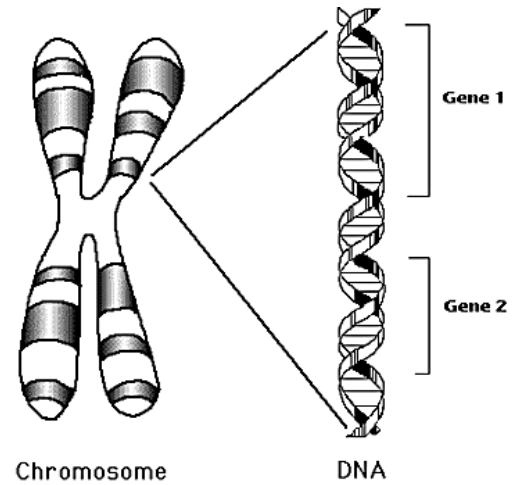


GENES AND DIFFERENTIATION

Each of your cells and the cells of all organisms have DNA, which are molecules that contain the information to control the processes that keep cells alive. Your cells' DNA is compacted into chromosomes, which contain the genetic information to determine your traits. Each of your traits is coded for by one or more genes, and each gene occupies a specific location on a chromosome.



The DNA nucleotides that make up a chromosome must be expressed as part of a well-regulated process known as **gene expression**. If a gene is expressed, the protein that it codes for is produced. Only a fraction of the genes in a cell are expressed at one time.

All the cells in an organism contain the same genetic information, since all of the cells develop from a single original cell. Mitosis (and the cell cycle) leads to the production of identical copies of the original cell, resulting in a multicellular organism.

The cells become specialized as a result of **differentiation**. For example, the genes that are expressed in a cell that will become a skin cell must be different from the genes that will become a brain cell. In effect, there must be a selective process of turning genes on and off in cells that will perform different functions in the adult organism.

PRACTICE

- Which of the following represents the highest level of organization of genetic information?
 - Nucleotide
 - Gene
 - Chromosome
 - A, T, C, or G
 - Which is true about a gene?
 - All traits are determined by only one gene
 - A gene is shaped like a spiral ladder
 - A gene is made up of chromosomes
 - A gene occupies a specific place on a chromosome
 - Plants have specialized structures such as roots, stems, and leaves. What process is responsible for the development of these different structures?
 - Cell cycle
 - Mutation
 - Photosynthesis
 - Differentiation
 - If all of your cells contain the same genetic information, how can your cells have so many different appearances and functions?
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