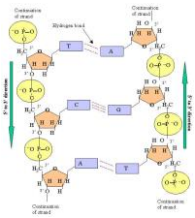
DNA and RNA

Nucleic Acids

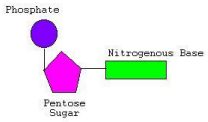
What is a Nucleic Acid?

- **Nucleic Acids** are organic molecules that carry information needed to make proteins
  - *Remember: proteins carry out ALL cellular activity*
- There are two types of nucleic acids:
  - DNA (deoxyribonucleic acid)
  - RNA (ribonucleic acid)



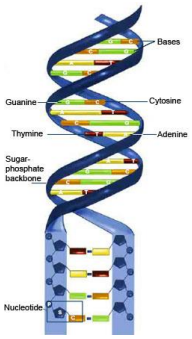
Parts of Nucleic Acid

- All nucleic acids are made up of monomers called nucleotides and have three parts:
  - Phosphate
  - Pentose sugar
  - Nitrogenous base



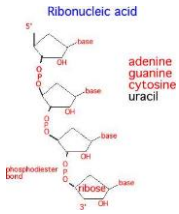
DNA Structure

- Two single chains that spiral in a double helix
- Pentose sugar is called deoxyribose
- Will have one of four nitrogenous bases:
  - Cytosine (C)
  - Guanine (G)
  - Adenine (A)
  - Thymine (T)



RNA Structure

- A single chain of nucleotides
- Has a sugar called ribose
- Has one of the following bases:
  - Cytosine (C)
  - Guanine (G)
  - Adenine (A)
  - Uracil (U)



DNA vs RNA

	DNA	RNA
Nitrogen bases	• Cytosine (C) • Guanine (G) • Adenine (A) • Thymine (T)	• Cytosine (C) • Guanine (G) • Adenine (A) • Uracil (U)
Sugar	deoxyribose	ribose
Molecule structure and shape	DOUBLE HELIX	SINGLE CHAIN OF NUCLEOTIDES

History of DNA

How was DNA's structure and function discovered?

History of DNA's Discovery

- **1869** Johann Friedrich Miescher first discovers DNA

History of DNA's discovery

- **1928** Franklin Griffith discovers that genetic information can be transferred from heat-killed bacteria cells to live ones. Provided key evidence that DNA is genetic material.

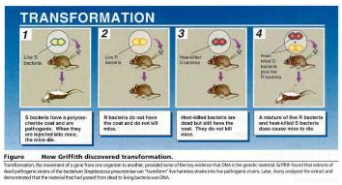
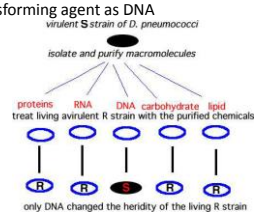


Figure How Griffith discovered transformation.

History of DNA's Discovery

- **1944** Oswald Avery, Maclyn McCarty and Colin MacLeod, identify Griffith's transforming agent as DNA

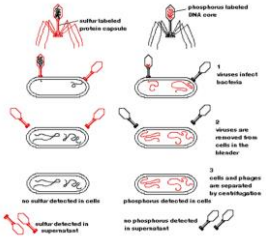


History of DNA's Discovery

- **1949** Erwin Chargaff reports that DNA composition is species-specific. Chargaff finds that the amount of adenine equals the amount of thymine, and the amount of guanine equals the amount of cytosine in DNA from every species.

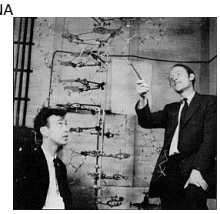
History of DNA's Discovery

- **1952:** Hershey and Chase's blender experiment confirms DNA as the genetic material



History of DNA's Discovery

- **1953** James Watson and Francis Crick discover the molecular structure of DNA



- If something is very large or very long, how do you get it to fit in a tiny space?
- The human genome is 3 billion base pairs. If lined up end to end, the DNA from a single cell would stretch about 1.8 meters. All DNA must fit in the nucleus; how do you think the cell accomplishes this?