

# DNA -- THE DOUBLE HELIX

*(modified from The Biology Corner - Worksheets and Lessons)*

The nucleus is a small spherical, dense body in a cell. It is called the "control center" because it controls all the activities of the cell. Chromosomes, found in the nucleus, are microscopic, threadlike strands composed of the chemical DNA (short for deoxyribonucleic acid).

Chromosomes are composed of genes, which is a segment of DNA that codes for a particular protein which in turn codes for a trait. It is commonly referred to as the gene for baldness or the gene for blue eyes.

In 1953, James Watson and Francis Crick established the structure of DNA. The shape of DNA is a double helix, which is like a twisted ladder. The sides of the ladder are made of alternating sugar and phosphate molecules. The sugar is deoxyribose. Color all the phosphates red (labeled with a "p"). Color all the deoxyriboses blue (labeled with a "D").

The rungs of the ladder are pairs of 4 types of nitrogen bases. The bases are known by their coded letters A, G, T, C. These bases always bond in a certain way. Adenine will only bond to thymine. Guanine will only bond with cytosine. The bases can occur in any order along a strand of DNA. The order of these bases is the code that contains the instructions. For instance ATGCGCATAT would code for a different gene than CGATCGCGAT. A strand of DNA contains millions of bases.

Color the thymines orange.



Color the adenines green.



Color the guanines purple.



Color the cytosines yellow.

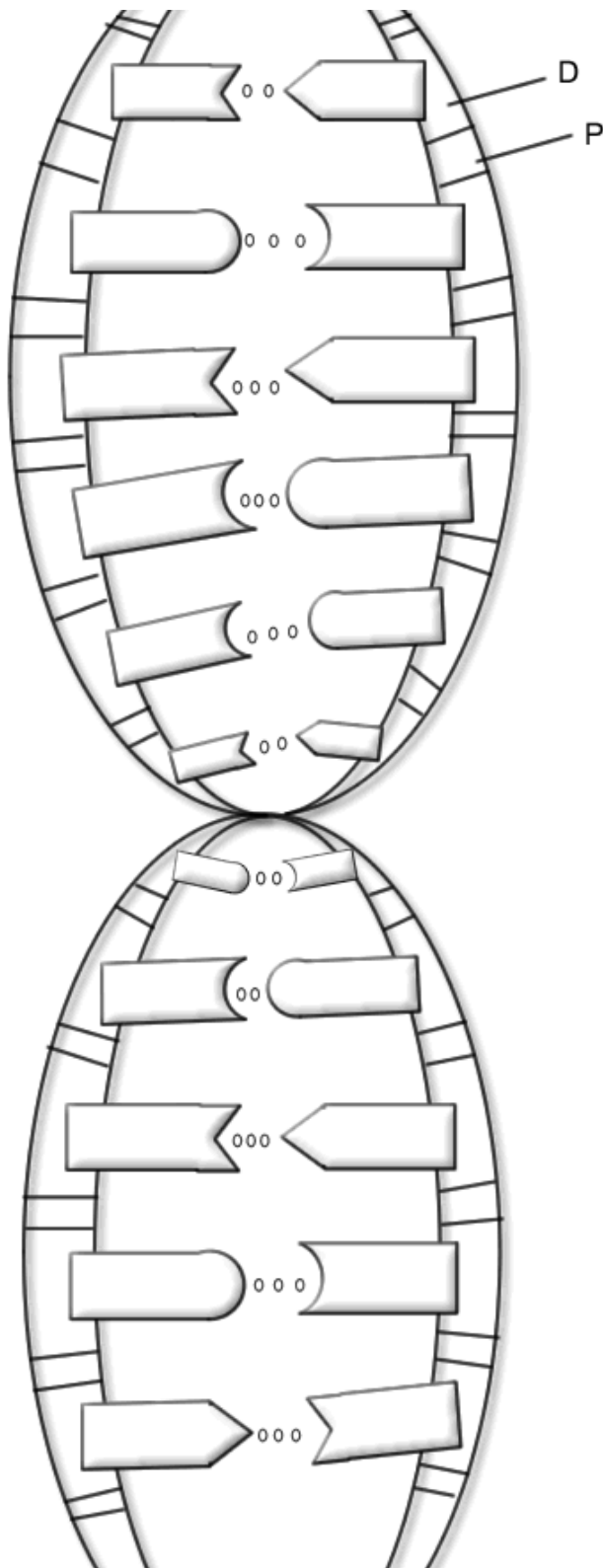


## *The Blueprint of Life*

Every cell in your body has the same "blueprint" or the same DNA. Like the blueprints of a house tell the builders how to construct a house, the DNA "blueprint" tells the cell how to build the organism. Yet, how can a heart be so different from a brain if all the cells contain the same instructions? Although much work remains in genetics, it has become apparent that a cell has the ability to turn off most genes and only work with the genes necessary to do a job. We also know that a lot of DNA apparently is nonsense and codes for nothing. These regions of DNA that do not code for proteins are called "introns", or sometimes "junk DNA". The sections of DNA that do actually code from proteins are called "exons".

Color the images according to your instructions.

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1. Write out the full name for DNA. \_\_\_\_\_
2. What is a gene? \_\_\_\_\_
3. Where in the cell are chromosomes located? \_\_\_\_\_
4. What two scientists established the structure of DNA?
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
5. What is the shape of DNA? \_\_\_\_\_
6. What are the sides of the DNA ladder made of?
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
7. What are the "rungs" of the DNA ladder made of?
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
  - d. \_\_\_\_\_
8. What sugar is found in DNA? \_\_\_\_\_
9. How do the bases bond together? A bonds with \_\_\_\_\_ G bonds with \_\_\_\_\_
10. How do some cells become brain cells and others become skin cells, when the DNA in ALL the cells is exactly the same. In other words, if the instructions are exactly the same, how does one cell become a brain cell and another a skin cell?
  
11. Why is DNA called the "Blueprint of Life"?