



## **EDO UNIVERSITY IYAMHO**

### **Department of Biological Sciences**

#### **ÆB 211 INTRODUCTORY GENETICS AND CELL PHYSIOLOGY**

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#### <sup>1</sup> **INTRODUCTION TO GENETICS AND CELL**

##### **Introduction:**

**Cell**, in biology is the basic membrane-bound unit that contains the fundamental molecules of life and of which all living things are composed. A single cell is often a complete organism in itself, such as a bacterium or yeast. Other cells acquire specialized functions as they mature. These cells cooperate with other specialized cells and become the building blocks of large multicellular organisms, such as animals and humans.

##### **History of the DNA**

The RNA and DNA were discovered in 1869 by Friedrich Miescher, he discovered a microscopic substance in the pus of discarded surgical bandages. It was called “Nuclein” since it was found in the nucleus

- RNA is found in the nucleus, mitochondria and ribosome, it is found in the cytoplasm of all cells

# The Structure of RNA

## RiboNucleic Acid

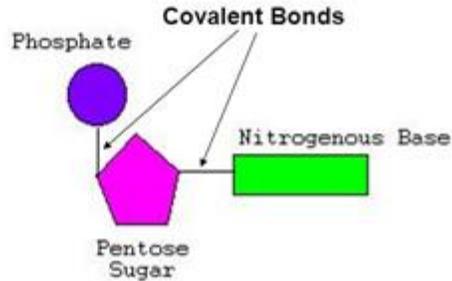
- RNA is a polymer composed of RNA Nucleotides.

Each "Nucleotide" is made up of 3 components:

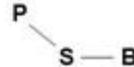
1. A phosphate group
2. A sugar – the sugar in RNA is Ribose.
3. A Nitrogenous Base

Held Together by

"Covalent Bonds." These bonds are strong.... You wouldn't want your DNA falling apart

