

Topic #1:
Genetically Modified (GM) Foods

In the following dialog, Benjamin and Jeremy discuss the rapidly growing use of genetically-modified organisms as sources of food, a topic that is debated in Europe with a great deal of passion. In the United States, however, few seem to be concerned.

People have been producing genetically modified organisms through selective breeding for thousands of years. The cereal grains, vegetable crops, and livestock found on farms today bear little resemblance to the wild species from which they were developed.

Modern technology has given us the ability to go beyond selective breeding. Organisms can now be modified by moving genes from one species to another and by introducing synthetic genetic material into their genomes. Humans no longer simply select from variations present in the population: they create new variations!

Some find our new power exciting. They dream of crops with greater resistance to disease and insect pests, pigs with healthy fats, and a level of agricultural production sufficient to feed everyone on the planet. Others fear that we have crossed an important boundary and are now tinkering with living systems that we understand incompletely. They question our ability to predict the consequences of our actions and are afraid that we may disrupt the delicate natural order.

Here are the procedures for fulfilling this assignment.

I. First, in “**Get Started**,” readers are introduced to a bioethical issue through a short dialog designed to stimulate interest and provoke a response. The dialog is not meant to be a comprehensive lesson. It is only a starting point. Readers should check the statements in the dialog for accuracy, they should carefully analyze the arguments, read what others have to say about the topic, and formulate their own opinions.

II. In “**Get Informed**,” readers are provided with resources to begin their study. Further information can be found through online searches and by reading the references in the books and papers listed.

III. Finally, in “**Get Involved**,” readers become a part of the conversation. Questions are provided as suggested topics for short essays (500-750 words). These are suggestions only – all well-conceived essays pertinent to the topic of discussion will be considered. Essays can be submitted as e-mail attachments (Microsoft word documents) to Craig.Merow@germantownacademy.org for possible posting. Authors should include their name, address, and grade in school with their submission. Two essays will be posted each week between prompt postings. Comments on the postings are always welcomed. **Please join the conversation.**

I. Get Started

Benjamin: Would you like some chips?

Jeremy: That's Frankenfood!

Benjamin: Frankenfood? What are you talking about? These are name-brand corn chips, 100% natural.

Jeremy: It's Frankenfood. Transgenic. Most likely made from corn with inserted bacterial genes. No thank you!

(Jeremy takes a bite of his organic oat muffin and launches into one of his perennial sermons.)

I avoid GM foods. Sentient animals are suffering in research labs because modern Dr. Frankensteins are attempting to make pigs with omega-3 fats. Just eat a walnut and stop pestering the pigs.

Benjamin: I'm not "pestering" pigs! No one is commercially producing food products with genetically modified animal ingredients.

Jeremy: It's just a matter of time. Have you read about the "Enviropig?" They are trying to modify pigs' poop! Something to do with the phosphorous content. Farmers don't want to supplement their pigs' diet, and they want manure that is easier to dispose of – anything to save a buck. They are also trying to produce blind, naked chickens without beaks!

Benjamin: I'm not going to argue with you about anything that involves animals. I refuse to talk about animals with anyone who will not wear leather shoes!

(Benjamin loudly crunches a corn chip.)

We're talking about corn chips. Introducing bacterial genes into the corn genome to make the plants resistant to insect pests enables farmers to reduce their use of pesticides. Would you rather eat corn chips contaminated with pesticides?

Jeremy: Why do you think the corn with the bacterial genes is resistant to pests? The inserted genes enable the corn to manufacture its own pesticide ... and you're eating it.

Benjamin: Jeremy, you have to admit that the consensus among scientists is that the GM plant foods that have been developed are completely safe.

Jeremy: I suppose they agree that Bt corn, for instance, is safe for humans to eat, but that doesn't mean that it is safe!

Benjamin: You just contradicted yourself!

Jeremy: I did not. Your problem is that you only consider the interests of Homo sapiens. Did it ever occur to you that other animals might be harmed?

Benjamin: Don't tell me that you are worried about the pest insects being killed.

Jeremy: Very funny! I'm worried about monarch butterflies. The pollen from Bt corn has been shown to kill monarch caterpillars.

Benjamin: That study was done in a laboratory. No one has shown that the caterpillars are being affected in the field.

Jeremy: Who should have the burden of proof? Is every new Frankenfood crop innocent until proven guilty? Innocent until it produces an ecological disaster?

Benjamin: GM foods hold a lot of promise. They may play an important role in overcoming the world's food problem. GM foods will be developed that are more nutritious, drought resistant, and have higher yields. Weigh that against the *chance* of disaster.

