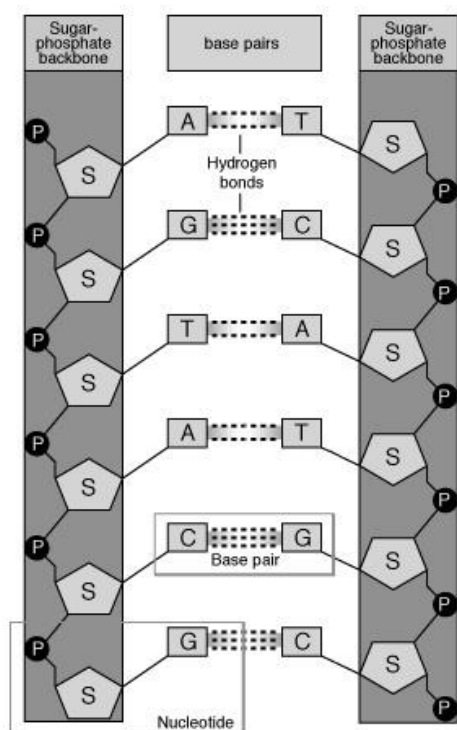


DNA MODEL ACTIVITY

BACKGROUND

Deoxyribonucleic acid, or *DNA*, carries the hereditary information. DNA and proteins make up the chromosomes of cells. Although the chemical composition of DNA was known in the 1920s, its structure was not determined until the 1950s. James D. Watson and Francis H. C. Crick worked out the structure of DNA in 1953, after long months of research. DNA is made up of molecules of the sugar *deoxyribose*, a *phosphate group*, and a *nitrogen base*. The basic unit of DNA, the *nucleotide*, is made up of one of each. A molecule of DNA may contain as many as 200,000 nucleotides. The nucleotides make up two chains that are linked and twisted around one another in the form of a *double helix*. The rungs of the DNA ladder consist of pairs of nitrogen bases. There are two kinds of nitrogen bases: *purines* and *pyrimidines*. The purines, *adenine* (A) and *guanine* (G), have a two-ringed structure while the pyrimidines, *cystosine* (C) and *thymine* (T), have a one-ring structure. In DNA, a particular *purine* always bonds with a particular *pyrimidine*. **Adenine bonds to thymine and guanine bonds to cytosine.** The purines and pyrimidines are bonded together by hydrogen bonds.



OBJECTIVES

In this activity you will:

1. Learn the basic units and structure of DNA.
2. Use paper models to understand how the units making up DNA fit together.

MATERIALS

- Scissors
- Transparent tape
- 4 Nucleotides

PROCEDURE:

1. Color the phosphates **YELLOW** and the deoxyribose sugars **PURPLE**. Color the nitrogen bases as follows: Adenine = **RED**, Thymine = **GREEN**, Guanine = **BLUE**, Cytosine = **ORANGE**.
2. Cut out each nucleotide.
3. Make a nucleotide model by using tape to “bond” the nucleotides to each other. You will create a small section of DNA that will be added to the class DNA to make one continuous strand.

CONCLUSIONS AND APPLICATIONS

1. When was the structure of DNA discovered?
2. Who discovered the structure of DNA?
3. What is the shape of DNA?
4. Give one difference between a pyrimidine and a purine.
5. What would the resulting DNA look like if two purines bonded together?
6. What determines the sequence of the nitrogen bases in a new DNA strand?
7. Write out the sequence of the new DNA segment that would form *complement* to the segment GGACTGTTA.
8. If an incorrect nucleotide is incorporated into a new strand of DNA, will this mistake be transmitted to the next generation of DNA molecules that forms from this strand?
9. When a DNA molecule replicates, are the two new strands identical to each other? Why or why not?
10. How is DNA and chromosomes related?