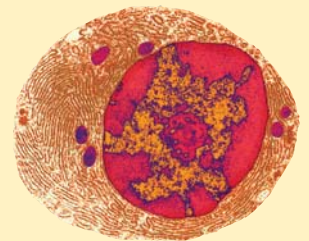


DNA: From Genes to Proteins

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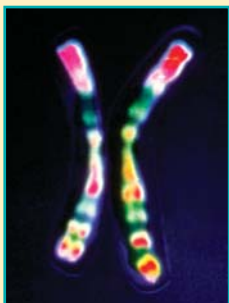
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Glossary

A page number in boldface type indicates the page on which the word is defined in the text.

active transport process that requires energy and uses transport proteins to move materials through a cell membrane (9)

allele alternate form of a gene for a single trait; may be dominant or recessive (16, 17, 19)

amino acid one of 20 organic compounds that are the basic building blocks of proteins; DNA specifies the order in which amino acids are combined to make various proteins in the ribosomes (13)

anaphase step in mitosis during which the chromatid pairs separate, and each of the two resulting chromosomes moves toward an opposite end of the cell (14)

asexual reproduction form of reproduction in which a new organism is produced by mitosis (14, 18)

autosome chromosome unrelated to the sex of an organism (19)

autotroph organism that makes its own food (10)

carbohydrate organic compound involved with energy transfer and cellular structure; sugars and cellulose are examples (4, 6, 10)

cell basic unit of structure and function in living things (2–16, 18)

cell cycle regular sequence of growth and division in cells; consists of three phases: interphase, mitosis, and cytokinesis (12, 14)

cell membrane thin film surrounding a cell that controls which substances may enter or leave (4–6, 8, 9, 14)

cell theory theory that the cell is the basic unit of structure and function in living things, all living things are made of one or more cells, and all cells come from other cells (2)

cell wall rigid, supportive structure that surrounds, shapes, and protects the cell membrane in the cells of plants and some other organisms; made of the carbohydrate cellulose (4–7)

chloroplast organelle in the cells of plants and some other organisms that contains chlorophyll and is the site of photosynthesis (6, 7, 10)

chromatid shorter, thicker state of chromatin that forms during prophase; chromatids occur in pairs (14)

chromatin material that makes up chromosomes when it is uncoiled and spread out in the nucleus during interphase (14)

chromosome threadlike structure of protein and DNA on which genes are located; found in the nucleus of eukaryotic cells (5, 12, 14, 16, 18, 19, 22)

compound microscope type of microscope that contains more than one lens to magnify an image (2)

convex lens lens that is thicker in the center and thinner at the edges; makes an object appear larger (2)

cross to breed or combine genetic material from two different organisms (15–17, 20)

cytokinesis final stage of the cell cycle, during which the cell membrane pinches inward, dividing into two new cells genetically identical to the parent cell (14)

cytoplasm jellylike material made up of water, sugars, and proteins that takes up most of the space inside the cell membrane, excluding the nucleus (4, 5, 11, 14)

diffusion movement of materials from an area where there is more of the material to an area where there is less (8–10)

diploid containing a full set of chromosomes of which one-half came from the female parent and one-half from the male parent (18)

DNA (deoxyribonucleic acid) genetic material in a cell's nucleus that carries instructions for making proteins that control an organism's life functions (4, 5, 12, 13, 16, 18, 19, 21)

dominant form of allele that, if present, determines the trait expressed, or visible, in an individual (16, 17, 19)

egg haploid female reproductive cell (18)

endocytosis process by which a cell transports large molecules into the cell by surrounding them with the cell membrane (9)

endoplasmic reticulum organelle that forms compartments to hold other cell structures; often coated with ribosomes (5)

enzyme protein in cells that speeds up certain chemical reactions, such as those of digestion (4, 5, 22)

equilibrium state of balance, such as when equal amounts of water molecules are on both sides of the cell membrane (8)

eukaryotic cell cell with a membrane-enclosed nucleus and organelles (5)

exocytosis process by which a cell transports large molecules out of the cell by merging packets of molecules called vesicles with the cell membrane, which then opens and releases the contents (9)

fermentation process by which cells break down glucose to release energy without the use of oxygen (11)

fertilization joining of a female reproductive cell (egg) with a male reproductive cell (sperm) (18)

gene segment of DNA on a chromosome that contains instructions for protein synthesis and controls a particular inherited trait (5, 16–22)

genetics scientific study of how traits are passed to offspring through genes (15)

genome complete genetic code of a species (22)

genotype all genes, whether dominant or recessive, inherited by an organism (16, 17, 19)

