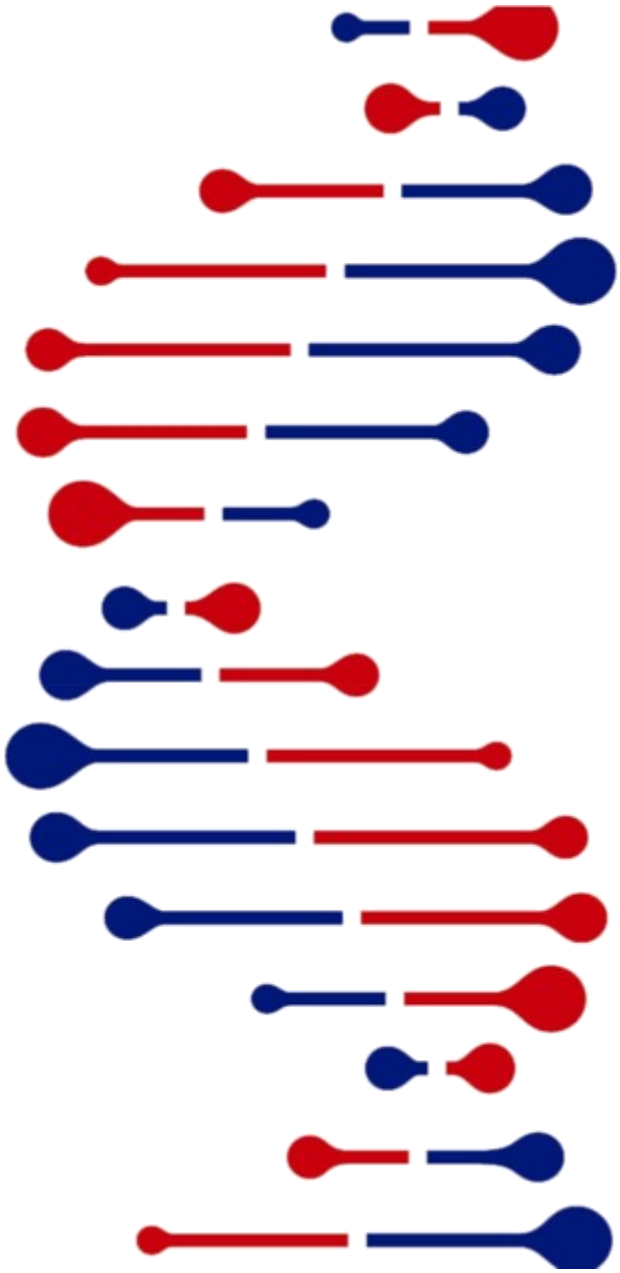
Lecture 15



I. Bacteria can undergo change to their DNA in two ways
A. _____
1. Remember the definition from Lecture 8: A permanent, heritable change in the genetic material. There is a change in the chemistry of a gene. This change is perpetuated _____ _____
B. Bacterial _____
1. The process is which a new recombinant chromosome is formed by _____ _____ from two organisms. The genotype of this new chromosome is different than that of either of the parents. A change in _____ usually accompanies this change in genotype.
2. There are three genetic exchange mechanisms that bacteria use.
i. _____: A mechanism where "naked" DNA is taken up by a bacterium.
ii. _____: A mechanism in which a bacteriophage carries DNA from a donor bacterium to a recipient bacterium.
iii. Conjugation: A mechanism in which DNA is passed via _____.

II. Transformation allows bacteria to make a protein, or proteins, that give them _____ _____ that may be beneficial for their survival. This also allows scientists the ability to _____ a bacterium to perform certain tasks.

A. In _____, bacteria can be transformed with genes that enable them to _____.

B. In medicine, bacteria can be transformed with a gene that enables them to make _____.

III. DNA that bacteria may uptake can be linear or circular (See How Does It Work?, right)

A. Linear DNA can _____into the bacterium's double-stranded DNA.

B. Circular DNA (plasmids) will not integrate into host DNA, but instead _____, where they will be transcribed and translated to form protein products.

