIC TRANSFORMATION!!
IS THIS COOL STUFF OR WHAT???????????