Golgi body organelle that collects, packages, and sends materials to places in the cell where they are needed (5)

haploid containing half of one parent's genetic information (18)

heredity passing of traits from one generation to the next (15, 16)

heterotroph organism that cannot make its own food and so must feed on other organisms such as plants or animals that eat plants (10)

heterozygous having two different alleles for a given trait, usually one dominant and one recessive (16, 17)

homozygous having two identical alleles for a given trait, either both dominant or both recessive (16, 17)

incomplete dominance genetic pattern in which neither allele for a trait is completely dominant over the other, thus producing a phenotype that is intermediate between the two alleles (17)

interphase stage of the cell cycle during which growth and DNA replication, or the copying of genetic material, occurs (12–14, 18)

lipid organic compound that does not mix with water and makes up membranes and other cell structures (4)

lysosome organelle that contains digestive enzymes that break down old cell parts (5)

magnification making an object appear larger through the use of a lens (2)

meiosis process in sexual reproduction that produces reproductive cells with half the genetic information of the parent cells (18)

messenger RNA (mRNA) single-stranded nucleic acid molecule that carries genetic instructions from the DNA in the cell nucleus to the site of protein synthesis on ribosomes in the cytoplasm (13)

metabolism sum of the chemical changes in living cells by which energy is captured and released (10)

metaphase step in mitosis during which the chromatids align in the center of the cell (14)

microscope optical instrument that uses lenses to enlarge images to view details of objects that are too small to see with the eye alone (2, 6)

mitochondrion organelle that is the site of cellular respiration; plural: *mitochondria* (5, 7, 11)

mitosis stage of the cell cycle during which a cell's nucleus divides, forming two new nuclei identical to the original nucleus; requires a series of steps: prophase, metaphase, anaphase, and telophase (14, 16, 18)

multiple alleles when a gene for a given trait has more than two alleles (17)

natural selection slow, ongoing process by which species change over time as organisms with traits better suited to their environment are more likely to survive and reproduce (19)

nitrogen base one of five nitrogen-based molecules (adenine, guanine, cytosine, thymine, and uracil) that, along with a sugar and a phosphate, make up the building blocks of nucleic acids (12, 22)

nuclear membrane thin film that surrounds and protects the nucleus of a eukaryotic cell (5, 14)

nucleic acid organic compound such as DNA or RNA that contains information that cells need to reproduce, grow, and function (4, 12)

nucleus membrane-enclosed organelle in a eukaryotic cell that contains DNA and directs cell activities; plural: *nuclei* (5, 12–14)

organ body part made of more than one type of tissue that does a specific job for an organism (3, 4, 6, 7)

organelle specialized part of a eukaryotic cell that performs a certain function (5, 6, 10, 12)

organic compound most compounds that contain carbon (4)

organ system group of organs that work together to do a large job for an organism (3)

osmosis movement of water across a selectively permeable membrane by diffusion (8)

passive transport process that does not require energy to move materials through a cell membrane; includes diffusion and osmosis (8, 9)

phenotype individual's outward appearance (16, 19)

photosynthesis process by which cells containing the green pigment chlorophyll make glucose, or sugar, from carbon dioxide and water using light energy (10, 11)

pollination transfer of pollen from the male stamen to the female pistil of a flowering plant as a part of reproduction (15)

polygenic inheritance when a trait is controlled by more than one gene (17)

probability likelihood of a certain outcome (16, 17)

prokaryotic cell cell containing only a cell wall, cell membrane, cytoplasm, and DNA but no nucleus or other cell structures (5)

prophase step in mitosis during which chromatin strands in the nucleus coil up and fold, becoming chromatids (14)

protein organic compound present in all living cells that is needed for cell growth and repair; made of amino acids (4, 5, 7, 9, 12–14, 16, 22)

protein synthesis process by which cells assemble amino acids into proteins using instructions from DNA (13, 22)

Punnett square table that shows all the possible combinations of alleles in offspring of the same parents and gives the probability of each combination (16, 17)

recessive form of allele that is masked by a dominant allele; a recessive trait is not expressed, or visible, in the individual unless both alleles for the trait are recessive (16, 17, 19)

replication process by which DNA is duplicated, providing new cells with a copy of a parent cell's genetic material (12, 13, 18, 19)

respiration process by which cells use oxygen to break down glucose, releasing energy and producing carbon dioxide and water (11)

ribosome organelle that is the site of protein synthesis (5, 13)

selective breeding process by which humans cross organisms to produce offspring with certain desirable traits (20)

selectively permeable allowing only some materials to pass through; a property of cell membranes (8)

sex chromosomes chromosomes that determine the sex of an organism; in humans, two X chromosomes produce a female, while an X and a Y chromosome produce a male (19)

sex-linked inheritance passing of traits mainly to offspring of one sex due to genes located on one sex chromosome but not on the other (19)

sexual reproduction form of reproduction in which a male reproductive cell and a female reproductive cell join to produce a zygote that inherits a unique combination of genes from the parents and is genetically different from them (18, 19)

specialized having a structure or makeup that is specially adapted to perform a particular function (6, 7)

sperm haploid male reproductive cell (18)

stomata small openings in leaves through which gases, such as oxygen and carbon dioxide, can move in and out (6, 10)

telophase step in mitosis during which a new membrane forms around each new set of chromosomes, forming two nuclei (14)

tissue group of cells of one type that work together to do a job for an organism (3, 6, 7)

trait characteristic or attribute (4, 5, 13, 15–17, 19–21)

transcription transfer of information from a DNA molecule into an mRNA molecule (13)

transfer RNA (tRNA) molecule of RNA that carries a specific amino acid to the ribosomes where they are synthesized into proteins by the use of mRNA (13)

vacuole organelle that can store food, water, or wastes (5)

variation difference among organisms of the same species (19)

zygote diploid cell formed by fertilization when a male reproductive cell joins with a female reproductive cell (18)