

# Science Nonfiction: How Biotechnology is Shaping Food's Future

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# Vonnie Estes

Agtech and bio-industrial innovation consultant Vonnie Estes was the 2017 recipient of the Rosalind Franklin Award for leadership in biotechnology. With a career working in leadership roles at prominent ag companies including DuPont, Monsanto and Syngenta, along with small startups and venture funds, she is driven by a passion for biology and sustainability and consults with companies to develop and commercialize innovation.

ESTES  
CONSULTING

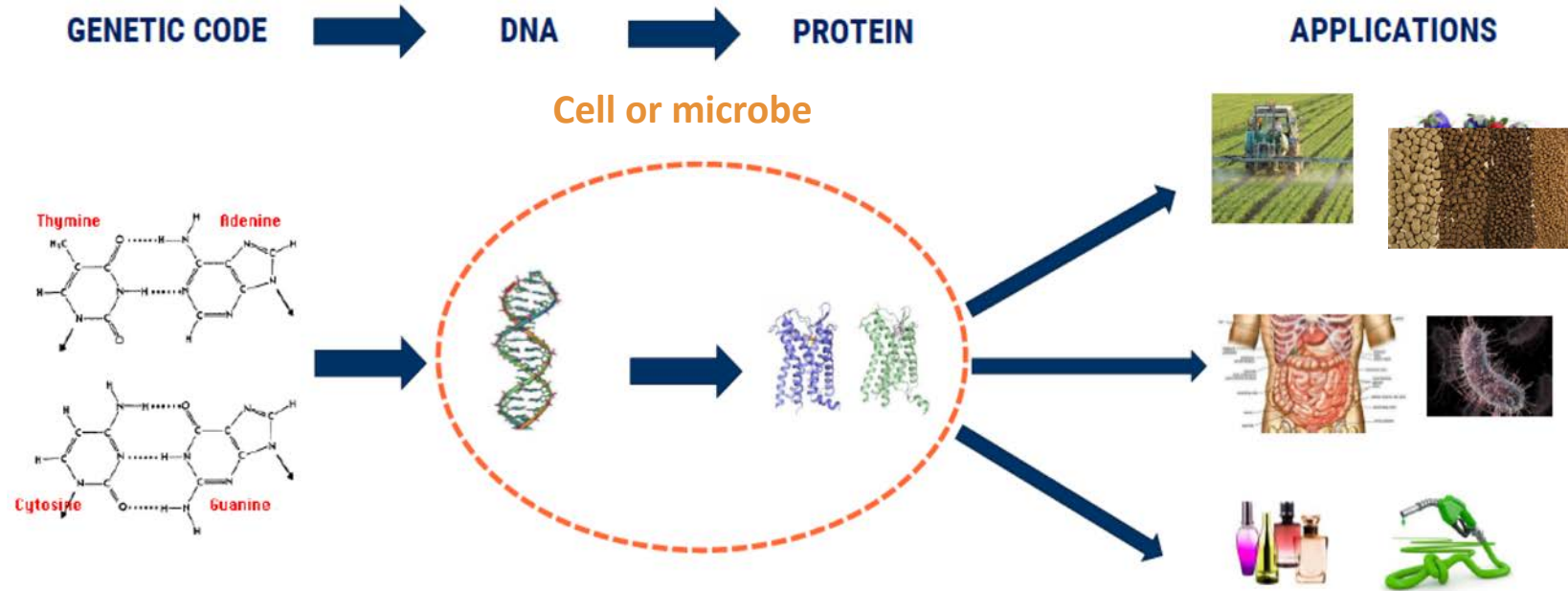
# Biotechnology:

*Improving ways to feed, fuel,  
and heal the world*

Vonnie Estes  
September 26, 2018



# What is Biotechnology?



Technology based on biology using cellular processes to develop products to improve our lives and the health of our planet

# Biotechnology

Applications

Government regulation

Public perception & acceptance

New horizons



# Biotech uses in medicine

Tools for disease detection

Reduce rates of disease

Fight serious illnesses

Individual medicine

Very high acceptance rate by consumers



# Industrial biotech

Streamline chemical manufacturing processes

Lower temperature to clean clothes

Reduce use of and reliance on petrochemicals

Production of materials we haven't dreamed of

Promising new approaches to pollution prevention,  
resource conservation, and cost reduction



# Industrial companies using biotech



*Leather*



*Flavors &  
Fragrances*



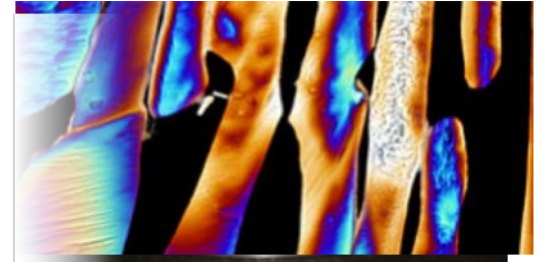
**Geltor**

*Collagen*



**LYGOS**

*Chemicals*



**Bolt  
Threads**

*Fabric*





# FEAR

AP Photo / Nick Ut  
AP Photo/Nick Ut

# Biotechnology in food chain

Climate change and consumer demands affecting food supply

Biotechnology is now more **consumer-facing** with crops, food, food ingredients, animal breeding, and animal feed

Don't come with a clean slate  
(GMO backlash)



# Biotechnology in crop production

Higher crop yields with fewer inputs

Less chemicals use and run-off

Crops with enhanced nutrition profiles

Produce foods free of allergens

Reduce fuel use and CO<sub>2</sub> emissions



More environmentally sustainable farming practices

# Biotech alternative food proteins

Microbes are factories making animal proteins

Production of alternative animal products: meat, milk, egg whites

Reduce land and water requirements to sustainably meet growing protein needs



USDA and FDA Announce Joint Public Meeting on Use of Animal Cell Culture Technology to Develop Products Derived from Livestock and Poultry - Sept. 10, 2018



