Bacterial Transformation & Plating Transformed Bacteria Virtual labs

PART A: Bacterial Transformation Virtual Lab

Go to https://www.labxchange.org/ and to your class (through the Dashboard).
Click on the “Transforming Bacteria” simulation.

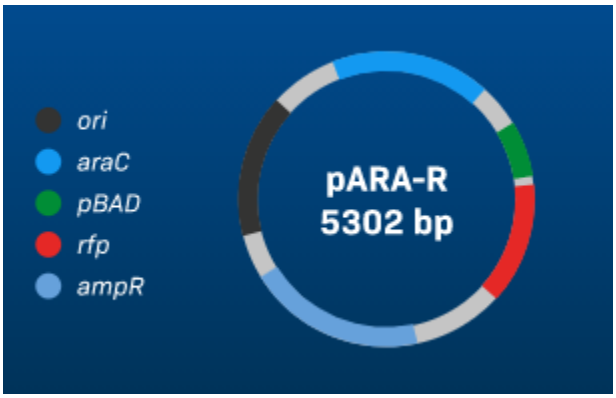
If it asks: Choose Level 1 as the activity level.

1. Context

1. What is the purpose of the virtual lab?

2. What does rfp stand for?

3. Give a brief explanation of what each part of the PARA-R plasmid is and why it is in the plasmid.



4. Why does it mean a bacteria is “competent?”

5. How does the heat shock help bacteria take up DNA?

6. Why is calcium chloride added to the cells?

2. Materials

7. Fill in the table below with descriptions of the materials in the checklist.

Material	**Description of Item w**
Luria broth (LB) solution	
pARA-R (R) solution	
Competent cells (CC) cells	
micropipettes	
Micropipette tips	
Ice bucket	
Water bath	
Floating tube rack	
Biohazardous waste container	
timer	

3. Predictions

8. Which letter tube did you choose that best represents a successful transformation?

9. What is the control group? What will it contain?

10. What is a negative control and why do we use a negative control?

11. What is the experimental group? What will it contain?

12. Which letter tube did you choose to be the negative control outcome?

4. Protocol

Follow the steps of the protocol to complete the simulation.

13. There are 5 different overall steps to the protocol. You will fill in the table below with the name of each step. It will be in blue at the top of the protocol list. The first one has been filled in for you.

Steps of the Bacterial Transformation Protocol	
1	Set the water bath temperature.
2	
3	
4	
5	

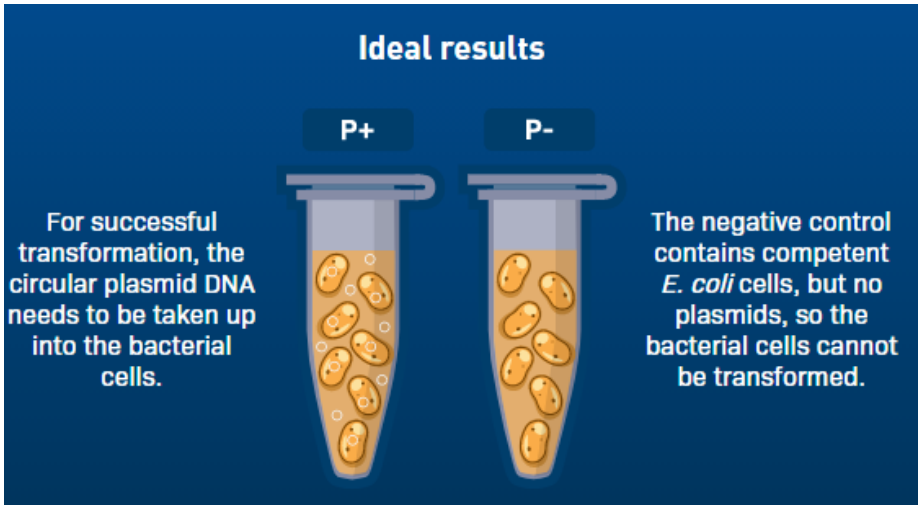
5. Results

14. Take a screenshot of your predicted results and your actual results. Paste it below.

15. Did your results match your predicted results? Explain why or why not.

16. How can a scientist know if a transformation is successful?

17. How do your results compare to the "ideal results" shown?



6. Reflection

Answer the questions on the simulation. Record your answers below. Type out the correct answer so you can refer back to this document to help study.

1. What is bacterial transformation?

2. How does the P- tube differ from the P+ tube?

3. Select whether the following statement is true or false: Luria broth is primarily used to culture, or grow, bacteria.

4. You used aseptic technique during this lab. Why is it important to work in a sterile manner when working with bacteria in the lab?

5. Why are the cells incubated at 42^{o}C?

PART B: Plating Transformed Bacteria Virtual Lab

Go to https://www.labxchange.org/ and to your class (through the Dashboard).
Click on the “Plating Transformed Bacteria” simulation.