Jeremy: Food companies are not interested in "solving the world's food problem." They are interested in making a profit! They are busy developing food plants that can survive the herbicides they sell. Their goal is to sell megalomaniac factory farmers on the idea of using herbicides instead of cultivation to control weeds. Just spray the fields with poisons, GM crops and all.

What's going to happen when GM plants pollinate their wild relatives? Picture a world with high-yield, pest resistant weeds. Plants don't carefully choose sexual partners! Every spring I can barely see out my windshield for weeks due to the trees spewing tons of gametophytes into the wind! My car is covered. GM plants *are* going to cross with wild plants. It's inevitable.

Benjamin: Jeremy. Jeremy. Jeremy! Enough! Wash your windshield and eat your muffin. It's time to get back to school.

II. Get Informed

Caplan, Arthur. L. Smart Mice, Not-So-Smart People. Lanham, MD: Rowan and Littlefield. 2007.

This volume includes two short, entertaining chapters about GMO's by an international expert in bioethics: "Face-off over Gene Foods," and "Are Genetically Modified Foods Fit for a Dog?"

Fiester, Autumn. "How the Biotech Tail is Wagging the Pig." Online posting. <http://blog.bioethics.net/2006/04/how-biotech-tail-is-wagging-pig.html>. 3 April 2006.

A widely-read guest post from a moral philosopher and bioethicist who is highly critical of the use of biotechnology for frivolous purposes.

Fiester, Autumn. "Justifying the Principle of Restraint in Animal Biotechnology." American Journal of Bioethics 8.6 (2008): 36-44.

Dr. Fiester argues for a "default position of wariness" with regard to new developments in biotechnology.

Fiester, Autumn. "Ethical Issues in Animal Biotechnology." The Penn Center Guide to Bioethics. Ed. Ravitsky, Vardit, and Autumn Fiester and Arthur L. Caplan. New York: Springer. 2010. 425-433.

Real philosophy, but current and readable.

Guelph Transgenic Pig Program. www.uoguelph.ca/enviropig/.

A description of an attempt to genetically modify pigs so that they can be raised with less impact on the environment.

Lai, Liangxue., et al. "Generation of cloned transgenic pigs rich in omega-3 fatty acids." Nature Biotechnology 24 (2006): 435-436.

Sixteen researchers make a case for producing omega-3 pigs and explain the science behind how it was accomplished. Highly technical.

Monsanto. www.monsanto.com/biotech-gmo/asp/default.asp.

A major player in the GMO market makes its case.

PBS. "Harvest of Fear: A Nova/ Frontline Special Report." www.pbs.org/wbgh/harvest. 2001.

Basic information; interviews with scientists, government regulators, company executives; access to videos.

Ruse, Michael, and David Castle, eds. Genetically Modified Foods: Debating Biotechnology. Amherst, NY: Prometheus. 2002.

Includes arguments for and against the use of genetically modified organisms for food.

Silver, Lee. Challenging Nature: The Clash of Science and Spirituality at the New Frontiers of Life. New York: Ecco. 2006.

A wide-ranging, generally supportive account of biotechnical research and development.

Singer, Peter. And Jim Mason. The Ethics of What We Eat: Why Our Food Choices Matter. Emmaus, PA: Rodale. 2006.

A good discussion of the benefits and risks of GMO's from a utilitarian perspective can be found on pages 206-216.

Singer and Mason recommend the following websites for information on genetically engineered foods (page 294):

Union of Concerned Scientists at www.ucsusa.org. Click on "Food & Agriculture."

Center for Food Safety on GMO's: www.centerforfoodsafety.org/geneticall7.cfm.

Thompson, Paul. "The Opposite of Human Enhancement: Nanotechnology and the Blind Chicken Problem." NanoEthics 2.3 (2008): 305-316.

Jeremy's comment about "blind chickens" refers to the finding that reducing the capabilities of a farm animal may reduce its suffering. This notion is discussed by Thompson.

University of Pennsylvania, Center for Bioethics. "Genetically Modified Organisms." <http://highschoolbioethics.org/briefs/gmo.asp>. 2008.

Several actual cases of GMO's are discussed.

III. Get Involved

1. Should food manufacturers be required by law to clearly label products that include ingredients from genetically modified organisms?
2. Does GMO research, development, and production pose unacceptable risks to animals, humans, and/or the environment?
3. In creating GMO foods has mankind overstepped his bounds? Has he violated the natural order? Is he "playing God?"

See the University of Pennsylvania Center for Bioethics reference above for more essay ideas.