

Biological inheritance (heredity) in humans

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Palli J. Biological inheritance (heredity) in humans. *J Clin Gen Genomics*. 2021;4(4):2

DESCRIPTION

Heredity, also called inheritance or biological inheritance, is the passing on of traits from parents to their offspring; either through asexual reproduction or sexual reproduction, the offspring cells or organisms acquire the genetic information of their parents. Through heredity, variations between individuals can accumulate and cause species to evolve by natural selection. The study of heredity in biology is genetics.

Eye colour is an inherited characteristic in humans: a person may receive the "brown-eye trait" from one of their parents. Genes govern inherited traits, and an organism's genotype refers to the entire set of genes contained within its genome.

The entire set of observable qualities of an organism's structure and behaviour is referred to as its phenotype. These characteristics are the result of the genotype's interaction with the environment. As a result, many characteristics of an organism's phenotypic are not passed down through generations. Sun-tanned skin, for example, is the result of a person's genotype interacting with sunlight; hence, suntans are not handed down to offspring. Due to variances in their genotype, some people tan more easily than others: People with the genetic feature of albinism, for example, do not tan and are extremely vulnerable to sunburn.

Heritable qualities are known to be passed down through the generations *via* DNA, a molecule that encodes genetic information. DNA is a lengthy polymer made up of four interchangeable bases. The genetic information is specified by the nucleic acid sequence (the sequence of bases along a particular DNA molecule), which is analogous to a sequence of letters spelling out a passage of text. Before a cell divides through mitosis, the DNA

is copied, and each of the resulting two cells inherits the DNA sequence. A gene is a segment of a DNA molecule that determines a single functional unit; different genes have distinct base sequences. Chromosomes are condensed structures made up of long strands of DNA found within cells.

Homologous chromosomes, which contain a unique combination of DNA sequences that code for genes, are inherited by organisms from their parents. A locus is the precise position of a DNA sequence within a chromosome. Alleles are various versions of a DNA sequence that differ between individuals at a specific locus. Mutations can cause DNA sequences to alter, resulting in new alleles. If a gene is mutated, the new allele may impact the trait that the gene regulates, changing the organism's phenotype.

While this straightforward correlation between an allele and a feature works in certain circumstances, most traits are more complicated and are governed by several interacting genes both within and between organisms. Complex interactions between genetic networks and cell communication, according to developmental biologists, can rise to heritable variants that could explain some of the mechanics of developmental plasticity and canalization.

Recent discoveries have verified significant cases of heritable alterations that cannot be explained by the DNA molecule's direct action. These events are classified as epigenetic inheritance systems, which evolve throughout time in a causal or autonomous manner. Although research into the modes and mechanisms of epigenetic inheritance is still in its early stages, it has sparked a lot of interest recently because it broadens the scope of heredity and evolutionary biology in general. At the organismic level, epigenetic inheritance mechanisms have been revealed in DNA methylation marking chromatin, self-sustaining metabolic loops, gene silencing by RNA interference, and the three-dimensional structure of proteins (such as prions).

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Received date: December 01, 2021; **Accepted date:** December 15, 2021; **Published date:** December 22, 2021



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