

GLOSSARY AND CREDITS

Have you ever seen a puppy or a kitten or a human baby that resembles its parents? We often make these observations without a second thought. The science of genetics is that living things reproduce "after their kind." A pig has never been known to give birth to a sheep, and a snake has never been known to give birth to a pigeon.

Up to the mid-nineteenth century, heredity was thought to result from the flowing together of substances from all the parts of each parent's body and the blending of these substances to form a new individual. The new individual would not resemble either parent but would have features of each. If this theory were true, however, how could two purple-flowered plants produce plants that bear white flowers? How could brown-eyed parents have a child with blue eyes? How could pure white goats and pure black goats produce spotted kids? How could white sheep have brown lambs, and how could solid-colored cattle give birth to spotted calves? We can conclude that some characteristics are common for a species. For example, feathers, flying, and toothless beaks for grasping food are common in birds. And yet, other unique characteristics are found in the individual. The mechanism of heredity allows for change, and it provides for constancy from one generation to the next.

In this unit, you will learn about how traits are inherited all the way down to an organism's molecules, like DNA, chromosomes, and genes. You will also learn a little bit about evolutionary mechanisms and patterns.

VOCABULARY

adaptive radiation	a pattern of evolution in which several closely related, yet different, species evolve from one common ancestor in order to adapt to different environmental pressures
allele	alternative form for a specific gene (either dominant or recessive)
analogous	being related or showing a close similarity
autosome	any pair of chromosomes other than the sex chromosome
carrier	condition of being heterozygous for a recessive trait
chromosome	rod-shaped structure that contains DNA and is located in the nucleus

chromosome theory	theory that states that the behavior of chromosomes explains the inheritance of genes
codominance	condition in heterozygotes in which both members of an allelic pair are dominant and both contribute to the phenotype
coevolution	a pattern of evolution in which two species evolve in relation to each other
convergent evolution	a pattern of evolution in which similar characteristics evolve between two unrelated species due to their adaptation to similar environments
dihybrid cross	breeding of individuals that have genes for two different characteristics
diploid	having chromosomes in homologous pairs
divergent evolution	a pattern of evolution in which very different species evolve from one common ancestor due to their adaptation to different environmental pressures
DNA (deoxyribonucleic acid)	a giant molecule consisting of the sugar deoxyribose, phosphates, and nitrogen bases; contains coded genetic information
dominant	can prevent the allele from being expressed in a pair of genes
embryo	the beginning or developing stage of an organism
embryology	form and structure of an embryo or any of its parts
evolution	genetic change in a population or species over many generations
gamete	male and female reproductive cells (egg and sperm cells)
gene	a segment of DNA that contains the information for making protein and, therefore, allows the nucleus to run the cell's activities and carry hereditary traits

gene flow	mechanism of evolution that suggests traits can be shifted between populations by outbreeding or migration
gene pool	all of the genes present in a specific population
genetic drift	mechanism of evolution that suggests changes in the gene pool of a population are due to chance
genotype	the genes present in an organism
gradualism	a theory of evolution that states that a species evolves by consistent, small, steps
haploid	having a single, complete set of chromosomes, or one half of each pair of homologous chromosomes
Hardy Weinberg Principle	Gene frequencies in a population will remain stable from generation to generation until acted on by an outside force.
heterozygous	a pair of non-identical genes that influence a trait in different ways
homologous	having a similarity attributable to a common ancestor
homozygous	a pair of genes that are identical in the way they influence a trait
hybrid	offspring from a cross between parents; has different phenotypes for a specific trait
incomplete dominance	condition in heterozygotes in which both members of an allelic pair are neither dominant nor recessive to other alleles, so the two traits blend in the phenotype of the individual
lineage	continuous line of descent
macroevolution	evolution above the species level
microevolution	evolution at or below the species level
monohybrid cross	the breeding of two organisms that differ in a single trait
morphology	form and structure of an organism or any of its parts

multiple alleles	when more than two alternatives for a gene exist
mutation	a change in the genetic information code
natural selection	mechanism of evolution proposed by Darwin; suggests traits suitable for an environment survive while those less favorable do not
nucleotide	the combination of phosphate, sugar, and nitrogen bases in DNA or RNA; can combine to code a specific amino acid
one-gene-one-enzyme concept	idea that the genetic code of the gene is responsible for the production of a specific enzyme, which regulates the metabolic pathways in the cell during meiosis; states that the combination of chromosomes in a gamete is due to chance
phenotype	the expression of a genetic trait; what the trait looks like
probability	the chance that a given event will occur; usually expressed between the number 0 (will not occur) and 1 (the event will occur)
punctuated equilibrium	a theory of evolution that states that a species evolves in spurts of rapid change and then goes through periods of no change
Punnett square	a grid system used to predict possible combinations of genes due to random fertilization
pure-bred	a phenotype (trait) resulting from homozygous genes from the offspring of true breeding
recessive	a gene or trait that is masked when a dominant allele is present
RNA (ribonucleic acid)	a nucleic acid similar to DNA that uses ribose for the sugar and the nitrogen base uracil in place of thymine
replication	the separation of DNA's two polynucleotide chains, each of which then acts as a template for a new chain

self-fertilization	when an organism that possesses both male and female gametes brings the two genetically identical gametes together to produce offspring
sex-linked	genes that are carried on the X chromosome
speciation	the splitting of a lineage into separate and distinct species
species	group of related organisms that share features and characteristics
trait	a genetic characteristic of the individual
transcription	the transfer of genetic code from DNA to an intermediary RNA molecule
translation	converting the genetic code into the language of proteins
vestigial	small or underdeveloped