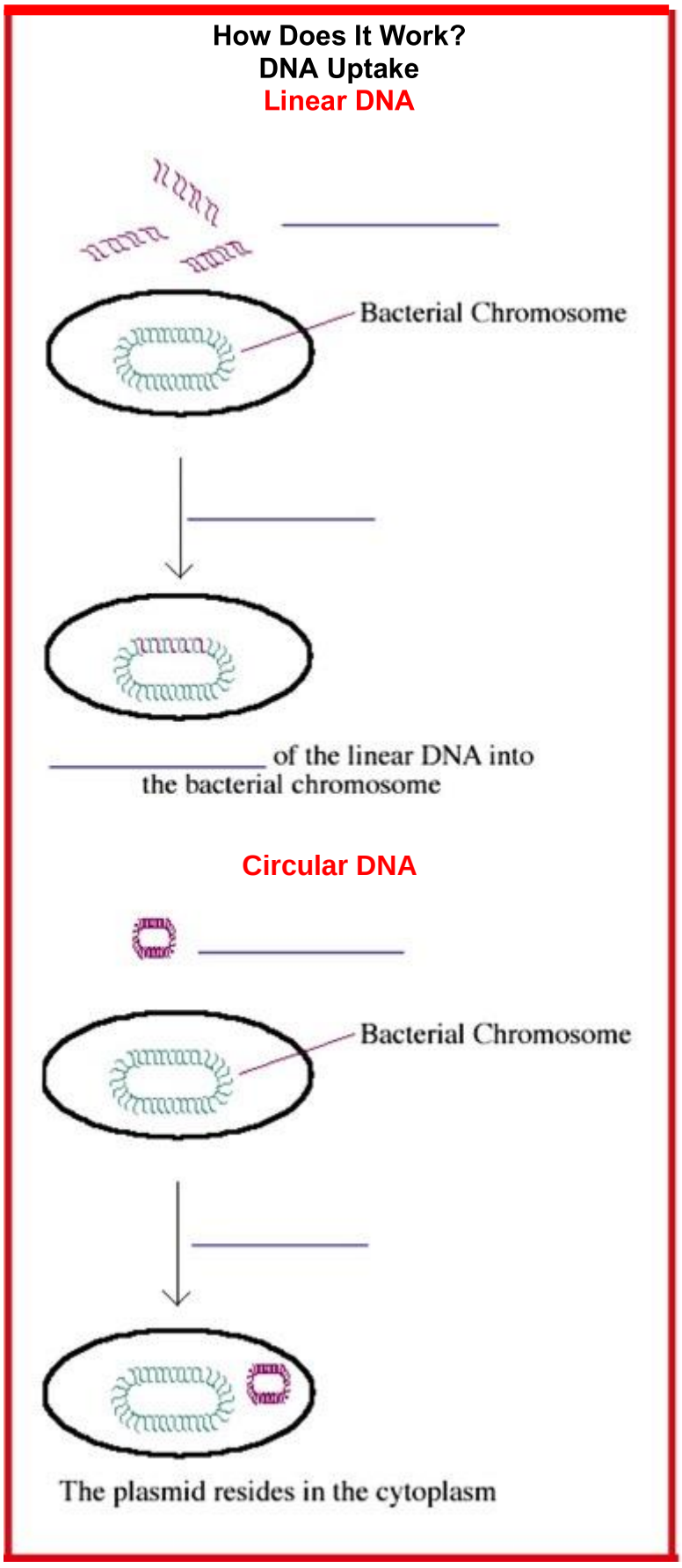
IV. In today's experiment, we will transform bacteria with a constructed plasmid called _____. The pGLO plasmid has three important genes:

A. The gene encoding for *gfp*

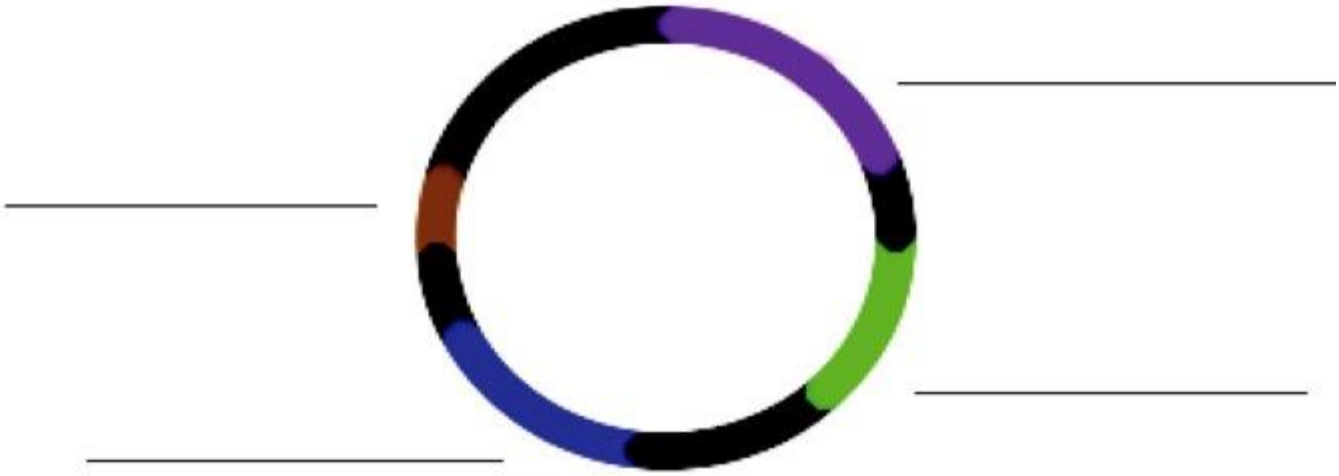
1. *gfp* is the _____.
2. This gene originates from the _____, *Aequorea Victoria.*

