

Genetic Technology Notes (completed)

What are genetic technologies & applications?

- ways in which humans use knowledge of genetics to manipulate or use DNA

What is the purpose of genetic technologies?

- study biological questions and benefit humans and solve problems of society, including diseases, nutrition shortages, crime, etc.

Why are all of these technologies possible, and what does this suggest about the relationships among all organisms on earth?

- the genetic code of DNA is universal (all organisms use the same code), suggesting all organisms are descended from one common ancestor

Technology	Description	Uses / Examples
<p>CRISPR</p>	<ul style="list-style-type: none"> • Use bacterial enzymes and specific strands of nucleic acid to cut an organism’s genome <ul style="list-style-type: none"> ○ can “turn off” harmful genes, and/or ○ add in beneficial new genes 	<ul style="list-style-type: none"> • study what unknown genes do • cure genetic diseases • genetically engineer organisms
<p>DNA Sequencing</p>	<ul style="list-style-type: none"> • “Reading” the exact nucleotide sequence of a strand of DNA 	<ul style="list-style-type: none"> • The Human Genome Project – determining the exact genetic code of human beings <ul style="list-style-type: none"> ○ Identify causes of genetic diseases • Everything DNA fingerprinting can do, but better (but more \$\$)

Technology	Description	Uses / Examples
Recombinant DNA / Genetic Engineering	<ul style="list-style-type: none"> • Inserting one organism's DNA into the genome of another • Any organism is able to "read" any other organism's DNA because the "code" is universal. 	<ul style="list-style-type: none"> • CRISPR • Genetically modified organisms (GMOs) or food • Scientific research • Medicine and gene therapy
Cloning	<ul style="list-style-type: none"> • Use the body cell (not a sex cell) of 1 adult to make a genetically identical individual 	<ul style="list-style-type: none"> • Scientific research • Making copies of genetically engineered organisms
DNA Fingerprinting	<ul style="list-style-type: none"> • Unique patterns made by different samples of DNA <ul style="list-style-type: none"> ○ <i>Identical</i> patterns mean same DNA (same person) ○ Similar patterns mean a genetic relationship (same family) 	<ul style="list-style-type: none"> • Forensics (criminal justice) • Paternity testing • Studying evolutionary relationships
Karyotyping	<ul style="list-style-type: none"> • Organizes a person's chromosomes into homologous pairs by size 	<ul style="list-style-type: none"> • Identify chromosomal mutations (e.g. triploidy 21, Down's Syndrome) • Identify sex (males XY, females YY)