LawCentral Schools

Resources for Alberta Classrooms

Genetic Engineering: Transgenics in Canada

Activity Overview

Students will explore the topic of transgenic organisms from a scientific, legal, and ethical perspective. The first portion of the activity is a computer interactive that captures student's attention and provides a foundation for the research activity that follows. The activity concludes with student's investigating the science behind genetically engineered mosquitoes and evaluating risks and benefits.

Curriculum Connections

This activity is designed for the Biology 30 and Science 30 curriculum but also has connections to Social Studies, Legal Studies, and Religion and Ethics. It has the following learning outcomes:

- To develop an understanding of what are transgenic organisms and how are they created
- To assess the risks and benefits of applications of science
- To reflect on the role of science and technology in society

Time Required

Approximately 80 Minutes

Materials Required

- Access to Computers
    - Genetic Engineering: Transgenics in Canada
- Student Worksheet

Lesson Format

- Online Interactive Presentation
    - Pre-test
    - Background Information
- Inquiry Research Project
- Class Discussion and Review

Pre-requisite Knowledge

- Basic understanding of genes and inheritable traits

For the Teacher

Instructions

1. Direct students to the online interactive presentation. This presentation can be found online at www.lawcentral.ca/abc-flash/GEF.htm. Students will be prompted to start the student activity after completion.

2. Assign the student activity

3. Finish the lesson with a discussion about the general topic of genetic engineering
    a. What are some interesting examples they encountered in their research
    b. What ethical issues exist?
    c. What are some general risks and benefits?
    d. How should the legal system react or respond? How do they feel about the patentability of genetic material?

Possible Adaptations

- The interactive presentation can also be done as a class on a Smart Board if computers are not available for all students.
- The assessment could be adapted into a class debate or discussion

Assessment

Assessment criteria is found in the student handout materials.

Additional Information

For more information on the topics covered in this activity, visit the links below:

http://news.nationalgeographic.com/news/2009/05/photogalleries/glowing-animal-pictures/
www.lawcentralschools.ca/Downloads/documentloader.ashx?id=32844
http://archives.cbc.ca/science_technology/biotechnology/clips/11001/
http://archives.cbc.ca/science_technology/biotechnology/clips/10998/
www.cbc.ca/news/interactives/gm-salmon/
www.cbc.ca/marketplace/pre-2007/files/health/glofish/

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Student Activity

Part 1

You are a lawyer who specializes in genetics and the law. Companies come to you to get legal advice. When you give your advice make sure you justify it by:

- Referring to precedent (what happened in previous similar cases) (1pt)
- Explaining how the case is similar or different to previous cases (1pt)

Scenario 1

A company called DNA-Farming has developed a process to insert genes from cocoa beans into cows that would allow them to produce chocolate milk. The company has named their product the Cocoa Cow.

Can the company patent their new innovation, explain?

Scenario 2

Susan is growing genetically modified blue pumpkins that have been patented by a company. She pays the company to grow their pumpkins. Wild animals often eat the pumpkins and the seeds get scattered in her neighbour Alkarim's pumpkin field.

Does Alkarim have to pay the company to grow and sell blue pumpkins found on his land?

Part 2

Research Project

The Canadian government is considering releasing genetically engineered mosquitoes in Canada to stop the spread of West Nile Virus. They are seeking a company that can genetically modify mosquitoes so that the offspring they produce will die before being able to reproduce.

You are a biologist hired by the government to write a scientific report. In this report you will include:

1. An explanation of the technology to genetically engineer mosquitoes
    - Refer to real life examples of similar projects

2. Perform an analysis of the risks and benefits of the project

3. Recommend laws that should be in place to protect Canadians from the risks. You can refer to existing Canadian laws or other laws from other countries. You can also suggest new laws that might be needed.

Format

- Pictures and diagrams may be used if needed
- Your report can be divided into headings
- Remember to cite any resources used
- Be concise (say the most with the fewest words)

How You Will Be Assessed

	4 Points Excellent	3 Points Proficient	2 Points Adequate	1 Point Limited *	Insufficient/ Blank *
Describe a current scientific process to genetically engineer mosquitoes to reduce the mosquito population	**Clear** and **accurate** understanding of a current process to create genetically engineered mosquitoes	**Mostly clear** and **mostly accurate** understanding of a current process to create genetically engineered mosquitoes	**Sometimes clear** and **sometimes accurate** understanding of a current process to create genetically engineered mosquitoes	**Rarely clear** and **rarely accurate** understanding of a current process to create genetically engineered mosquitoes	**Insufficient evidence** of student performance
Assess the appropriateness, risks and benefits of genetic engineering from a variety of perspectives x2	Provides **comprehensive** information about the strengths and weaknesses of the application of transgenic organisms	Provides **thorough** information about the strengths and weaknesses of the application of transgenic organisms	Provides **basic** information about the strengths and weaknesses of the application of transgenic organisms	Provides **superficial** information about the strengths and weaknesses of the application of transgenic organisms	**Insufficient evidence** of student performance
Make clear and logical arguments to defend a given decision on an issue, based on findings	Develops a position and uses evidence in a **compelling** manner to support position	Develops a position and uses evidence in a **credible** manner to support position	Develops a position and uses evidence in a **simplistic** manner to support position	Develops a position and uses evidence in an **inconclusive** manner that does little to support position	**Insufficient evidence** of student performance