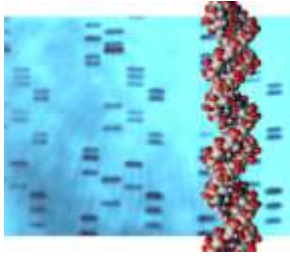


DNA Technology



DNA Technology

- **DNA Technology**- the science of manipulating DNA...
- **SO WHAT DOES THAT MEAN?**



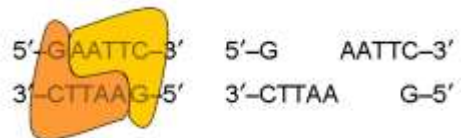
DNA Technology

- DNA Fingerprinting
- The Human Genome Project
- Genetic Engineering
- Stem Cell Research

Tools and Techniques

- **Restriction enzymes** = "DNA scissors"
 - naturally in bacteria
 - Recognize a specific **restriction site** and CUT the DNA into pieces.
 - **Restriction site** = specific DNA base sequence recognized by a restriction enzyme

Restriction Enzymes



Genetic Engineering

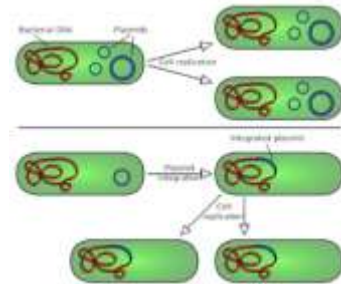
- **Recombinant DNA**- a piece of DNA that contains DNA from two different sources.
 - If we cut all the DNA with the same restriction enzyme, we can connect all the pieces.

Recombinant DNA



Recombinant DNA

- Scientists have pieced together the human gene for insulin with a bacterial plasmid.
- **Plasmid**- small, circular piece of bacterial DNA
- **Why bacteria?**
 - They reproduce asexually (**binary fission**)
 - Quick way to make millions of copies of the genes (gene cloning)



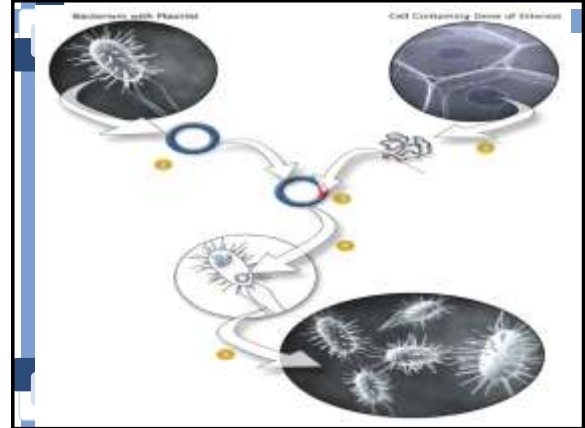
The Process

1. Find gene
 - protein
2. Isolate gene (cut it out)
3. Cut bacterial plasmid.
4. Insert gene into bacterial plasmid
5. Insert plasmid into bacteria
6. Bacteria replicate
7. Bacteria make lots of protein

Recombinant DNA

- **Transgenic organism**- contains recombinant DNA
 - also called a “GMO” (genetically modified organisms).
- Ex. Many plants resistant to pesticides

WHAT'S the CONCERN??



Stem Cells

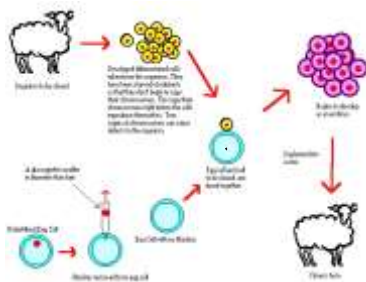
- Cells become **specialized for a specific function**.
- This happens through **genes being turned on and off**.
- **Stem Cells**- unspecialized, all genes still turned on.
 - Can become any type of cell

Stem Cells

Pluripotent Stem Cells



Cloning



The Human Genome Project

- **Goals:**
 1. To locate all genes in the human DNA.
 2. To determine the sequence of all genes in the human DNA
- **Why?**
 - To help find markers for diseases
 - To help find cures for diseases with a genetic basis.

Ethical Issues

- What are some of the ethical issues that come along with such knowledge?
- What do you think should be controlled?

Ethical Issues

Gene Therapy

- Insertion, alteration, or removal of genes within a cell (organism) to treat disease
 - Often use viruses

