

Chapter 6: Genetic Engineering

TB ch. 14-3, p. 331

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Essay 2: Having a tough time starting?

Try "Issues in Biology", p. 330

Do Genetically Modified Foods Need Stricter Controls?

Read and answer #2. You may choose this topic for your essay. It would fall under the choice of Genetically Modified Organisms

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Applications of Genetic Engineering

Genetic Engineers have the ability to change the DNA sequence of a living organism.

In the past, this process has been a "hit or miss" trial, but nowadays, scientists can precisely remove and add DNA to experiment or change the genetic nature of organisms.



ex: genes that create bioluminescence in fireflies were isolated and injected into tobacco plants.

The result: glowing tobacco!

Figure 13 - 12, p. 331

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Transgenic Organisms

Transgenic organisms contain genes from other organisms. The result is mostly synthetic - created by humans - instead of natural.

Biotechnology, as it exists today, is largely dependent on transgenic organisms, and experiments done in this area of study.



BBC Headline:

Thursday, 25 April 2002, 03:16 GMT 04:16 UK
Artificial liver 'could be grown'

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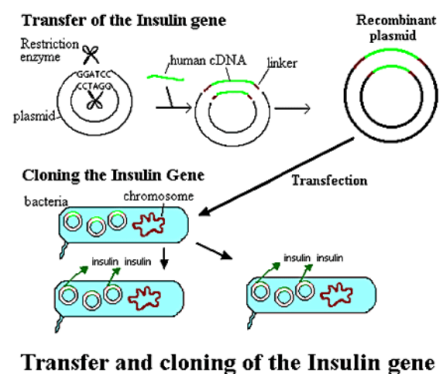
Transgenic Microorganisms

Bacteria reproduce quickly and are simple (and cheap!) to grow in laboratory conditions. Because of this, they are often used to create substances necessary for medicine and various industries.

Human proteins, such as insulin, can be grown using bacteria, making the product cheap and plentiful.

In order for this process to work, human genes for necessary proteins or chemicals are inserted into bacterial DNA, and the product is isolated from the colony at a much reduced price (when compared to the alternative - human donations, or natural animal alternatives).

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Transgenic Animals

Many transgenic animals are currently being used as test-subjects to better understand the human body.

ex: rodents created to have an immune system similar to humans will react the same way we would to infections.

Some researchers are trying to create organisms that would be resistant to parasites or bacteria that make us sick when we eat them, or create animals that have a higher protein count.

ex: Salmon are currently being grown in farm that have genes designed to make them grow fatter and faster.

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When Transgenes Wander, Should We Worry?

ScienceDaily (July 30, 2006)



Aqua Bounty has applied for federal approval to commercially produce a growth-enhanced, transgenic Atlantic salmon (*Salmo salar*). At 18 months, the transgenic fish is clearly much larger than the same-age normal fish. But overall growth of the same generation of fish evens out by 36 months. (Image Credit: Aqua Bounty Technologies)

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Producing Transgenic Animals

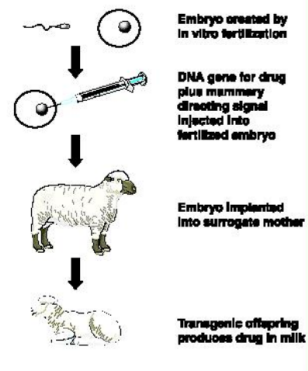
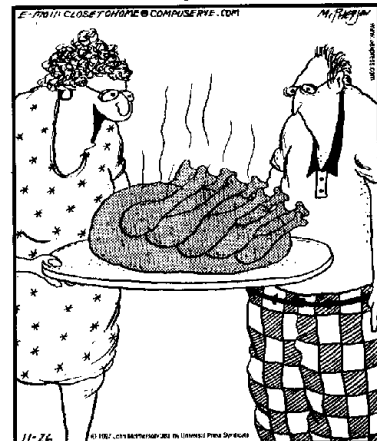


Figure 2.

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Close to Home By John McPherson



"Isn't genetic engineering amazing? Two years ago who would have even imagined such a thing as a Turkipede?"

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Transgenic Plants

Trangenic plants have been available on the market for over a decade. Most of these plants contain genes that produce chemicals to prevent insect attack, or chemicals to resist weed-killing sprays used by the farmers.

Some plants are being created to contain more nutrition, such as vitamin A, or even human antibodies that would help us fight infection in our own race.



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Where GMOs Are Grown

GMO statistics show that the country with the highest amount of genetically modified foods as of the year 2000 was by far the United States. According to Stanford University, the breakdown by county of the four largest producers was as follows:

- United States – 68%
- Argentina – 23%
- Canada – 7%
- China – 1%

Other countries that have grown GMOs commercially are Uruguay, Australia, France, Bulgaria, Germany, Mexico, South Africa and Romania

Source: Love to know. 2009. [GMO Statistics](http://organic.lovetoknow.com/GMO_Statistics). URL: http://organic.lovetoknow.com/GMO_Statistics. Information obtained on October 29, 2009.

Summary of global land use for GM crops in 2001 and 2002

Plant	Property	M. ha	2001 in %	M. ha	2002 in %
Soya	Herbicide tolerance	33.3	63	36.5	63
Maize	Insect resistance	5.9	11	7.6	13
Maize	Herbicide tolerance and insect resistance	1.8	3	2.2	4
Maize	Herbicide tolerance	2.1	4	2.5	4
Rape	Herbicide tolerance	2.7	5	3.0	5
Cotton	Herbicide tolerance	2.5	5	2.2	4
Cotton	Insect resistance	1.9	4	2.4	4
Cotton	Herbicide tolerance and insect resistance	2.4	5	2.2	4
Total		52.6	100	58.7	100

Source: State Laboratory of the Canton Basel City, 2003. [Genetically modified organisms in food: investigation statistics from 1998 to 2003](http://www.kantonlabor-ba.ch/files/baerliche/Report0356.pdf). URL: <http://www.kantonlabor-ba.ch/files/baerliche/Report0356.pdf>. Information obtained on October 29, 2009.

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The problem?

Many transgenic organisms have been patented, and in the case of plants, companies sell the seeds at a high price. Some seeds have been created to produce only seedless plants, so farmers have to buy the seeds every year, rather than harvest their own seeds.

Others have seeds that spread to neighboring fields and create a hybrid generation for the next year, but companies retain the right to "sue" or destroy crops that contain their transgenic DNA but hasn't been paid for...

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