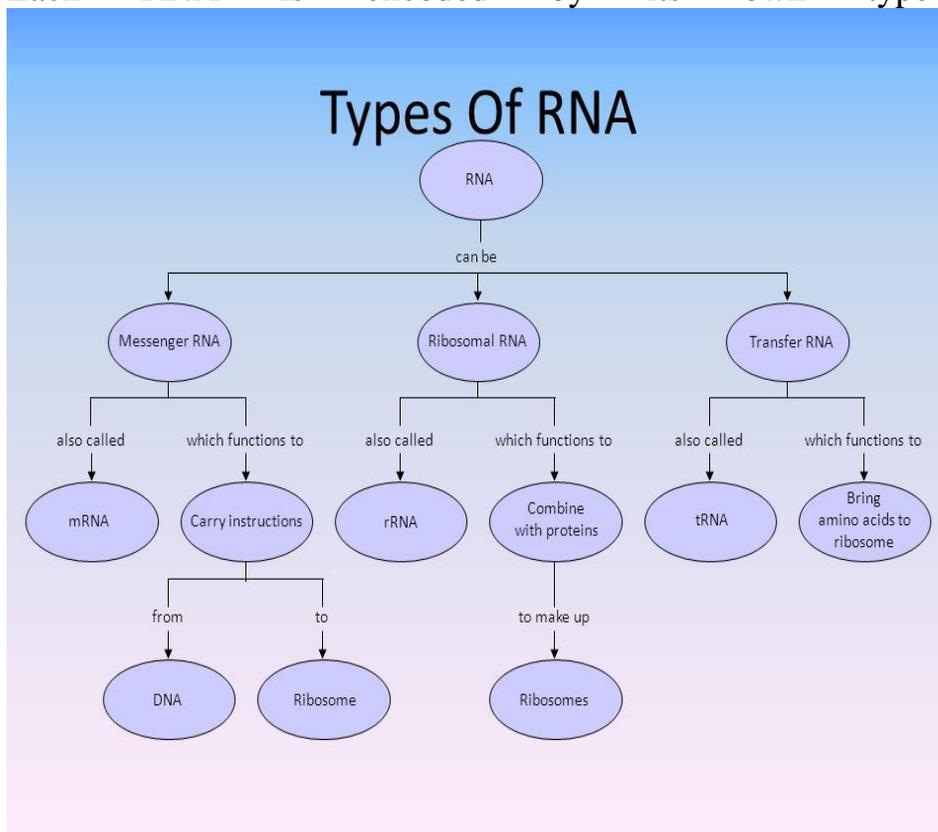


This is how I draw a Nucleotide



5

- Each RNA is encoded by its own type of gene



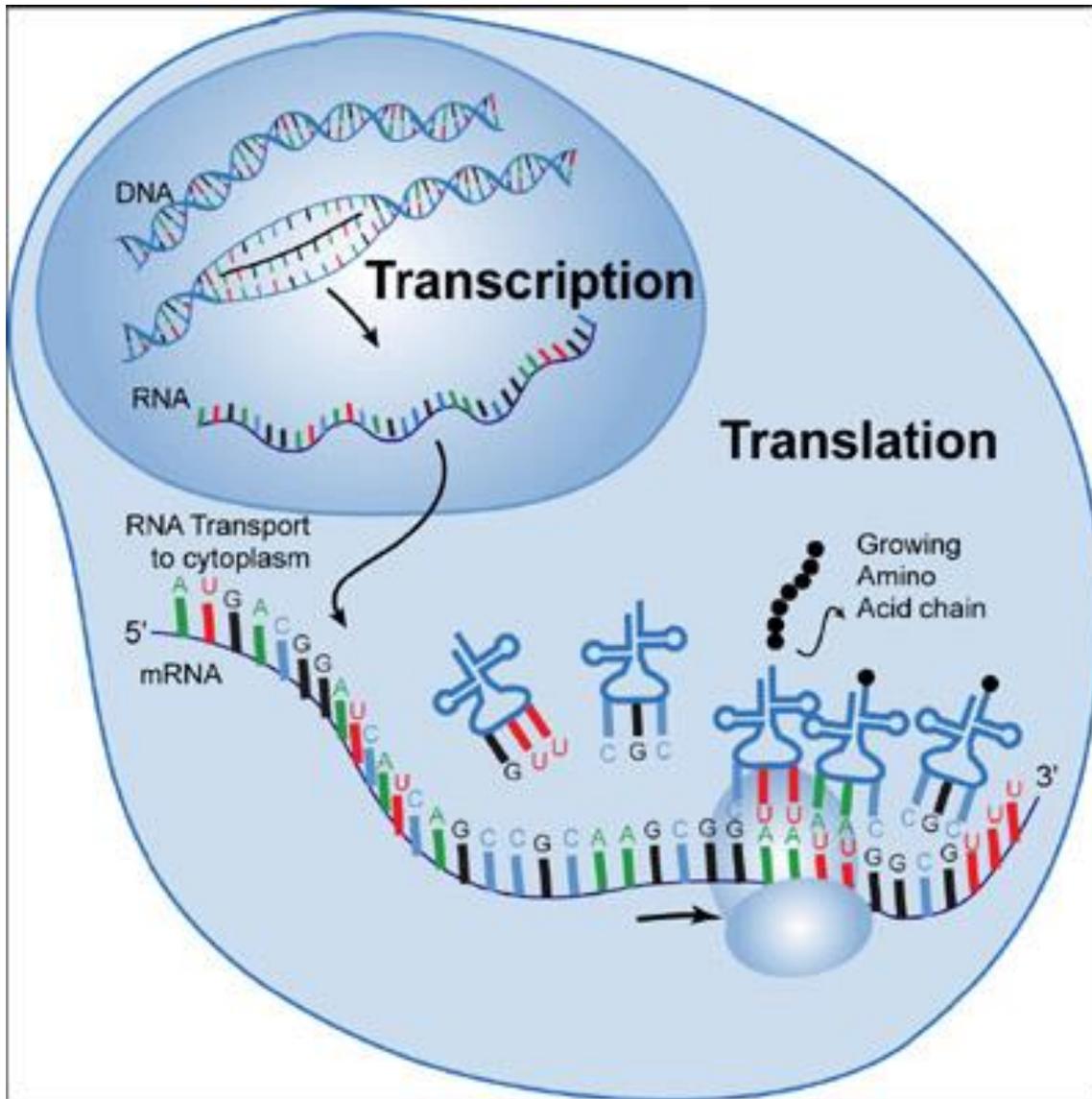


## USES/FUNCTIONALITIES OF RNA

- It acts as a messenger between DNA and protein synthesis complexes known as ribosome
- It forms vital portions of ribosome
- It acts as an essential carrier of molecule for amino acids to be used in protein synthesis (form proteins
- Plays important role in biological roles in coding, decoding and regulation and expression of genes

## WHAT DOES RNA DO

- A) Genetic transcription: the process by which a DNA sequence is copied to produce a complimentary RNA segment.
- B) Genetic translation: making proteins from instructions contained in the genetic code.



