



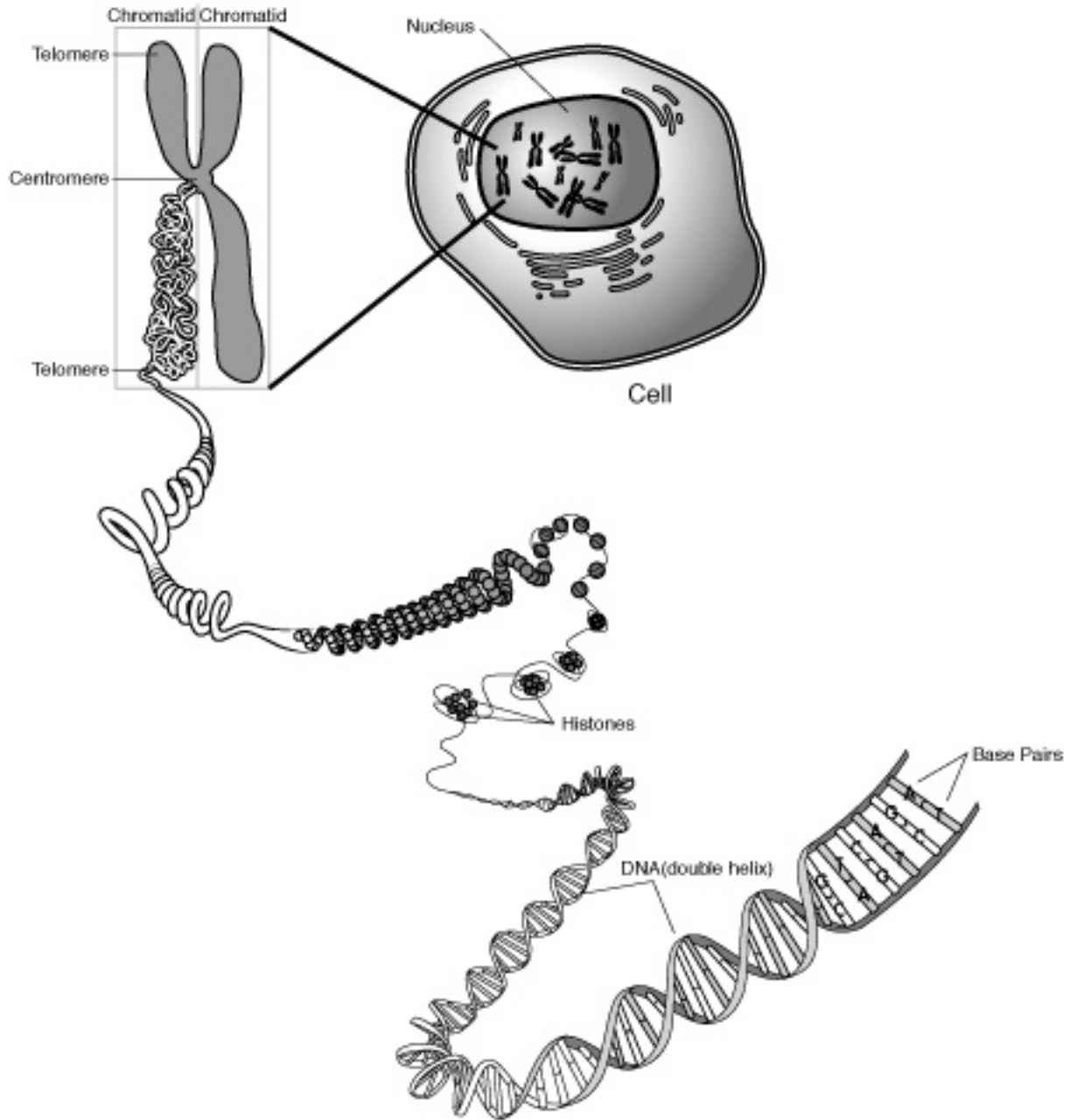
Biotechnology Tools

Gel Electrophoresis

DNA

- **DNA of all organisms share many characteristics**
- **All organisms have same bases:**
 - **A, T, C, G**
 - **only the order changes**
- **Virtually all DNA molecules form the double helix**

