Chapter 13: Genetic Engineering

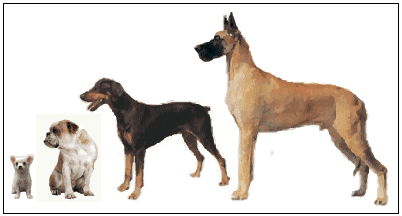
EQ: How have humans attempted to \_\_\_\_\_\_\_\_\_\_\_\_\_\_the genetics of various organisms? What are their goals?

**13-1 Changing the Living World**

Humans have made use of the genetic variation that occurs in all living things through the process of **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_breeding**.

How is it accomplished?: By allowing \_\_\_\_\_\_\_\_\_\_\_\_\_\_those organisms with the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_traits to \_\_\_\_\_\_\_\_\_\_\_\_\_, humans have been able to produce many different breeds of some species including:

1. 2. 3. 4.



What is **hybridization?** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(disease resistance and high crop yields).

What is the goal of inbreeding? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Many dogs breeds are inbreed often causing genetic problems (joint deformities, blindness) to develop.

# Increasing Variation

Some breeders will **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_mutations to increase the amount of genetic variation they have to work with.**

What are the two most common ways this is done?

1. 2.

Most of these mutations are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the organisms. Occasionally useful mutations (like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_able to digest oil) are produced.

Many plants (citrus fruit, flower varieties) have been exposed to levels of chemicals that prevent their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_from separating thus creating **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**(many chromosomes).

**Continue with summary on back**

**Summary**:Write answers to each of the following questions using complete sentences.

1. How are the processes of selective breeding and inbreeding different? How are the goals of each different?

2. Explain why scientists attempt to induce mutations in some organisms.

3. How is genetic engineering fundamentally different than selective breeding?

**EQ: What are the basic techniques used to manipulate DNA?**

**13-2 Manipulating DNA**

Advances in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_now allow scientists to overcome some of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_associated with selective breeding and inbreeding. The goal of **genetic engineering** is to make the desired genetic changes\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: the DNA.

What is the first step in genetic engineering?

What is the function of **Restriction enzymes**?

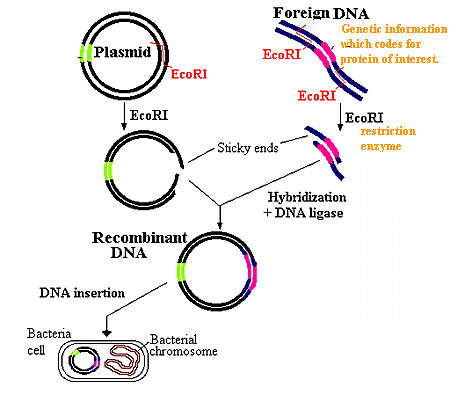
Finally the DNA fragments are separated in a process called **gel electrophoresis**.

In this process \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is used to pull \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_fragments through a gel. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and lighter fragments are pulled the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and farthest.

# Using the DNA Sequence

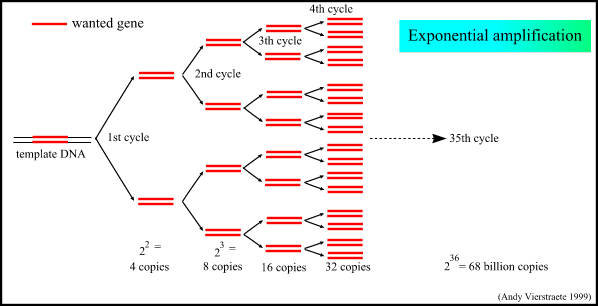
Once isolated a DNA fragment can be read, studied, and changed.

What is **Recombinant DNA?**



**Continue on back**

What process is used to make copies of the recombinant DNA?



**PCR does artificially what a cell would do normally during replication.**

**13-3 Cell Transformation**

What is **Transformation**?

***Bacteria can be transformed by placing them in close proximity to foreign DNA****.*

What is the function of a **genetic marker?**

Plant cells can be transformed by using bacteria (already transformed) that carry specific genes.

How are animal cells transformed?

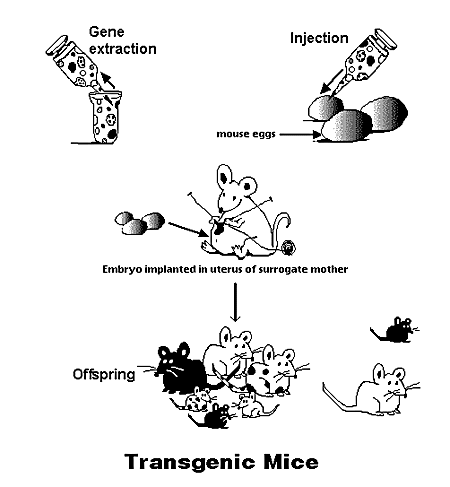
*It is important to remember that only a small number of cells are transformed using these techniques. Genetic markers indicate successful transformations.*

**Summary: Name and briefly describe three techniques used to manipulate DNA?**

**EQ: How have humans applied the techniques of genetic engineering?**

**13-4 Applications of Genetic Engineering**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**organisms contain genes from other\_\_\_\_\_\_\_\_\_\_\_\_\_\_. These are also called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**(genetically modified organisms). Transgenic bacteria, because they reproduce quickly, are used to produce\_\_\_\_\_\_\_\_\_\_\_\_, growth hormone, and one of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_factors needed by hemophiliacs.



Transgenic animals have been produced that grow faster and produce a better quality meat. Some transgenic plants produce a large percentage of the food supply used to feed livestock.

# Cloning

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**are genetically \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_organisms produced from a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_egg. Simple organisms like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_are easy to clone. Cloning of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is much more difficult and remains very\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.