If it asks: Choose Level 1 as the activity level.

1. Context

1. What is the purpose of the virtual lab?

2. What is bacterial transformation?

3. What will the bacteria that have been transformed with the pARA-R plasmid express?

4. What does *ampR* code for and what does that do?

5. Which bacteria will survive and grow in the presence of ampicillin?

6. Why do we add the ampicillin to the growth media?

7. Why is arabinose added to the growth media?

8. What will bacterial colonies look like if they express the *rfp* gene?

2. Materials

9. Fill in the table below with descriptions of the materials in the checklist.

Material	**Description of Item w**
P+ cells in solution	
P- cells in solution	
LB plate	
LB/amp plate	
LB/amp/ara plate	
Cell spreader	
Lab tape	
incubator	
Ice bucket	
refrigerator	

3. Predictions

10. Do we expect growth on the LB only plate?

11. If no growth occurs on the LB only plate, what might be the issue?

12. What is required for growth on the LB/amp plate?

13. Which cells should be able to grow on the LB/amp plate?

14. Which cells should be able to grow on the LB/amp/ara plate?

15. How can the experimenter be sure that the cells contain not only the *ampR* genes, but also the *araC* and *rfp* genes?

16. Make your prediction about the growth on the 3 different plates by manipulating the interactive in the blue box. Take a screenshot of your predictions and paste it below.

17. For each outcome below, type in the reason you chose in the blue box in the simulation.

Outcome	Reason
There is no growth on the P- half of the LB/amp plate.	
There is some growth on the P-half of the LB/amp plate.	
There is no growth on the P+ half of the LB/amp plate.	
There is some growth on the P+ half of the LB/amp plate.	

18. Write out the answer you chose to the following question: If growth occurred on the LB plate, but not on the LB/amp/ara plate, what is the most likely reason for this outcome?

4. Protocol

Follow the steps of the protocol to complete the simulation.

19. There are 5 different overall steps to the protocol. You will fill in the table below with the name of each step. It will be in blue at the top of the protocol list. The first one has been filled in for you.

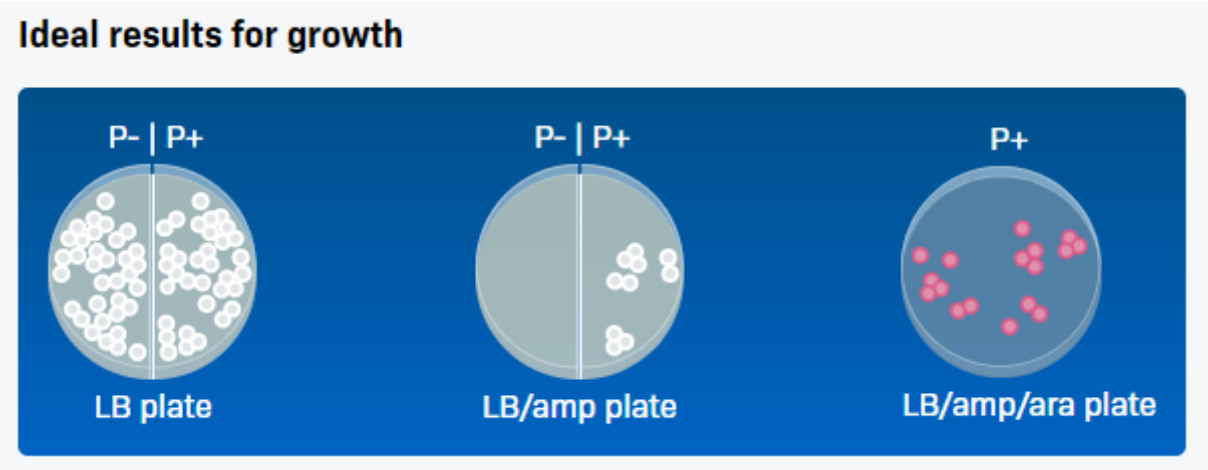
Steps of the Plating Transformed Bacteria Protocol	
1	Label the agar plates.
2	
3	
4	
5	

5. Results

20. Take a screenshot of your predicted results and your actual results. Paste it below.

21. Did your results match your predicted results? Explain why or why not.

22.. How do your results compare to the “ideal results” shown?



22. Did your reasons for the outcomes match the ideal reasons for growth or non-growth on the LB/amp plate?

6. Reflection

Answer the questions on the simulation. Record your answers below. Type out the correct answer so you can refer back to this document to help study.

1. Why is ampicillin added to the agar?

2. Why are plated cells incubated at 37°C?

3. What is the purpose of the LB/amp/ara plate containing arabinose in addition to the ampicillan?

4. How is it possible for a human gene to be expressed in a bacterial cell?

5. What is the relationship between proteins and traits?