Intro to Synthetic Biology

HSSP Summer 2018

Classwide Discussion

Scenario: For the first time, scientists have finished sequencing the full genome of the dirigible plum and have released this information on a public database. This delicious fruit has been highly sought after, and there is high demand for a more marketable, mass-producible version of the dirigible plum. One of the first characteristics of the fruit to be changed is its size. In their work, the scientists happened to find a gene, LOVEGOOD1; when active, this gene is responsible for maintaining the normally small size of the fruit.

Essential Question: Using the information that scientists know about the dirigible plum, how can the plum be made bigger? How can this development be regulated? What is important to know about this development?

Assignment: In groups of three, prepare a slideshow presentation explaining the content/point of view of your assigned group. Be sure to follow the guidelines below and include the information in your presentation. Be prepared to orally present your work for 5 - 10 minutes, which includes time for questions.

The three groups are as follows:

* Group 1 - Scientists
  + Using the techniques discussed in class, propose a scientific path that could be used to implement the desired change in the dirigible plum. Sample components should include (but aren’t limited to):
    - Gene circuit diagram (label all parts)
    - Biological pipeline parts: design, creation, insertion
    - Gene editing technique used and why you chose to use it
    - Required components for the chosen gene editing technique and how you will either make or get those components
    - Specific vector components - explain why each is important and how they factor into your overall pipeline
      * Promoter
      * Oligonucleotide
      * Primers
      * Selectable marker
    - Explanation of how you will create your vector housing all of these components and why you think it is effective
    - Explanation of how you will introduce your vector into the dirigible plum and why you think it is effective (be specific!)
* Group 2 - Policymakers
  + Summarize what is being proposed by the scientists.
  + How would you regulate the technique/pathway proposed by the scientists? Be specific!
  + What is the value of the proposed change? Why is it important?
  + What are some factors that you could use as an measure of success for your regulation?
  + What are some preliminary budget requirements for this technology?
  + How cost effective is this pathway?
  + How should the safety of this food be assessed?
  + What are some perceived environmental affects?
  + What are specific human health concerns that can be associated with this change?
  + What are some proposed ownership measures for the new crop (e.g. who should own the crop and why)?
* Group 3 - News Reporters
  + Summarize what is being proposed by the scientists and policymakers.
  + What are the most important things that the scientists have created?
  + How does the legislation proposed by the policymakers affect the public?
  + What are some potential public concerns that could be brought up?
  + How might the general public perceive the proposed scientific change?
  + How might the general public perceive the proposed regulation? (Give a variety of opinions here. For each viewpoint, list a few reasons why some people believe the viewpoint/information supporting their beliefs.)
  + What are some potential benefits of this proposed pathway?
  + What are some potential risks with this proposed pathway?
  + Which parties are involved? What are the benefits and risks for each party?
  + What are some ways in which the public can be directly involved in both scientists’ and policymakers’ actions in order to facilitate a more transparent process?