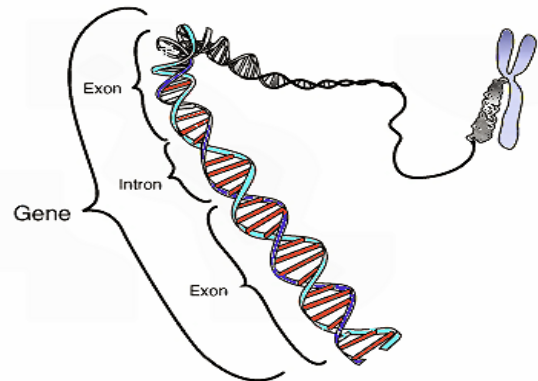


## Lab 8: Recombinant DNA Technology

### Gene

A gene is a stretch of DNA that codes for a type of protein that has a function in the organism. It is a unit of heredity in a living organism. All living things depend on genes.

Genes hold the information to build and maintain an organism's cells and pass genetic traits to offspring.

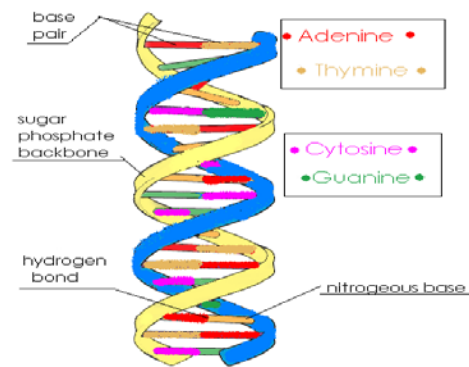


### DNA

DNA= Deoxyribu-Nucelic Acid

DNA is a very large molecule, made up of smaller units called nucleotides. Each nucleotide has three parts: a sugar (ribose), a phosphate molecule, and a nitrogenous base.

The nitrogenous base is the part of the nucleotide that carries genetic information. The bases found in DNA are four: adenine, cytosine, guanine, and thymine (ATP, CTP, GTP, and TTP)

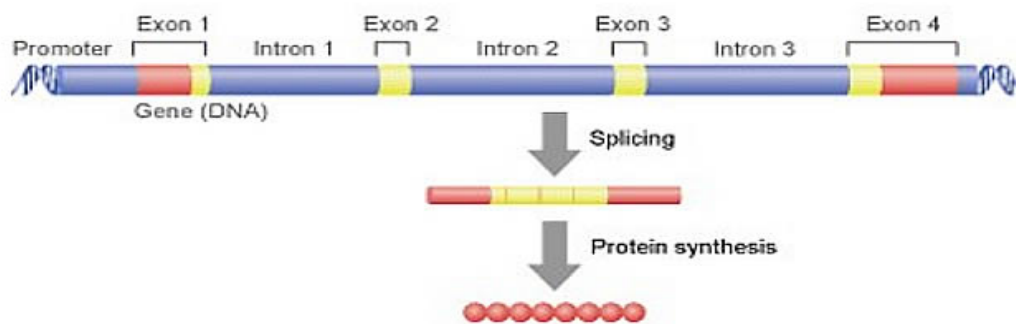


### Gene Components

**Genes contain:**

**EXONS:** a set of coding regions...

**INTRONS:** Non-coding regions removed sequence and are therefore labeled split genes (splicing).



## Genome

The genetic complement of an organism, including all of its GENES, as represented in its DNA

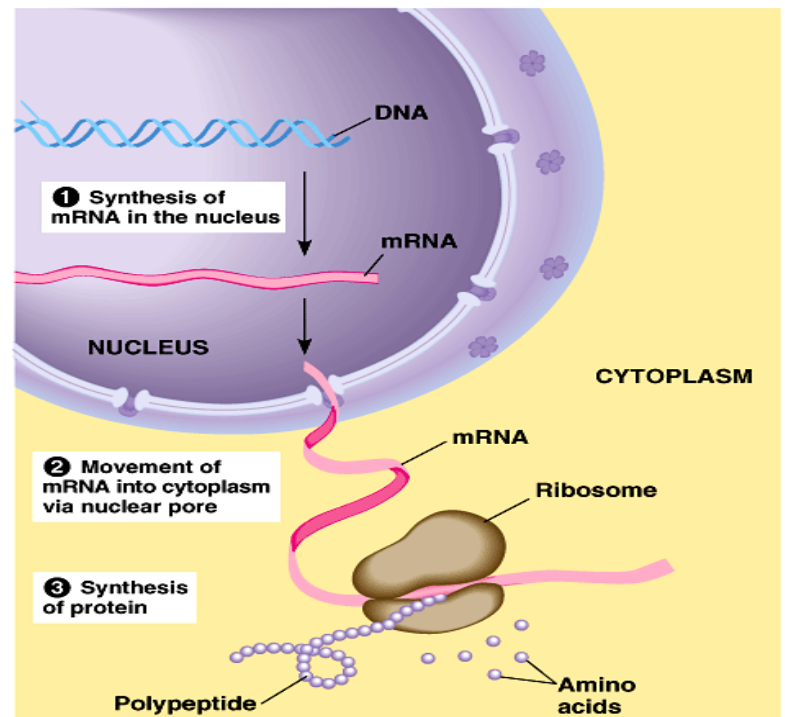
## Gene Expression

Is the process by which information from a gene is used in the synthesis of a functional gene product (proteins).

The process of gene expression is used by all known life - eukaryotes , prokaryotes, and viruses - to generate the macromolecular machinery for life.

### Steps in Gene Expression

1. Transcription (mRNA synthesis),
2. Post-transcriptional process (RNA splicing),
3. Translation (protein synthesis)
4. post-translational modification of a protein.



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## Genetic Changes

An alteration in a segment of DNA, which can disturb a gene's behavior and sometimes leads to disease.

It may be:

- (1) Small genetic change, genetic drift (mutation)
- (2) large genetic change, genetic shift (recombination)

## Mutation

Are changes in the DNA sequence of a cell's genome caused by radiation, viruses, transposons and mutagenic chemicals,

## **Recombination**

The exchange of corresponding DNA segments between adjacent chromosomes during the special type of cell division that results in the production of new genetic makeup.

## **Recombinant DNA**

DNA molecules that are extracted from different sources and chemically joined together; for example, DNA comprising an animal or a plant gene may be recombined with DNA from a bacterium.

## **Goals of rDNA**

1. To isolate and characterized a gene
2. To make desired alteration in one or more isolated gene
3. To return altered gene to living cells
4. Artificially synthesize new gene
5. Alternating the genome of an organism
6. Understanding the heredity disease and their cure
7. Improving human genome

In genetic engineering, recombination can also refer to artificial and deliberate recombination of pieces of DNA, from different organisms, creating what is called recombinant DNA.

## **Applications of rDNA**

**Agriculture:** Growing crops of your choice (GM crops), pesticide resistant crops, fruits with attractive colors, all being grown in artificial conditions.

**Pharmacology:** artificial insulin production, drug delivery to target sites.

**Medicine:** gene therapy, antiviral therapy, vaccination, synthesizing clotting factor,  
Other uses: fluorescent fish, glowing plants