Chromosome



DNA structure

S = sugars
(deoxyribose)

P = Phosphate group

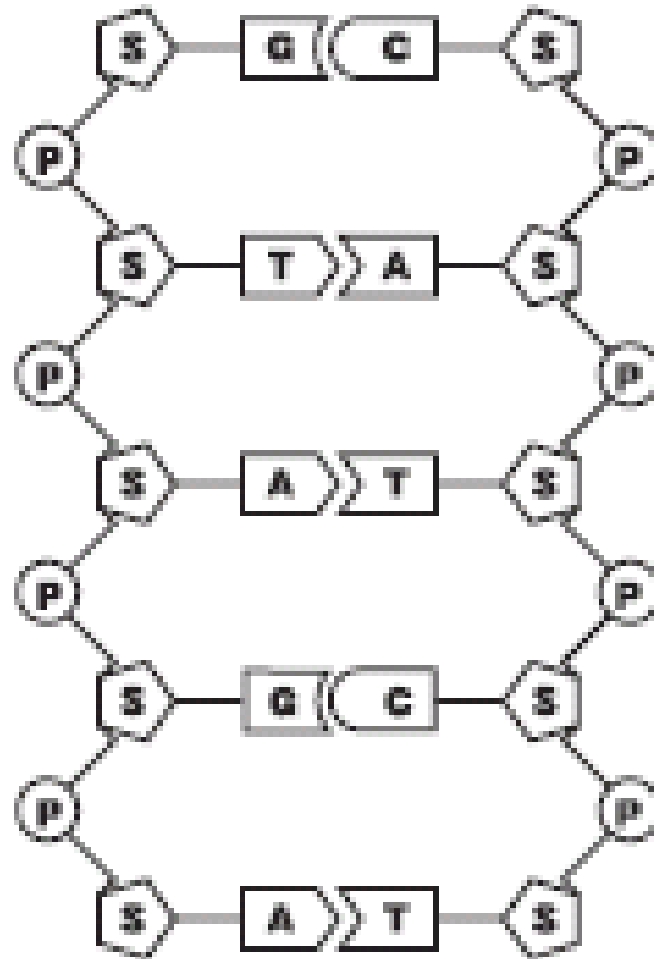
Nitrogenous Bases:

