**Gene Splicing**

**I. Introduction**

 In this lab, you will take the fragment of DNA that causes a unique trait in one organism, such as the DNA that makes a firefly grow and splice that DNA into a different organism, so that the second organism takes on the trait of the first organism. At least, that’s what you will attempt to do; the results may not always be what you expect. In the controversial field of genetic engineering, heated claims and passionate counterclaims are everywhere. And as technology advances, both the promises and the objections are rapidly multiplying.

 This gene splicing simulator follows many of the same steps that bioengineers use when they create transgenic organisms. By using the simulator, you will increase your understanding of what is involved in gene splicing.

**II. Procedure**

 1. Start the activity by going to the following website :

<http://glencoe.mheducation.com/sites/dl/free/0078802849/383937/BL_22.html> .

 2. Using the “Diagrams” button, read through The Cleaving Process, Matching Restriction

 Enzymes to Cleavage Sites, and Plasmid Vectors.

 3. Choose a Genetic Trait to splice into the DNA of the Host Organism.

 4. Choose a Host Organism (not every genetic trait can be successfully spliced into the DNA of

 every organism).

 5. Isolate (cut out) the DNA segment that codes for the Source Organism trait you chose – it’s

 highlighted in green. Do this by choosing the proper Restriction Enzyme. Only the proper

 enzyme will isolate the segment without cutting off part of it, leaving it with dangling ends so

 that it can be properly spliced into the target DNA.

 6. Once you have successfully isolated the proper gene fragment. Now you will attach it to a

 vehicle that will carry it into the host’s organism’s cells. In this case, the vehicle (or vector)

 is the bacterial plasmid (a plasmid contains the DNA of a bacterium). Choose the proper

 enzyme, enter its name in the restriction enzyme window, then push the “Continue” button.

 7. Once you have performed a successful gene splice and have created recombinant DNA,

 notice that the DNA segment you removed from the source organism’s DNA is now

 combined with the bacterium’s DNA. The original DNA segment is highlighted in green in

 the plasmid. Then introduce the recombinant DNA into the host organism. Click the

 “Continue” button.

 8. Make an ethical choice.

 Yes, I want to proceed.

 No, I want to stop without completing the experiment.

**III. Data**

 1. Record your choices and data in the table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  **Genetic**  **Trait** |  **Host**  **Organism** |  **Source** **Organism** **Restriction**  **Enzyme** **(Letter)** |  **Bacterial** **Plasmid** **Restriction** **Enzyme** **(Letter)** |  **Attempt** **Results** |
| Attempt 1 |  |  |  |  |  |
| Attempt 2 |  |  |  |  |  |
| Attempt 3 |  |  |  |  |  |
| Attempt 4 |  |  |  |  |  |
| Attempt 5 |  |  |  |  |  |

**IV. Analysis & Conclusions**

 **1. DNA is made up of two separate strands of base sequences. The same sequence is found**

 **on both strands, but running in opposite directions. What word describes this characteristic?**

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 **2. What does the term “sticky ends” refer to in gene splicing?**

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 **3. What is a plasmid? How is a plasmid used in gene splicing?**

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 **4. What types of vectors are used to carry DNA from one species into the DNA of another**

 **species? Give examples.**

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 **5. What is a “transgenic organism”? Give examples.**

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 **6. Why is it essential that the same restriction enzyme be used to cleave (cut) the DNA of**

 **both organisms used to create a transgenic organism?**

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 **7. Are there any factors other than technical ones that might slow — or even prevent —**

 **the use of bioengineering?**

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