



# Some No-Nonsense Facts on Genetics

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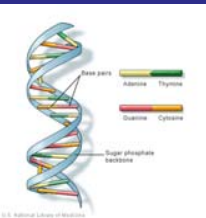
## DNA is found Everywhere

The DNA of these species is so similar because the basic organization of life is widely shared, with the largest differences found between plants and animals, or between tiny single-celled organisms like yeast and large multi-cellular organisms like ourselves. The similarities reflect a common ancestry to be shared by all life on Earth.



## How can we apply genetics ?

Genetics provides us a pathway to improve plants and animals. Geneticists selectively control traits to benefit the community. An example is teosinte. Teosinte has been selectively bred since 8000BC. Teosinte has been genetically modified to produce more kernels of corn on a larger stalk. Teosinte is now called maize. Maize is used as feed corn for livestock.



## DNA

DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms. The information in DNA is stored as a code made up of four chemical bases: adenine (A), guanine (G), cytosine (C), and thymine (T).

### Two kinds of fingerprints

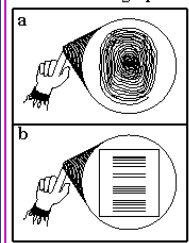


Figure 1.  
a) Conventional fingerprint  
b) DNA fingerprint

## DNA Fingerprint

A DNA fingerprint is a process of looking at the similarities and differences in organisms' DNA sequences. Distinguish Individual Identity from a population.

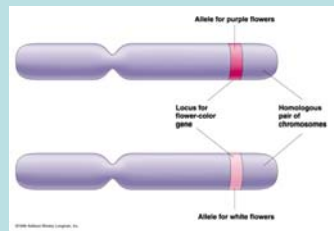
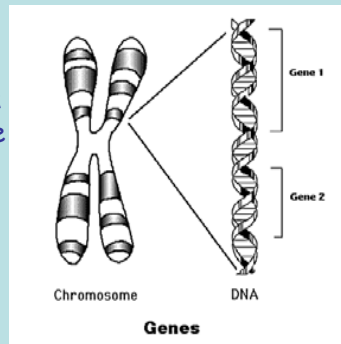


## Chromosomes

A threadlike linear strand of DNA and associated proteins in the nucleus of eukaryotic cells that carries the genes and functions in the transmission of hereditary information. A circular strand of DNA in bacteria that contains the hereditary information necessary for cell life.

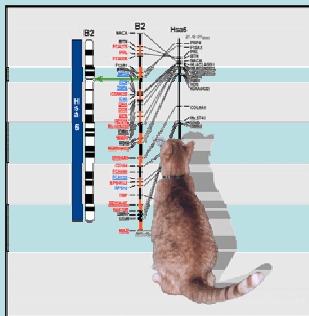
## Genes

A hereditary unit consisting of a sequence of DNA that occupies a specific location on a chromosome and determines a particular characteristic in an organism. Genes undergo mutation when their DNA sequence changes.



## Alleles

One member of a pair or series of genes that occupy a specific position on a specific chromosome.



## Genome

The total genetic content contained in a haploid set of chromosomes in eukaryotes (animal cell), in a single chromosome in bacteria, or in the DNA or RNA of viruses. An organism's genetic material.

## Phenotype

This is the "outward, physical appearance" of the organism. These are the physical parts, the sum of the atoms, molecules, cells, structures, metabolism, tissues, organs, reflexes and behaviors; anything that is part of the observable structure, function or behavior of a living organism.

		pollen ♂	
		B	b
pistil ♀	B	BB	Bb
	b	Bb	bb

## Genotype

This is the "internally coded, heritable information" carried by all living organisms. This stored information is used as a "blueprint" or set of instructions for building and maintaining a living creature. These instructions are found within almost all cells (the "internal" part), they are written in a coded language (the genetic code in DNA), they are copied at the time of cell division or reproduction and are passed from one generation to the next ("heritable"). These instructions are intimately involved with all aspects of the life of a cell or an organism.

$$\text{GENOTYPE} = \text{PHENOTYPE} + \text{ENVIRONMENT}$$

