Genetic Engineering

- **Genetic engineering**: Changing the DNA in living organisms to create something new.

- This organisms are called **Genetically Modified Organism (GMO)**

- **Example:**
- Bacteria that produce human insulin

- Genetically Modified organism are called **transgenic organism**; since genes are transferred from one organism to another.

Some genetic engineering techniques are as follows:

1. **Artificial selection**
   A. selective breeding
   B. hybridization
   C. inbreeding

2. **Cloning**
3. **Gene splicing**
4. **Gel electrophoresis:** analyzing DNA

1. **artificial selection**: breeders choose which organism to mate to produce offspring with desired traits.

- They cannot control what genes are passed.
- When they get offspring with the desired traits, the maintain them.

Three types of artificial selection:

A. selective breeding

B. hybridization

C. inbreeding

A. Selective breeding: when animals with desired characteristics are mated to produce offspring with those desired traits.

- Passing of important genes to next generation.
- Example: Champion race horses, cows with tender meat, large juicy oranges on a tree.

- For example people breed dogs for specific purposes.
- Dachshund were once bred to hunt badgers and other burrowing animals.
- They must be small to fit into the animals hole in the ground.

- Selective breeding occurs when you choose the best male and female to breed.
- This allows you to fine tune and control the traits
- The offspring or babies will then have the best traits.
- Then you continue to breed those organism with the best traits, those traits will be maintained.

- **<u>Examples of selective breeding:</u>**

- Angus cows are bred to increase muscle mass so that we get more meat,

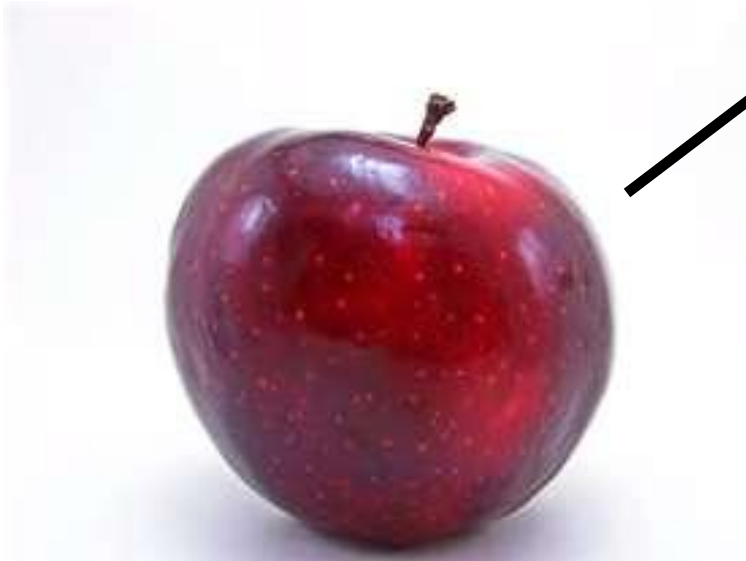
- Egg-Laying Hen-produces more eggs than the average hen

- **<u>B. Hybridizations</u>**: two individuals with unlike characteristics are crossed to produce the best in both organisms.
- Example: Luther Burbank created a disease resistant potato called the Burbank potato.
- He crossed a disease resistant plant with one that had a large food producing capacity.
- Result: disease resistant plant that makes a lot of potatoes.

Other Examples of hybridization:

1. Liger: lion and tiger mix

2. Grape + apple= grapple. The fruit tastes like grapes and looks like apple.



C. Inbreeding breeding of organism that genetically similar to maintain desired traits.

- Dogs breeds are kept pure this way.
- Its how a Doberman remains a Doberman.
- It keeps each breed unique from others.
- Risk: since both have the same genes, the chance that a baby will get a recessive genetic disorder is high.
- Risks: blindness, joint deformities.

2. Cloning: creating an organism that is an exact genetic copy of another.

- **Clone:** group of cells or organisms that are genetically identical as a result of asexual reproduction

They will have the same exact DNA as the parent.

How is cloning done?

- A single cell is removed from a parent organism.
- An entire individual is grown from that cell.
- Remember one cell has all the DNA needed to make an entire organism.
- Each cell in the body has the same DNA, but cells vary because different genes are turned on in each cell.

Dolly:

- Dolly was the first mammal cloned.
- She had the same exact DNA as her mother and had no father.
- Cloning is a form of asexual reproduction.
- Only one genetic parent.

http://content.tutorvista.com/biology_11/content/media/cloning.swf