

Study Guide

 to the **FOOD FOR THOUGHT** lecture:

The Role and Rule of Law in the Global Development of Food Biotechnology

Presented by **Gary Marchant** at Oregon State University 15 November 2007

Slides and streaming video available at <http://agsci.oregonstate.edu/orb/events>

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About the speaker

Professor Marchant is the Lincoln Professor Emerging Technologies, Law, and Ethics at the Sandra Day O'Connor College of Law at Arizona State University. He is also a Professor of Life Sciences at ASU and Executive Director of the ASU Center for the Study of Law, Science, and Technology. Marchant has a PhD in Genetics from the University of British Columbia, a Masters of Public Policy from the Kennedy School of Government, and a law degree from Harvard. He teaches and researches in the subject areas of environmental law, genetics and the law, and law, science and technology.

Terms

Biotechnology: the collection of industrial processes that involve the use of biological systems – biotech is commonly used to brew beer, produce antibiotics, and improve food crops and livestock through breeding. For some industries, these processes involve the use of genetically engineered organisms.

Genes: molecules that carry inheritable instructions for making proteins in the cells of living organisms. The proteins coded for by genes determine an organism's traits, or characteristics. Interestingly, some genes serve only to switch other genes on and off, and don't make a protein product all.

DNA: The genes of all organisms consist of DNA. Even though organisms are very different, they all use similar proteins in their metabolic pathways, and they use similar genes to encode these proteins. Scientifically speaking, it's what the DNA makes that matters, not where the DNA comes from.

Genetic modification: a change in an organism's genes made through selection, hybrid breeding, mutagenesis, or genetic engineering.

Hybrid breeding: producing a hybrid animal or plant by breeding two animals or two plants of different species or varieties to rearrange the genetic material between populations or races. Hybrids are produced because they have desirable characteristics not found or inconsistently present in the parent individuals or populations. Breeding companies sometimes use hybrids to protect intellectual property.

Genetic engineering: a change in an organism's genes made using recombinant DNA technology. A genetically modified/engineered organism is called a GMO. (More often than not, GE crops are referred to as GM crops, but this is a bit of a misnomer, since all GE crops are GM, but not all GM crops are GE!)

Recombinant DNA technology: a series of procedures used to join (recombine) DNA segments that make it possible to take a gene from any species and place it into almost any other species.

Coordinated Framework for Biotechnology: the US federal system for evaluating products developed using recombinant DNA technology, based on the health and safety laws that were already in place to address conventional product classes. The agencies responsible for oversight are the USDA's Animal and Plant Health Inspection Service, the EPA, and the FDA.

Take-home messages

Marchant's talk encompasses the following:

- Brief summary of GE foods
 - Risks, benefits, and concerns
- Role of law in addressing GE concerns
 - The Rule of Law
 - Some examples of difficult legal decisions
- Four key limitations of law in overseeing biotechnology

We'll focus on a few segments, so that your total watching time is about 20 minutes – begin by viewing part of the intro on streaming video (slides 2-6, video segment 4:35-7:35). Marchant's take home message is this:

- Law is an imperfect institution for addressing ethical and social concerns about emerging technologies such as biotechnology
- But it may well be the best available alternative we have
- An important project is therefore to explore ways that law can be more responsive and effective at addressing such concerns

Read each question below before you watch the selected segment on streaming video.

Questions

Short answer

1. In Marchant's intro, he points out that most of the corn, cotton, and soybeans in the US are GE. He mentions some of the demonstrated benefits of using biotech in this way, and he lists several potential benefits of second-generation products. Name two of each. (slides 2-6, video segment 4:35-7:35)
2. Throughout his talk, Marchant reiterates several times that the scientific consensus is that GE foods pose no unique risks from a health and environmental perspective, only from a legal and economic perspective. Name one of the false alarms raised in the media regarding the safety of GMOs. (slides 9-10, streaming video 8:30-11:20)
3. Marchant speaks of some key issues regarding the regulation of GMOs. These issues are complex and have many implications. The last issue he mentions is fairness. He shows the paperwork involved in getting two herbicide-resistant crops approved in Canada.
The first one was created using nuclear radiation, which causes multiple mutations on multiple chromosomes. (Nuclear radiation is a mutagenesis technique for genetic modification that has been in use for almost a century.)
The second one was changed much more precisely using recombinant DNA technology.
Both have the same trait.
The first crop required a short letter to meet approval. (The US wouldn't even require that.) The second required \$20-50 million worth of studies to meet approval.
What does Marchant say is the huge, overriding issue here? (slides 24-25, streaming video 24:15-27:20)
4. Marchant spends quite a bit of time talking about the many complexities of implementing GM labeling. He illustrates that mandatory labeling doesn't necessarily support consumer choice. He also points out

that almost all crops are genetically modified (but not necessarily genetically engineered). What are the four US crops that are not genetically modified? (slides [26-34](#), streaming video [27:20-34:20](#))

Essay

5. Social and ethical issues have kept GMOs from being a success in the marketplace. As a citizen (not as a geneticist or a lawyer), do you agree with Marchant's statement that it may be undemocratic **not** to consider the factors that drive public sentiment? Please construct an answer 75-125 words in length. (slide [10](#), slides [77-78](#), streaming video [52:10-55:10](#).)