B. The *bla* gene

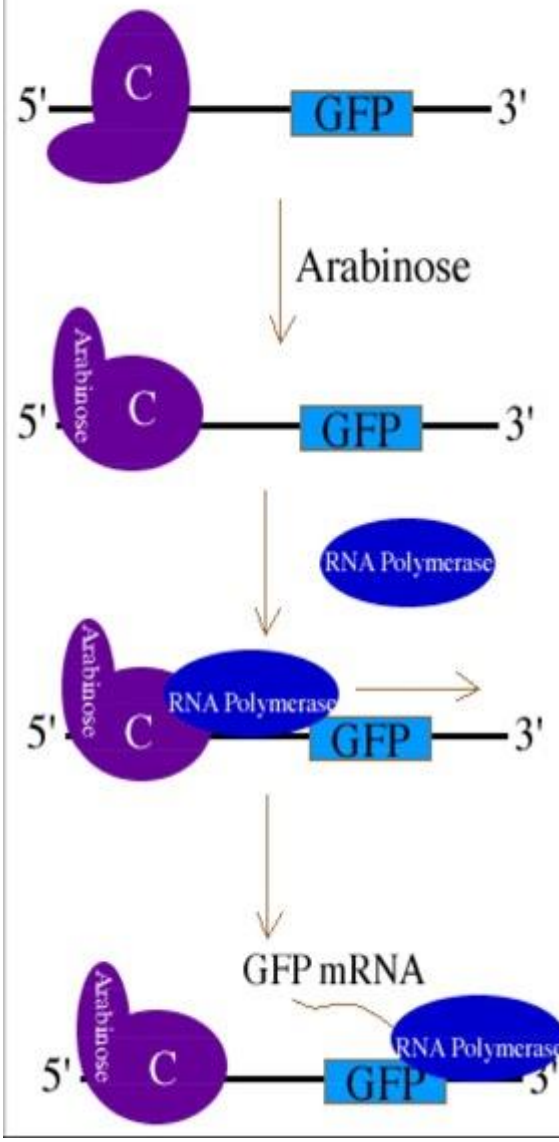
1. Encodes for beta-lactamase, an _____ that will allow transformed bacteria to be _____ to antibiotics that have a beta-lactam ring (e.g. ampicillin).
2. Because of this new antibiotic-resistance gene in the transformed bacteria, we can _____ for their growth using a media that contains _____.



The important genes of a pGLO plasmid:



The *ara*C gene



1. The Regulatory C protein (labeled "C") binds upstream of the gene encoding for *gfp*. This **<u>blocks RNA polymerase and *gfp* is not made</u>**.

2. Arabinose bind to the Regulatory C protein. Conformational changes allow RNA polymerase to **<u>bind and transcribe the gene encoding for *gfp*</u>**.

C. The *ara*C gene

1. Encodes for a _____ _____ called regulatory C protein. In nature, the Regulatory C protein stops the production of the enzymes needed to digest the simple sugar _____, if this sugar is _____ _____ in the environment.
2. Regulatory C protein binds upstream of the arabinose digestive genes and _____ _____. When arabinose is present, the Regulatory C protein changes conformations and _____ _____ _____ the needed genes.
3. In pGLO, the arabinose digestive genes _____ by the gene encoding for the green fluorescent protein. Thus_____ _____ _____.

V. Methods

A. $CaCl_2$

1. Often used to render bacterial membranes more _____ _____.

B. Heat shock

1. _____ DNA uptake

C. Glucose

1. Allows for quick cell recovery.