A= adenine

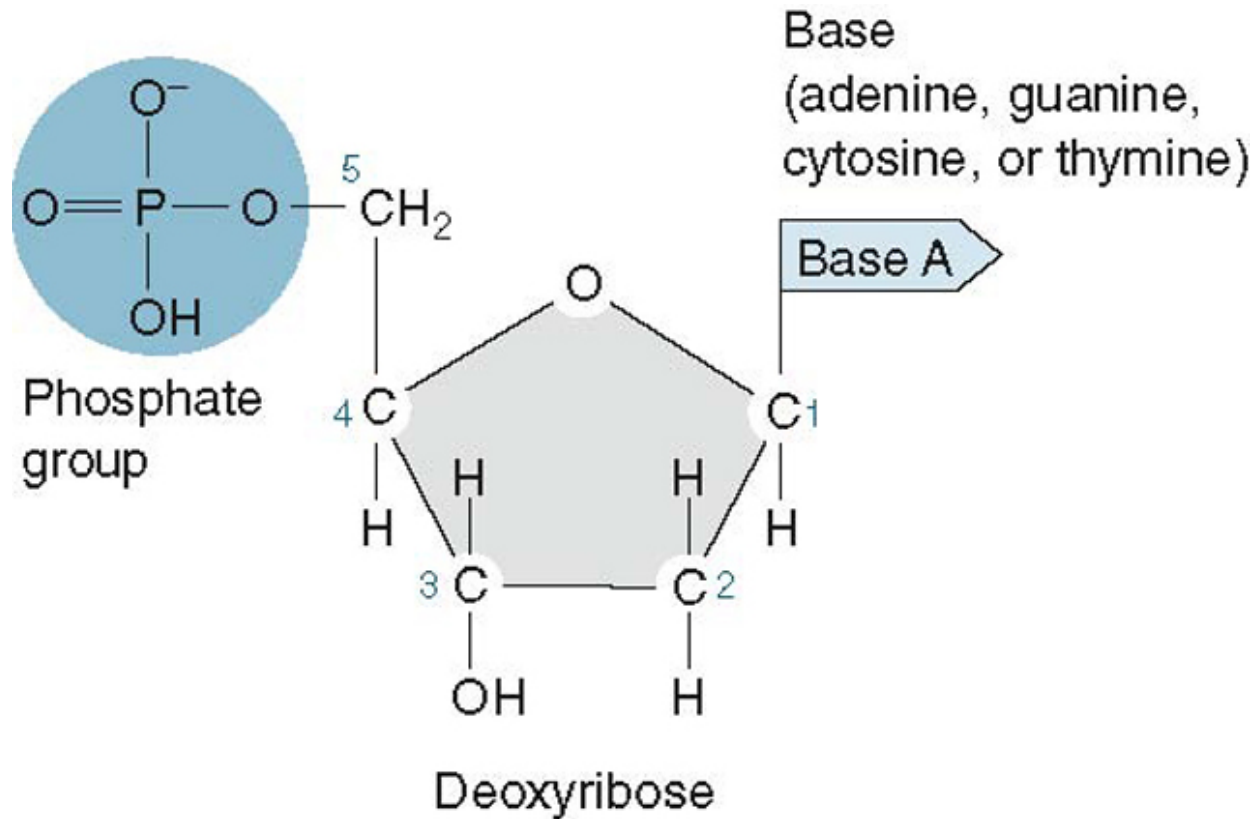
C= cytosine

G= guanine

T = thymine



DNA Bases

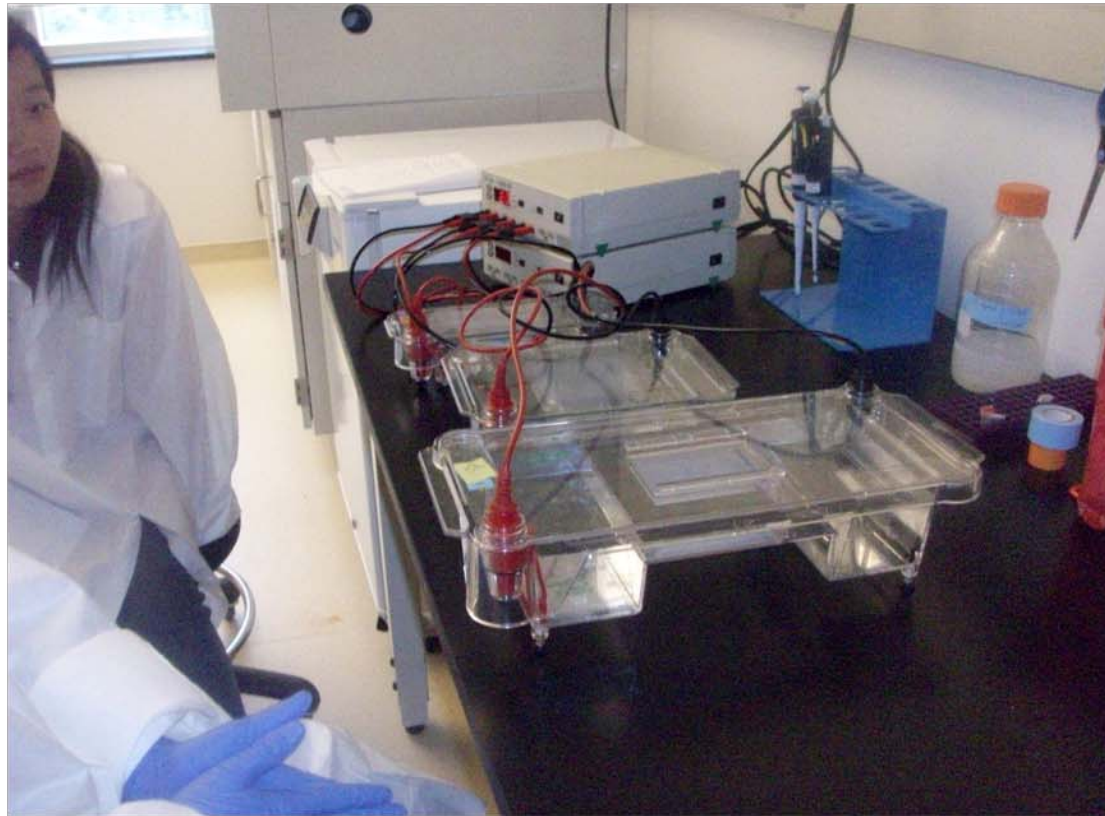




Gel Electrophoresis

- Used to study molecules
- Requires charged molecules (DNA fragments, RNA or proteins)
- Electrical current to separate molecules

Gel electrophoresis apparatus



Adding DNA fragments to the gel



Connecting the electrical current



Animation – Gel Electrophoresis

- [DNA manipulation - Gel Electrophoresis](http://www.dnai.org)
www.dnai.org

Gel Electrophoresis:

