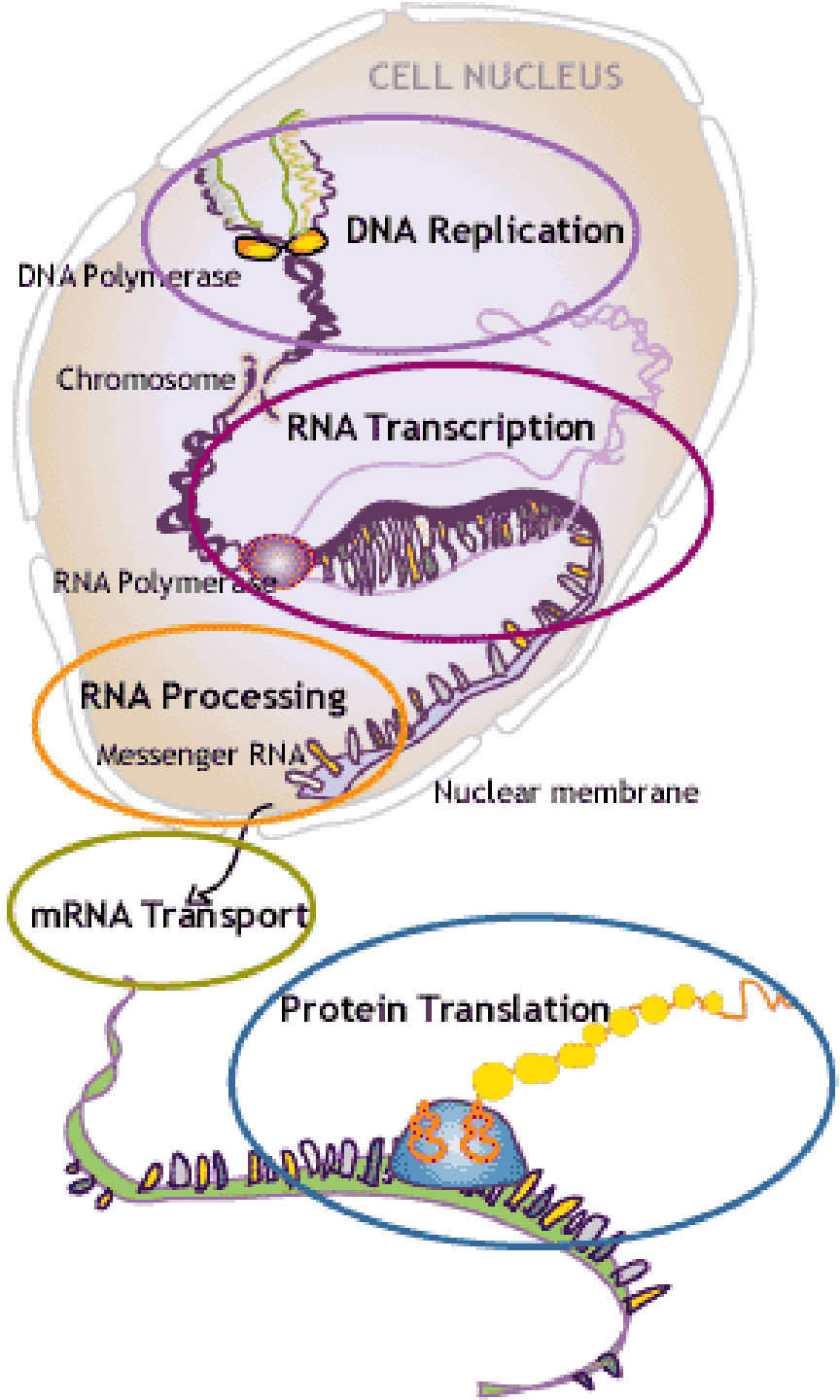
Genetic Engineering

The Science of the Future



From Gene to Protein

Gene- a sequence of DNA which codes a protein

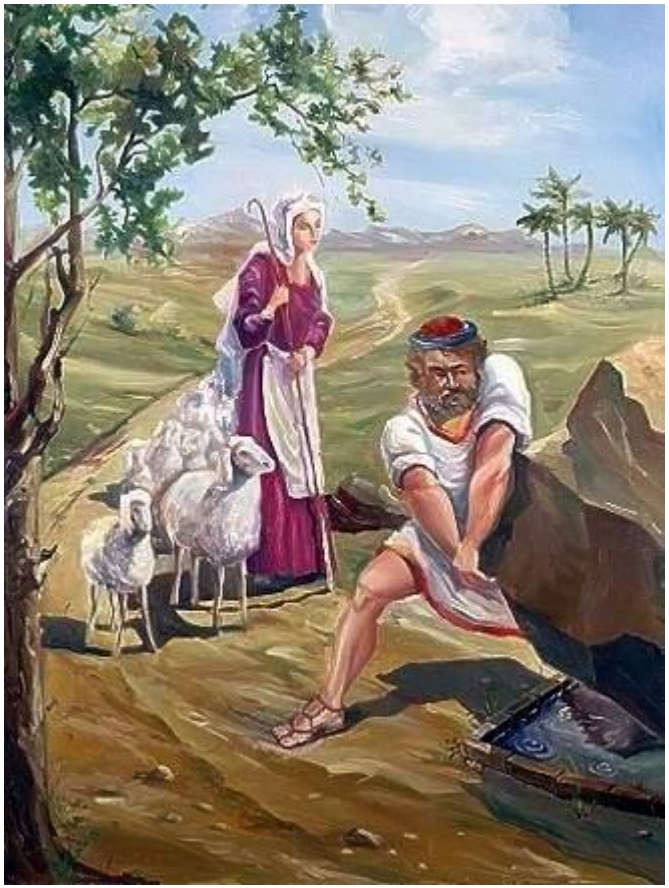
Different organism have different traits. In other words, they have different genes and express different proteins.

What if we could take a certain gene and transfer it to a different organism?

It's Possible!

What was done in the past?

Even thousands of year ago, people manipulated and influence the genomes of organisms.



