Student Guide to UV-Induced DNA Damage Exploratory Kit

Objectives:

1. Establish a relationship between UV exposure and DNA damage
2. Introduce students to research tools and methods
3. Educate students about how synthetic biology can be used in novel ways

Materials:

- Glycerol stock of cells transformed with uvrA-GFP plasmid
- Glycerol stock of cells transformed with constitutive plasmid
- Petri dishes
- LB + Agar
- Ampicillin
- Serological pipette tips

Procedure:

I. Make Ampicillin plates
   1. Microwave LB/Agar mixture until it is completely melted.
   2. Allow the melted mixture to cool for roughly 5 minutes.
   3. Add ampicillin in a 1:1000 ratio to the LB/Agar mixture.
      Note: For a 500 mL LB/agar. 500 uL of ampicillin should be added.
   4. Using a sterilogical pipette, pipette between 10-15 mL of the mixture into a petri dish
   5. Cover the petri dish and allow the LB/Agar mixture to solidify for 20-30 minutes.
   6. Store plates in a 4 C until needed.

II. Streak out cells from glycerol stock
   1. Using a pipette tip, scrape some cells from the glycerol stock of transformed cells.
   2. Streak the cells on an ampicillin-resistant petri dish.

III. Incubate cells for 16 hours in 37 C
   1. Place petri dishes with streaked cells in 37 C incubator overnight (~16 hours).

IV. Shine cells with sunlight
   1. Expose incubated petri dish to sunlight for 10 minutes.
   2. If performing a control, cover a petri dish with tin foil and expose alongside experimental petri dish.

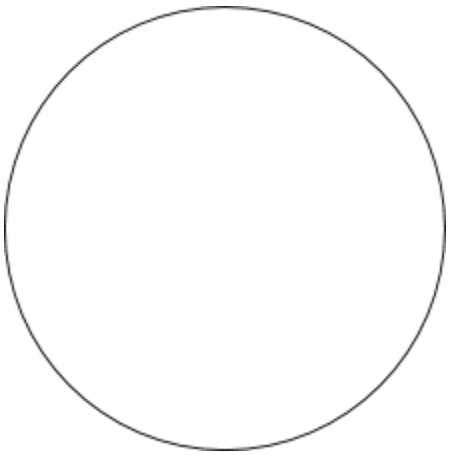
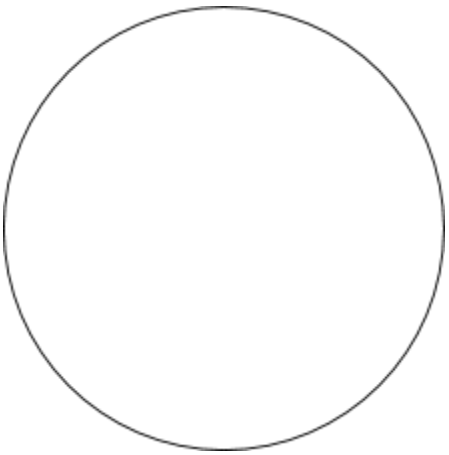
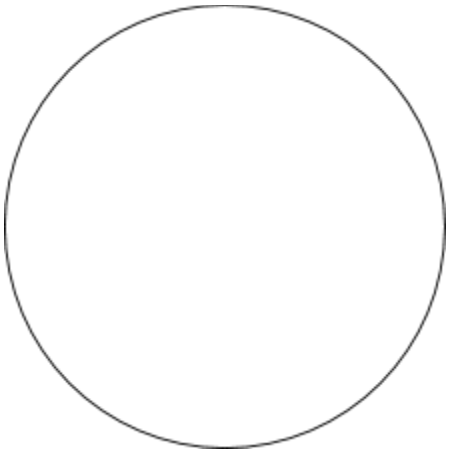
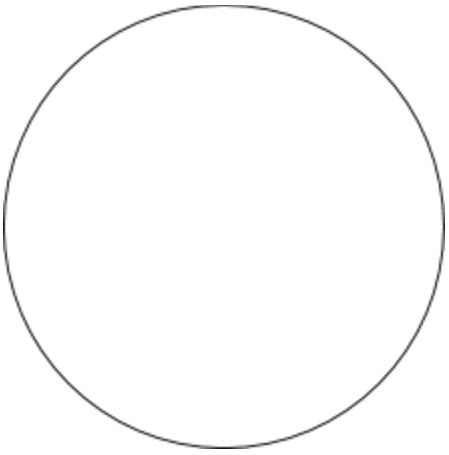
V. Check for fluorescence
   1. Visualize fluorescence under a UVC handheld lamp.
   2. Record observations.

Student Worksheet

1. What is the control petri dish? What is the experimental petri dish? What do you expect to see from each petri dish?

2. Have you heard about DNA or UV rays before? If so, what have you heard?

3. Record a before and after visual observation of what you saw during the experiment.

	Before	After
Experimental		
Control		

Student Worksheet

4. Summarize your observation in words. What was the difference between the before and after observations for both the control and experimental dishes?

5. Were your observations what you expected to occur?

6. What is a possible explanation for your results?

7. What was your favorite part of the experiment?

8. What did this experiment show about UV damage?

9. What are ways you can protect yourself from UV damage?