Denaturation of DNA

Heating → **Rupture of hydrogen bonds and separation of the two strands**

The temp. that produces loss of 50% of DNA helical form is termed the melting temp.(Tm)

Cooling of denatured DNA results in reformation of the double helix or renaturation or reannealing

- **Gene:**

-**It can be defined as a segment of DNA that code for a polypeptide chain depending on the sequence of the bases in the DNA. Every 3 bases form a code that determines an amino acid.**

A more expansive definitions:

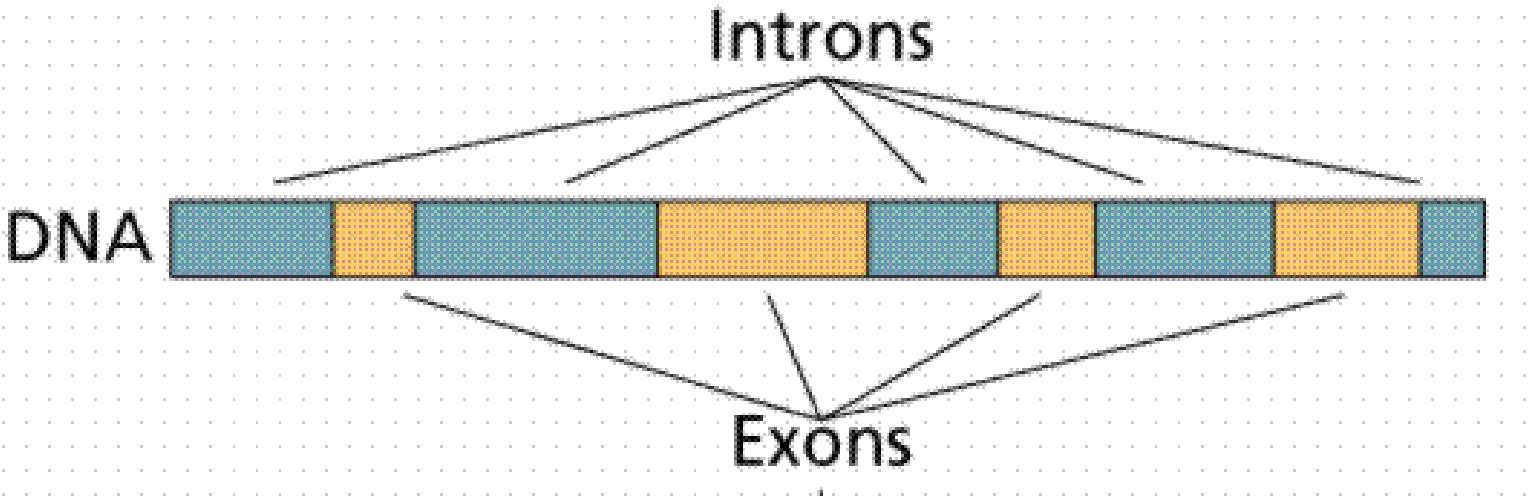
A gene is a part of DNA that gets transcribed into an RNA(mRNA, tRNA, rRNA or any other form of rna).

A gene is the basic physical and functional unit of heredity. Genes are made up of DNA. Some genes act as instructions to make molecules called proteins. However, many genes do not code for proteins.

A gene is a region of DNA that encodes function.

-The position of a gene along a chromosome is called the locus of the gene.

Most eukaryotic genes are discontinuous contain coding regions (exons or expressed sequences) and noncoding regions (introns).



- **Human genome:**
- **All of the DNA of an organism is called its genome (Total DNA Content).**
- **The human genome is the complete set of nucleic acid sequences for humans, encoded as DNA within the 23 chromosome pairs in cell nuclei and in a small DNA molecule found within individual mitochondria.**
- **Human genomes include both protein-coding DNA genes and noncoding DNA.**

- The content of the human genome is commonly divided into **coding** and **noncoding** DNA sequences.

❑ **Coding DNA** is defined as those sequences that can be transcribed into mRNA and translated into proteins during the human life cycle; these sequences occupy only a small fraction of the genome (<2%).

❑ **Noncoding DNA** is made up of all of those sequences (98% of the genome) that are not used to encode proteins.

- Some noncoding DNA contains genes for RNA molecules with important biological functions (noncoding RNA, for example ribosomal RNA and transfer RNA).

- **There are an estimated 19,000-20,000 human protein-coding genes. The estimate of the number of human genes has been repeatedly revised down from initial predictions of 100,000 or more as genome sequence quality and gene finding methods have improved, and could continue to drop further.**
- **Protein-coding sequences account for only a very small fraction of the genome (approximately 1.5%)**

- **Haploid human genomes, which are contained in germ cells (the egg and sperm gamete cells) consist of three billion DNA base pairs, while diploid genomes (found in somatic cells) have twice the DNA content.**
- Haploid refers to the presence of a single set of chromosomes in an organism's cells. In humans, only the egg and sperm cells are haploid.

- **Genotype** : if the two genes (alleles) at certain locus in an individual are indistiguishable from each other, the genotype is homozygous for these genes- if the two genes are different from each other, the genotype is said to be heterozygous.(**what is on the inside of the genes in DNA**)
- *An **allele** is a variant form of a given gene.*
- **Phenotype** : the physical or biochemical expression of the genotype (**what is the outside or the observable traits**)
- Most complex traits are influenced by many genes and by environment e.g. skin color, hair color, weight, behavior and some diseases like diabetes mellitus. **This means that the same genotype can result in different phenotype depending on the environment.**

- **Eukaryotic cells: cells that are divided by internal membranes into subcellular compartments such as the nucleus, mitochondria, and endoplasmic reticulum.**

- **Prokaryotic cell (e.g. a bacterial cell) is not subdivided by internal membranes and so characteristically has no definite nuclear membrane. Each cell contains one single double –stranded supercoiled circular chromosome.**

-In addition, most species of bacteria also contain small and circular extrachromosomal DNA molecules called plasmids. Plasmid DNA carries genetic information & may carry genes that convey antibiotic resistance to the host bacterium.

- **Chromatin** consists of very long double-stranded **DNA molecules** and a nearly equal mass of small basic proteins termed **histones** as well as a smaller amount of **non-histone proteins** (most of which are acidic and larger than histones) and a small quantity of **RNA**.
- ***Non-histone proteins: This class of proteins includes the various transcriptional factors, polymerases, hormone receptors and other nuclear enzymes.***

DNA Tertiary structure:

It is the folding of long DNA molecule to decrease its size and allow its packing inside the cell this is called (**DNA supercoiling**)