Hybridization: connecting two species to get the desired, mixed traits.

What was done in the past?

Plant species improvement through hybridization:

Plants A and B would have to be hybridized many times to yield a plant with all the desired traits of plant A, but with the resistance of plant B.

A mix of plants containing combinations of these traits

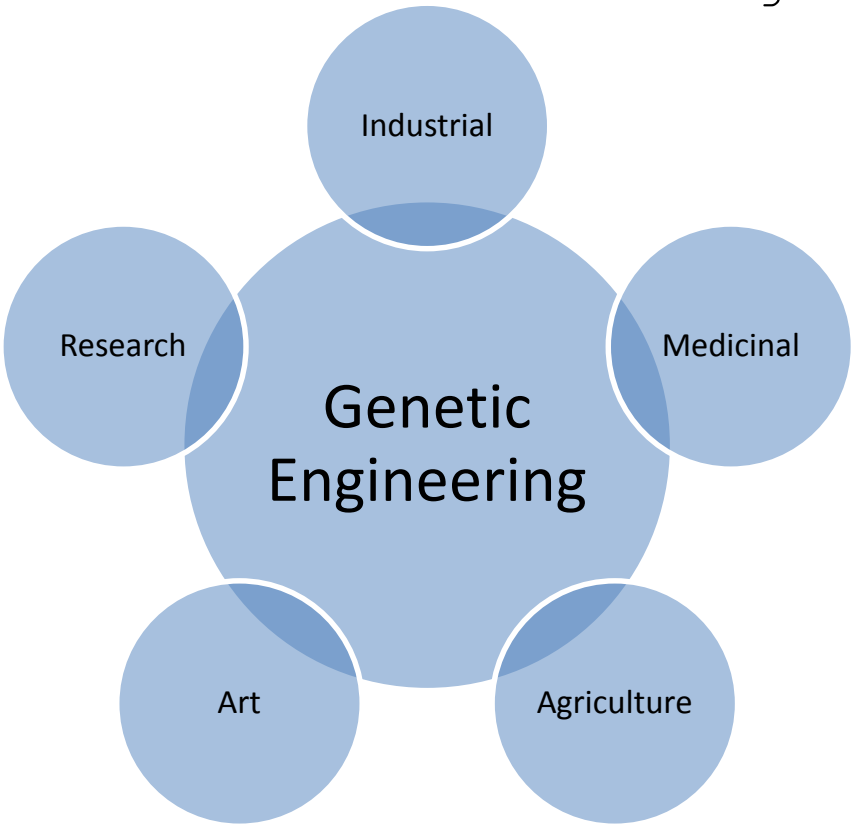
Plant A
Long stalk
Resistant to drought
High quality fruit
Ruined by Heliotis worm

