

# Definitions of Evolutionary Terms

## Adaptation

The adjustment or changes in behavior, physiology, and structure of an organism to become more suited to an environment.

According to Charles Darwin's theory of evolution by natural selection, organisms adapt to their environment to become better fitted to survive and passing their genes on to the next generation.

## Asexual Reproduction

An organism capable of asexual reproduction is able to produce offspring in the absence of a mate. In asexual reproduction, the offspring is a clone of the parent, and the DNA is identical. This results in low genetic variation in the species as a whole.

Examples of asexual reproduction are:

- **Binary fission** (one cell splits and becomes two—many one-celled organisms reproduce this way, including bacteria)
- **Budding** (some small animals reproduce this way, such as an aquatic animal called the hydra. One part of the parent buds off and eventually separates from the parent.)
- **Vegetative reproduction** (the ability of plants to reproduce without sexual reproduction, by producing new plants from existing vegetative structures. Some plants, such as the Canada thistle and most bamboos, send out long underground stems that produce new plants, often at considerable distances from the original plant.)

## Chromosome:

A double stranded DNA molecule that contains a series of specific genes along its length. In most sexually reproducing organisms, chromosomes occur in pairs, with one member of the pair being inherited from each parent.

## DNA:

Deoxyribonucleic acid. A large biological molecule composed of subunits known as nucleotides strung together in long chains. The sequences of these nucleotides contain the information that cells need in order to grow, to divide into daughter cells, and to manufacture new proteins. Changes in DNA result in mutations, which may be beneficial, neutral, or deleterious to the organism. If these changes occur to DNA in sperm or egg cells, they could be passed onto the next generation.

## Evolution:

Evolution consists of changes in the heritable traits of a population of organisms as

successive generations replace one another. It is *populations of organisms* that evolve, not individual organisms.

**Fact:**

In science, a "fact" typically refers to an observation, measurement, or other form of evidence that can be expected to occur the same way under similar circumstances. However, scientists also use the term "fact" to refer to a scientific explanation that has been tested and confirmed so many times that there is no longer a compelling reason to keep testing it or looking for additional examples.

**Fossil:**

A remnant or trace of an organism of a past geologic age, such as a skeleton or leaf imprint, embedded, and preserved in the Earth's crust, usually in stratified rock.

**Homologous Structures**

Structures that come from a common ancestor. Homologous structures may not necessarily perform the same function but they share a common ancestral origin.

For instance, the forelimbs of humans and bats are homologous structures. Although they are used differently, the basic skeletal structure is the same and they have the same embryonic origin. Their similarity in this regard could indicate a likely evolution from a common ancestor.

**Hypothesis:**

A tentative explanation for an observation, phenomenon, or scientific problem that can be tested by further investigation. Scientific hypotheses must be posed in a form that allows them to be rejected. Gene

**Gene**

A gene is a segment of DNA (on a specific site on a chromosome) that is responsible for the physical and inheritable characteristics or phenotype of an organism. It also specifies the structure of a protein, and an RNA molecule.

**Genomics:**

A recent branch of genetics that studies organisms in terms of their complete genetic material, including genes and their functions.

**Inherited Trait**

A trait or character that is genetically inherited or passed down from generation to generation.

Examples of inherited traits in humans:

- dimples
- Hitchhiker's thumb versus regular thumb
- tongue rolling
- longer second toe than big toe (or vice versa)
- left-thumbed or right-thumbed when interlocking fingers
- earlobes as either attached or unattached

**Macroevolution:**

Large-scale evolution occurring over geologic time that results in the formation of new species and broader taxonomic groups.

**Microevolution:**

Changes in the traits of a group of organisms within a species that do not result in a new species.

**Mimicry:**

In biology, mimicry is the superficial resemblance of one species of organism to another species or to a natural object in its surroundings. Some kinds of mimicry result in a selective advantage for concealment and protection from predators. Another type of mimicry enables protection to the mimic through its resemblance to another species that is toxic or in some other way dangerous.

**Mutation**

(1) A permanent, heritable change in the nucleotide sequence in a gene or a chromosome; the process in which such a change occurs in a gene or in a chromosome.

(2) A mutant, or an individual exhibiting such a change.

In genetics, mutation may be small scale (affecting the nucleotide sequence of a gene) or large scale (involving a change in the chromosome). It may arise from faulty deletions, insertions, or exchanges of nucleotides in the genetic material. Such a change may result in the creation of a new character or trait.

**Natural Selection**

It is the process by which heritable traits that increase an organism's chances of survival and reproduction are favored over less beneficial traits. Originally proposed by Charles Darwin, natural selection is the process that results in the evolution of organism.

**Offspring**

New organisms produced by a living thing.

## **Organism**

An individual living thing that can react to stimuli, reproduce, grow, and maintain homeostasis. It can be a virus, bacterium, fungus, plant or an animal.

## **Paleontologist:**

A scientist who studies fossils to learn about ancient organisms.

## **Population:**

A group of organisms of the same species that are in close enough proximity to allow them to interbreed.

## **Predator**

An organism that preys upon other organisms.

In ecology, predators are those animals that live by preying on other organisms for food. Many predators hunt and eventually kill their prey, such as lion preying upon a buffalo, mantis eating a bee, baleen whale consuming millions of microscopic planktons, *etc.*

## **Prey**

The animal being hunted; the organisms being eaten

## **Protein:**

A large molecule consisting of a chain of smaller molecules called amino acids. The sequence of amino acids and the molecule's three-dimensional structure are coded by the instructions in DNA and determine a protein's specific function in cells or organisms.

## **RNA:**

Ribonucleic acid. A molecule related to DNA that consists of nucleotide subunits strung together in chains. RNA serves a number of cellular functions, including providing a template for the synthesis of proteins and catalyzing certain biochemical reactions. The structure of RNA is determined by the sequence of nucleotides on DNA.

## **Science:**

The use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process.

## **Sedimentary:**

Rocks formed of particles deposited by water, wind, or ice.

## **Selective breeding:**

The intentional breeding of organisms with desirable traits in an attempt to produce

offspring with enhanced characteristics or traits that humans consider desirable. This process is also known as "artificial selection" (compare with "natural selection").  
Example: A farmer puts together two short-legged sheep to produce offspring that are also short-legged.

**Speciation:**

The evolutionary processes through which new species arise from existing species.

**Species:**

In sexually reproducing organisms, species consist of individuals that can interbreed with each other. (2) An individual belonging to a group of organisms (or the entire group itself) having common characteristics and (usually) are capable of mating with one another to produce **fertile** offspring.

**Survival of the fittest:**

A term that refers to the survival of only those organisms best able (fittest) to obtain and utilize resources, resulting in the evolution of organisms that are best adapted to the environment. Darwin used metaphorically to describe "natural selection." The phrase was invented by the 19th century philosopher Herbert Spencer. It has been misapplied through history to explain and justify social and economic inequities in human populations ("social Darwinism") or as a method for improving the human condition through selective breeding (eugenics). Survival alone is insufficient for evolution - it's reproduction - passing on of genes that really counts. Most modern biologists no longer use this term when describing or discussing natural selection.

**Theory:**

A plausible or scientifically acceptable, well-substantiated explanation of some aspect of the natural world; an organized system of accepted knowledge that applies in a variety of circumstances to explain a specific set of phenomena and predict the characteristics of as yet unobserved phenomena.

**Trait:**

A physical or behavioral characteristic of an organism.

Traits include physical attributes of an organism such as hair color, leaf shape, size, etc., and behavioral characteristics, such as bird nesting.