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Curriculum Units by Fellows of the National Initiative
2018 Volume V: Manipulating Biology: Costs, Benefits and Controversies

Should We? Possibilities, Perils, and Unintended Consequences of Genetic Engineering

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by Cristobal Carambo

Humans now have the technology to eradicate entire species of ticks, mosquitoes and rodents responsible for transmitting diseases. We can design our children to be taller, smarter and free of hereditary disorders. We can make our fruits larger, more nutritious and pest resistant. Modern biotechnologies such as CRISPR Cas-9 and gene drives have given our society the ability to manipulate the genomes of thousands of living (and even extinct!) species. But should we? Is there a limit to our use of biotechnology to benefit our species?

This unit will engage high school students in a two-week course of study that will explore the perils, possibilities, and unintended consequences of emerging genetic engineering technologies. Through the use of guided inquiries (POGILS), simulations, and independent research students will learn the science of modern techniques of genetic manipulation. The unit will culminate in a series of presentations that analyze the potential ecological impacts, socioeconomic consequences and ethics of genetic engineering.

Keywords: CRISPR-Cas-9; Gene Drive, POGIL, Genetic Engineering, Biotechnology, Bioethics.

(Developed for Contemporary Issues in Science, grade 10; recommended for Biology, grade 10)

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