Plant B
Short stalk
Resistant to drought
Tasteless fruit
Resistant to Heliotis

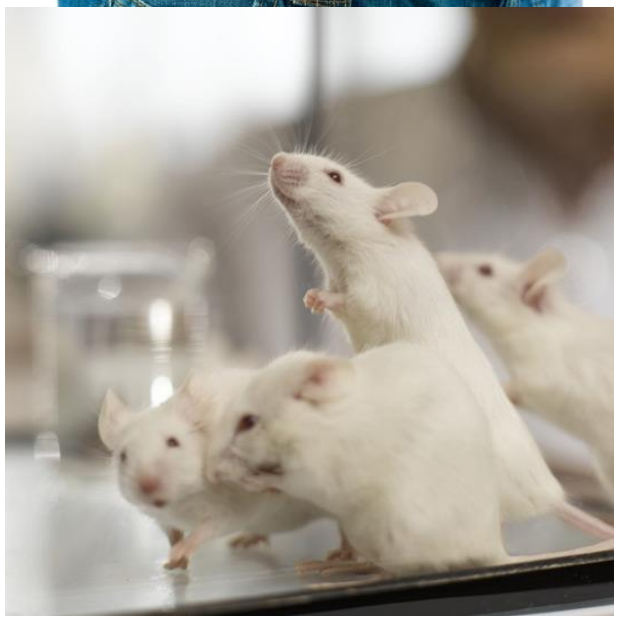
Using genetic engineering, we can transfer **only the desired trait!**

Genetic Engineering

A process of synthetically adding or changing genes, which leads to a change in the traits of an organism.



Medicine



-Creation of materials with medicinal purposes in yeast/bacteria:
Insulin (for diabetic patients)
Vaccinations
Antibodies

-All of the examples above can also be created using animals.

-Animals for use as a model for humans in medical research- obesity, diabetes,cardiac problems.

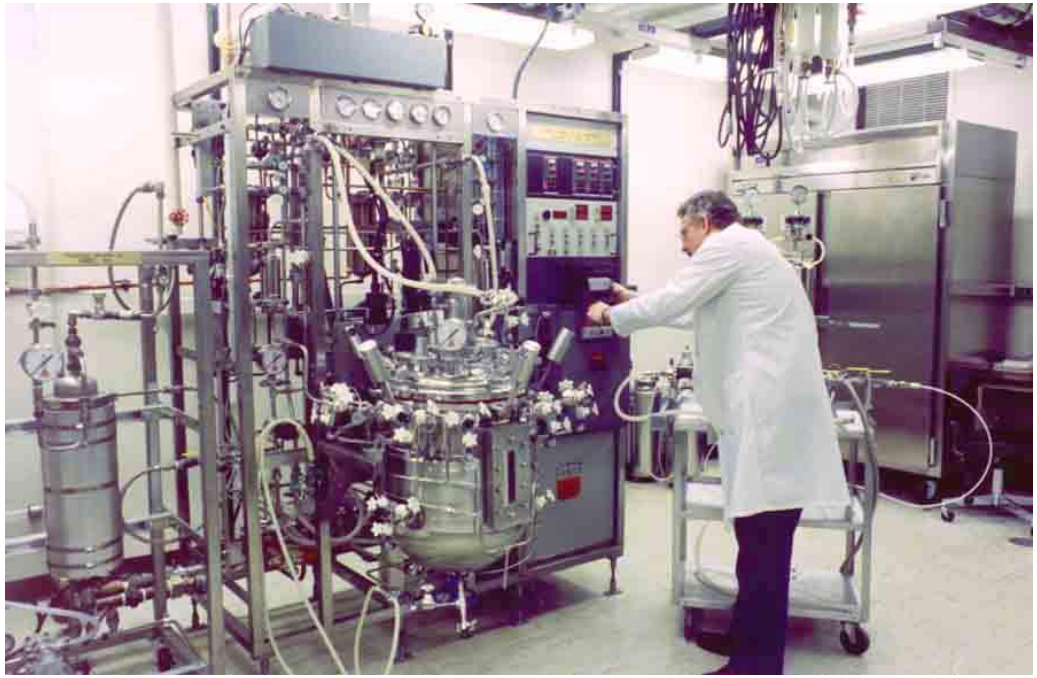
-Gene therapy- controlling the human genome for disease treatment.