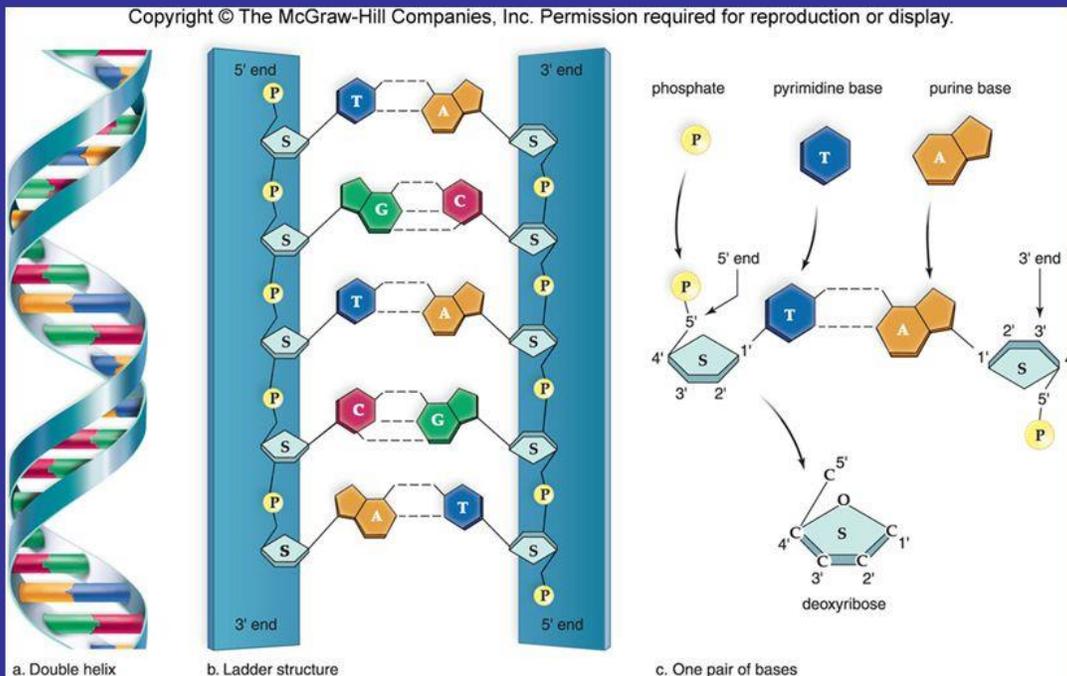
## DEOXYRIBONUCLEIC ACID (DNA)

- It is the hereditary material in humans and almost all other organisms. It carries genetic instructions used in growth, development, functioning and reproduction of all living organisms and many viruses.
- The DNA molecule consists of two long polynucleotide chains composed of four types of nucleotide subunits. Each chain is known as a DNA chain or DNA strand.
- Genetic information is carried in the linear sequence of nucleotides in DNA. Each molecule of DNA is a double helix formed from two complementary strands of nucleotides held together by hydrogen bonds between G-C and A-T base pairs.

- Duplication of genetic information occurs by the use of one DNA strand as a template for formation of a complementary strand. The genetic information stored in an organism's DNA contains the instruction for all the proteins the organism will ever synthesize. In Eukaryotes, DNA is contained in the cell nucleus.