# Biotechnology applications in animal health

Improve health and production  
through breeding

Better detection and treatment of  
disease

More nutritious and digestible feed

New and better vaccines



# U.S. biotech regulations

## **U.S. Department of Agriculture:** *Is it safe to grow?*

- Transgenic plants, potential plant pests
- Plant-produced industrial products

## **Environmental Protection Agency:** *Is it safe for environment?*

- Microbial pesticides, plant pesticides
- Engineered microorganisms used for industrial purposes

## **Food and Drug Administration:** *Is it safe to consume?*

- Foods, food additives, animal feed, feed additives
- Pharmaceuticals



# Regulations outside US

EU: European Food Safety Authority

Err on the side of caution, high burden of proof of safety

Focus on process rather than product (unlike U.S.)

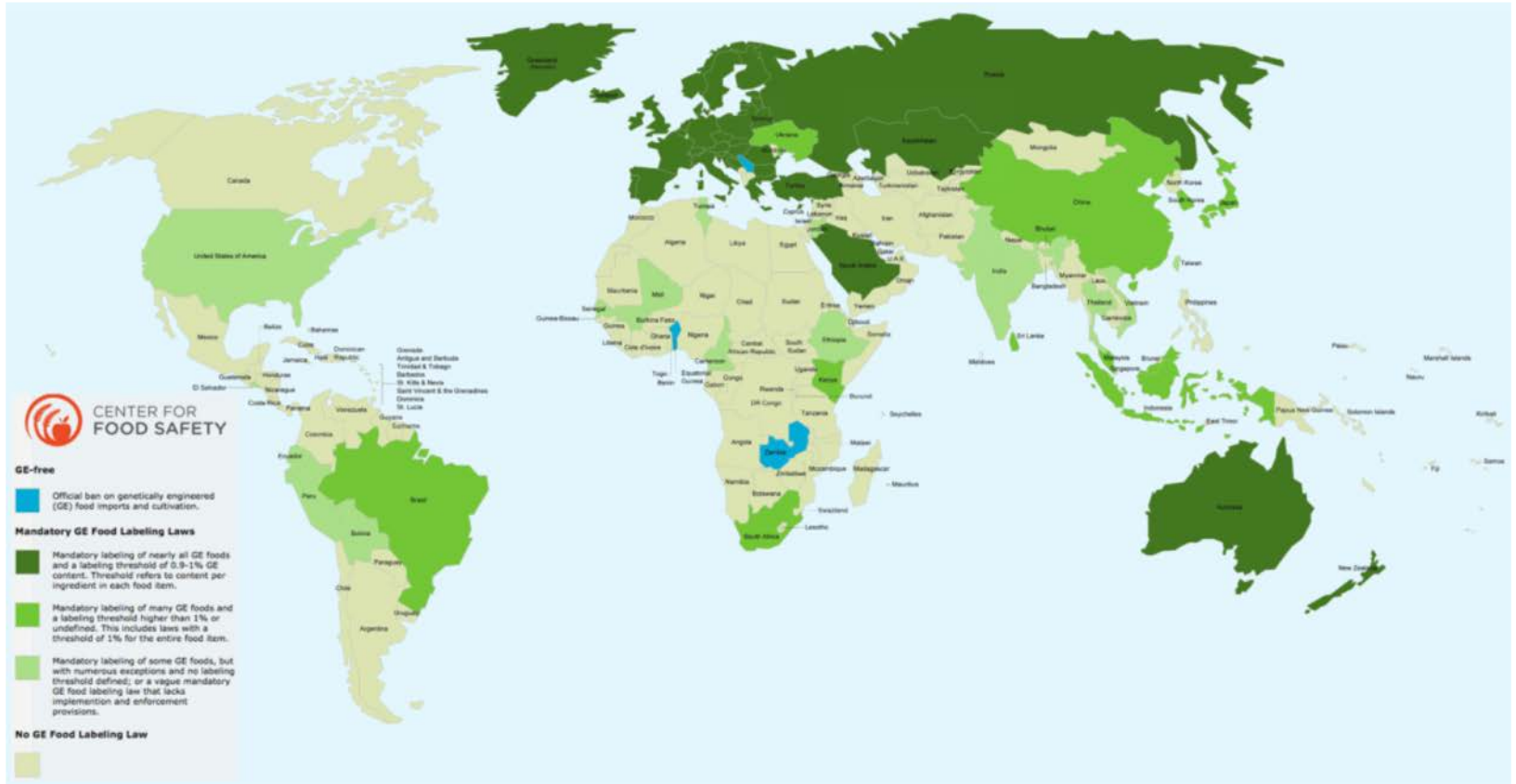
Differing labeling thresholds

EU, Saudi Arabia, Turkey and Australia: 0.9%

South Korea: 3%

Japan: 5%

# Global regulation of GMOs



# Public perception

# CLOSE THE TECH TRANSFER GAP

by engaging consumers  
early and often



# Biotechnology moving forward

Need sound policy decisions supporting innovation & risk-taking

Requires a well-informed public

Industry is worth \$ trillions and provides millions jobs

Requires funding, protection, and regulation

Risks and challenges need to be addressed through dialogues among stakeholders including policy makers, experts, the public, and NGOs

Biotech enhances all parts of our lives  
health, food, environment

# What's next?

Genome editing of microorganisms, plants and animals

Signs of increasing public acceptance

AI, machine learning, robotics

Advancing different legal and technical ways to work and new biz models

Speed and confluence of new tools and technologies