Research

Research on gene activity and influence

Research on the influence of various material on cells

Industry

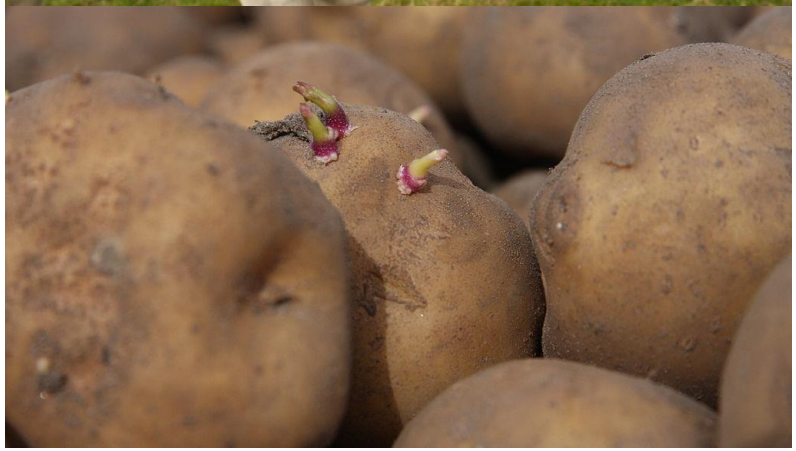


Industrial production of:
Enzymes
Insulin
Hormones
Vaccinations

Biofuel production

Cleaning ocean pollution

Identification of harmful chemicals in water.



Agriculture

Plant and animals are genetically engineer for:
Protection from environmental conditions

Protection against pests and insects

Protection from viruses

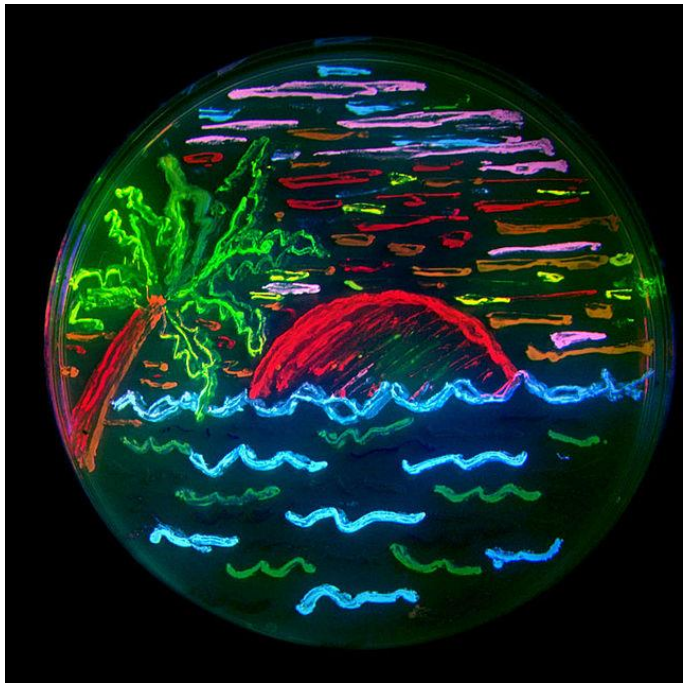
Increasing production yield and increasing product quality (nutrition, taste,…)