## 21.1 DNA and RNA structure and function

# DNA structure



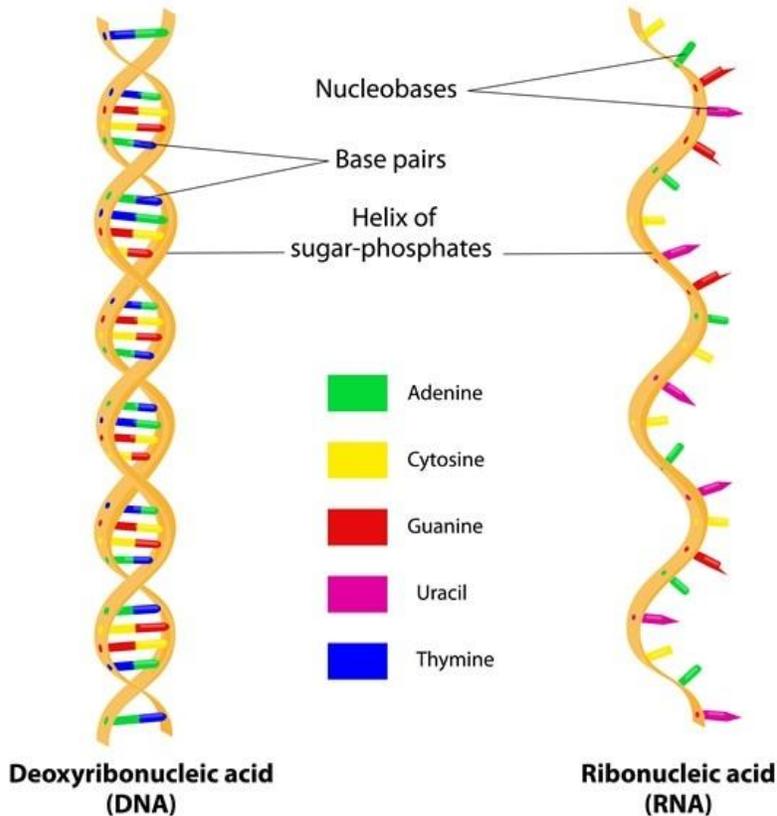
## FUNCTIONS OF DNA

- The structure of DNA provides a mechanism for hereditary
- Genetic information is stored in the DNA and transferred to offspring

## DIFFERENCES BETWEEN RNA AND DNA

DIFFERENCES BETWEEN RNA AND DNA	
RNA	DNA
Is single stranded	Double stranded
Pentose sugar is ribose	Pentose sugar is deoxyribose (lacks one oxygen atom)
Adenine, guanine, cytosine and uracil	Common organic bases are adenine, guanine, cytosine, thymine

## Structure of DNA & RNA



## BIOENERGETICS

- Bioenergetics is the study of energy transfer within living things.
- **Why Study Bioenergetics?**
- The understanding of metabolism provides the directions to better understand how skeletal muscles generate energy, and how and why the body responds to exercise the way it does.
- The Laws of Bioenergetics provide the rules upon which metabolism functions

### USES

- A system of holistic therapy in which massage and other physical therapies are used in conjunction with psychotherapy

It is concerned with the energy involved in making and breaking of chemical bonds in molecules found in biology

**There are two laws of bioenergetics:**

- 1) Energy cannot be created or destroyed, but can be changed from one form to another.
- 2) Energy transfer will always proceed in the direction of increased entropy, and the release of “free energy”.

Examples of energy transfer within the human body include:

- ✦ Eye sight: light to electrical impulses (action potentials)
- ✦ Muscle contraction: chemical energy to mechanical energy
- ✦ Vitamin D formation: light energy to chemical energy
- ✦ Photosynthesis: light energy to chemical energy in plants

## **MEMBRANE BIOLOGY**

- This is the study of biological and physiochemical characteristics of membranes.
- Biological membrane is a separating membrane that acts as a selective permeable barrier within living things.
- Biological membranes are made up of three components; lipids, proteins and sugars.
- All membranes have a common structure in which two-layered sheets of lipid molecules have proteins embedded in them
- Functions of the membrane
  - They keep toxic substances out of the cell
  - They contain receptors and channels that allow specific molecules such as ions, nutrients, wastes and metabolic products that mediate cellular and extracellular activities to pass between organelles and cells

## **Summary and Conclusion**

- The father of RNA and DNA is Friedrich Meischer in 1869.
- RNA has a single strand while DNA has a double strand, the common base uracil in RNA is replaced by thymine in DNA. The basic function of the RNA is transcription and translation. DNA carries genetic material that are used in growth, development and reproduction.

- Energy is transformed from one form to another , in the body it is stored in different forms and can be used for treatment in the human body through physical therapy and psychotherapy using massage
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## REFERENCES

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<http://kidshealth.org/en/parents/about-genetics.html>

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Vertebrate Zoology for Schools