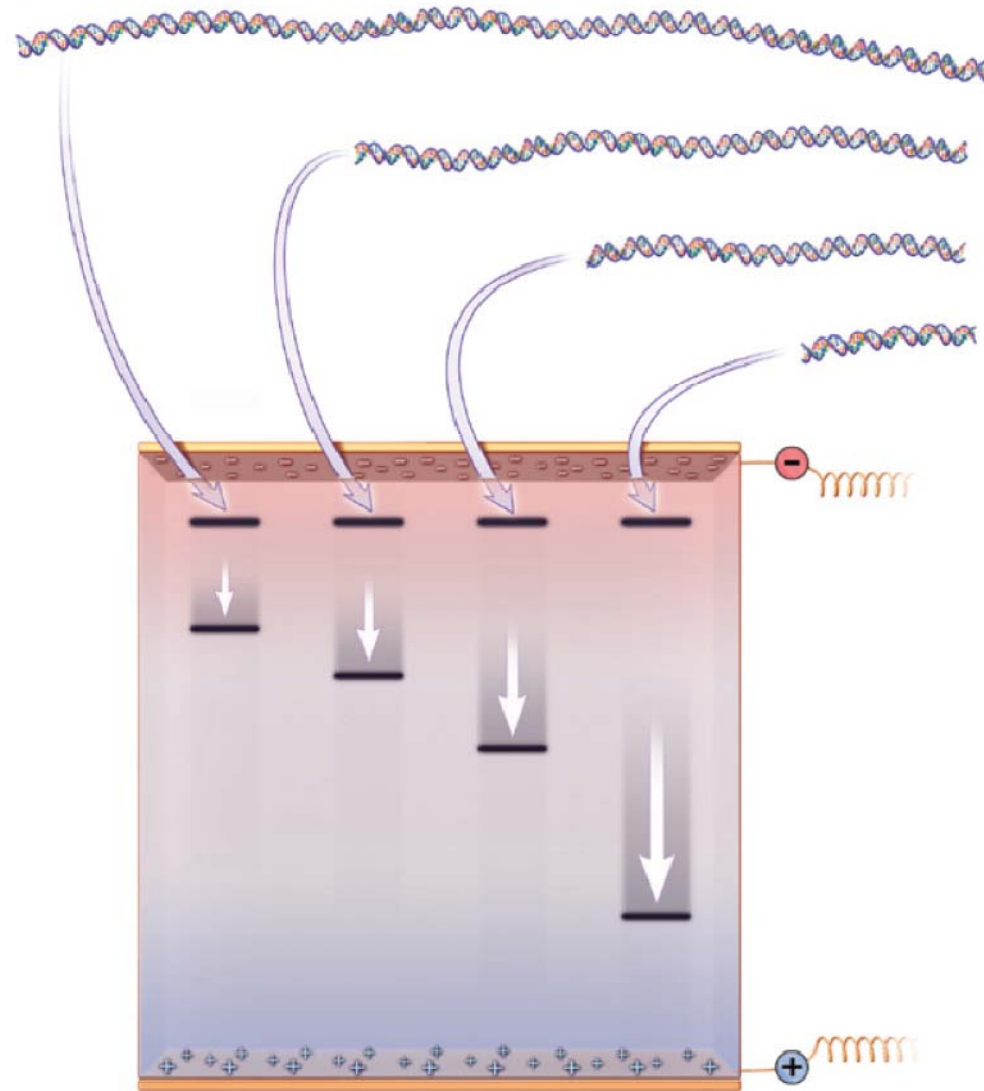
Separates based on size or shape

- Must cut DNA into “workable” sizes using restriction enzymes
- Agarose gels used for 500 – 25,000 base pairs
- Buffer solution – with salt to help conduct electricity, control the pH and maintain the shape of the molecules
- Stain – to see the colorless DNA strands

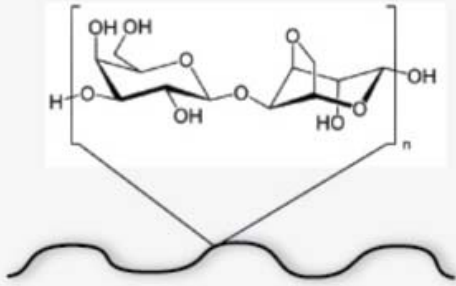
Analysis using Gel Electrophoresis

- Cut the DNA into fragments, choosing a specific restriction enzyme
- DNA fragment will migrate based on their size
 - Smaller sizes travel farther
- Compare the sample to a standard of known size

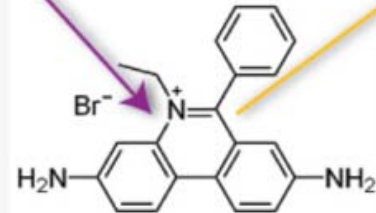
⊖ Negatively charged DNA fragments



Agarose



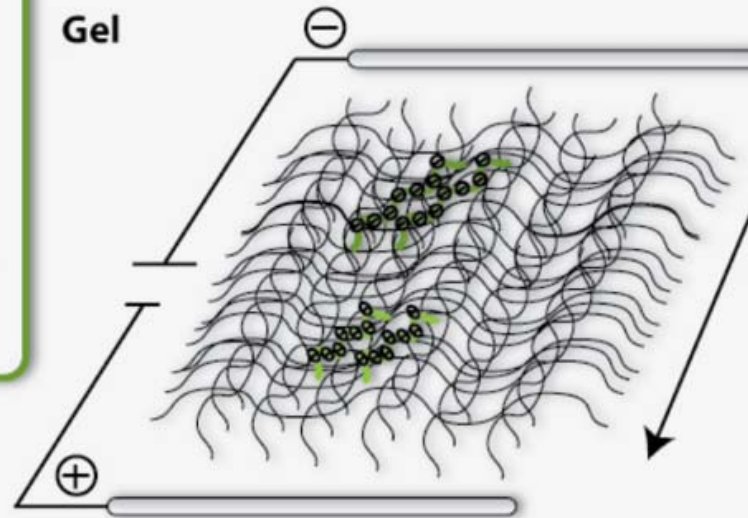
Dye to see the DNA



DNA

Agarose Gel-Electrophoresis

Gel



Animation – GE

learn.genetics.utah.edu

[Gel Electrophoresis Virtual Lab](#)