Art

Colorful and
glowing bacteria

Glowing fish

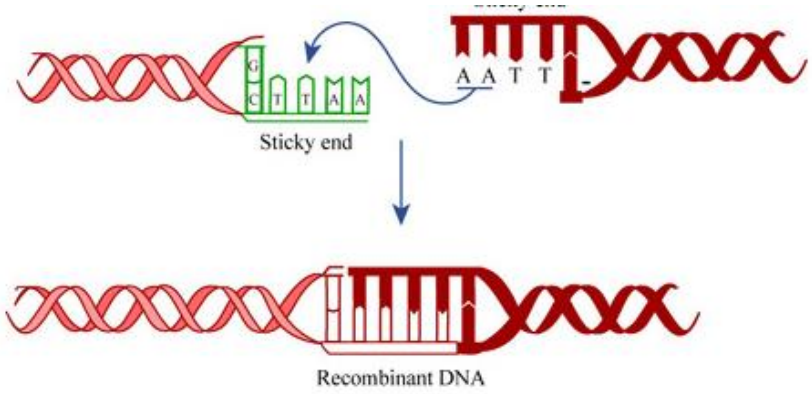
Purple roses



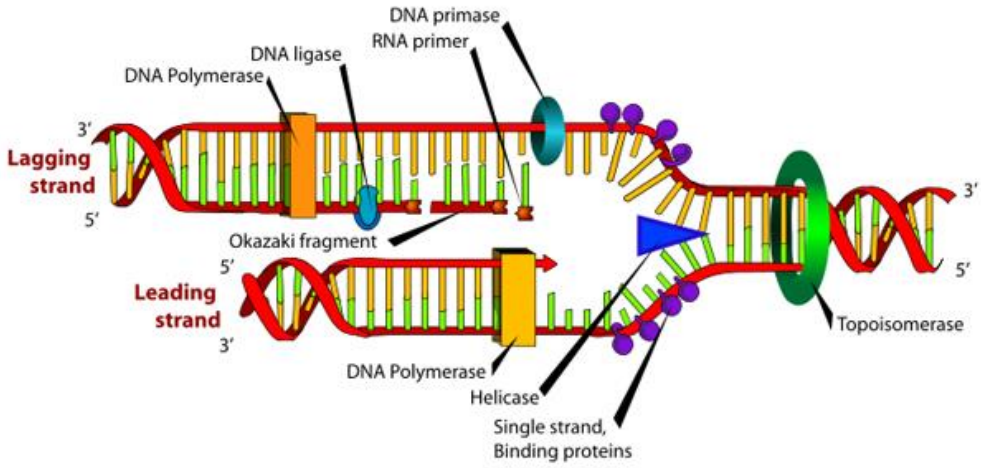
How do we do this?

In order to control the traits of an organism, we must control its DNA.

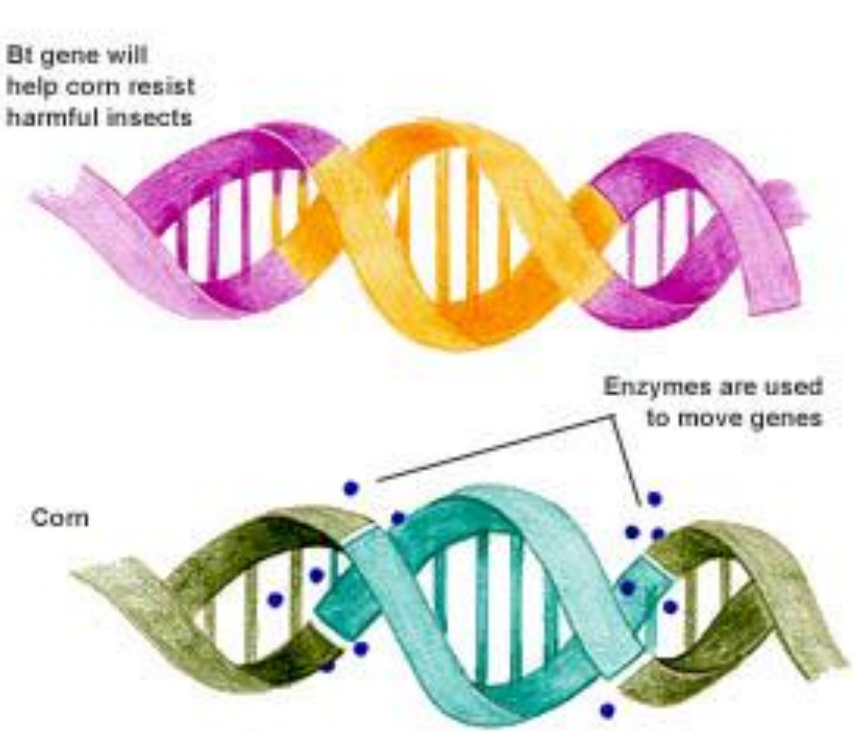
What manipulations can be done on DNA molecules?

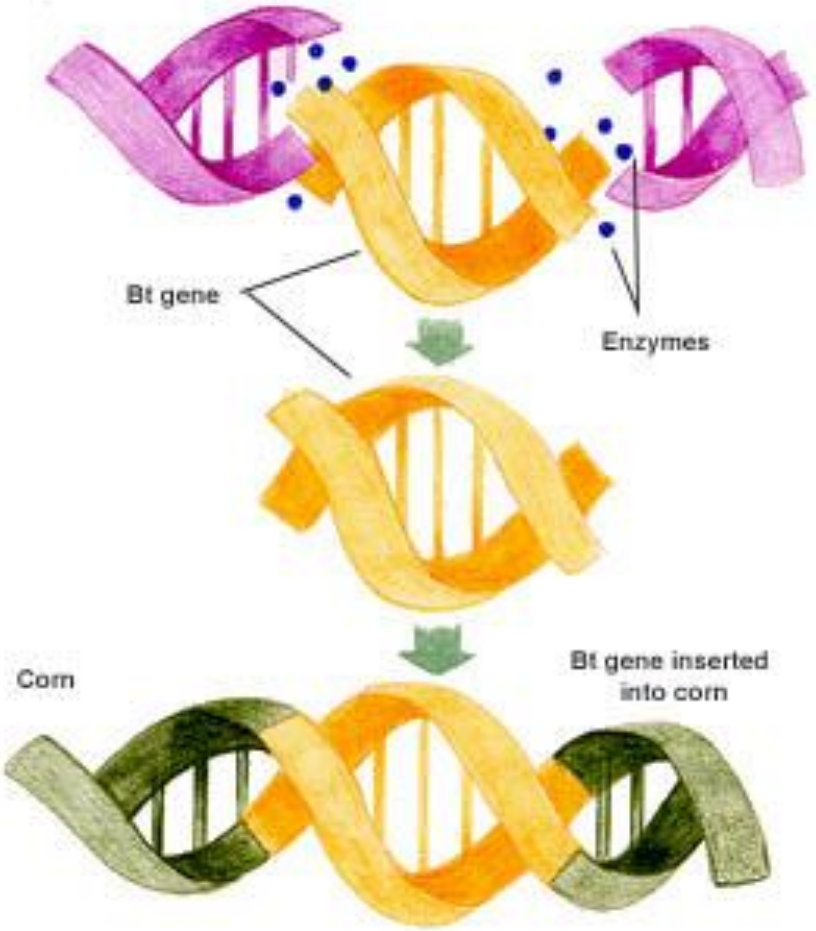


Enzyme- a material, usually a protein, which act as a catalyzer of chemical processes.



How do we do this?





We'll be trying this out in the lab!