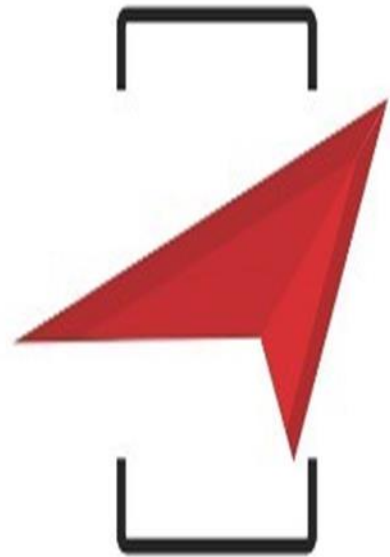


CDS, AFCAT



SAFALTA CLASSTM

An Initiative by **अमरउजाला**

Cell: कोशिका

- A cell is the smallest (biological, structural and functional) unit of life.
- Cell (dead ^{मृत} cell) was discovered by Robert Hook in 1665 but first living cell was discovered by Antony Van Leuwenhoek. (Bacteria) जीवाणु

Cell Theory:

- It was given by theodor Schwann and Matthias Jakob Schleiden

The three principles of the cell theory are as described below:

- All living organisms are composed of one or more cells.
- The cell is the basic unit of structure and organization in organisms.
- Cells arise from pre-existing cells.

* Virus ← Exception of Cell Theory

Eukaryotic vs. Prokaryotic Cells

Characteristics	Eukaryotic Cells	Prokaryotic Cells
Definition	Any cell that contains a clearly defined nucleus and membrane bound organelles	Any unicellular organism that does not contain a membrane bound nucleus or organelles
Examples	Animal, plant, fungi, and protist cells	Bacteria and Archaea
Nucleus	Present (membrane bound)	Absent (nucleoid region)
Cell Size	Large (10-100 micrometers)	Small (less than a micrometer to 5 micrometers)
DNA Replication	Highly regulated with selective origins and sequences	Replicates entire genome at once
Organism Type	Usually multicellular	Unicellular
Chromosomes	More than one	One long single loop of DNA and plasmids
Ribosomes	Large	Small
Growth Rate/Generation Time	Slower	Faster
Organelles	Present	Absent
Ability to Store Hereditary Information	All eukaryotes have this ability	All prokaryotes have this ability
Cell Wall	Simple: Present in plants and fungi	Complex: Present in all prokaryotes
Plasma Membrane	Present	Present
Cytoplasm	Present	Present

Cell कोशिका

Tissue ऊतक

Organ अंग

Organ System

Body शरीर

Algae शैवाल

Virus विषाणु



link b/w living & non living

एकदलीय

अनेकदलीय

Amoeba

Bacteria

Eu

Archae

Blue

Green

Algae

जीवाणु

एडी

शैवाल

* Virus

Acellular

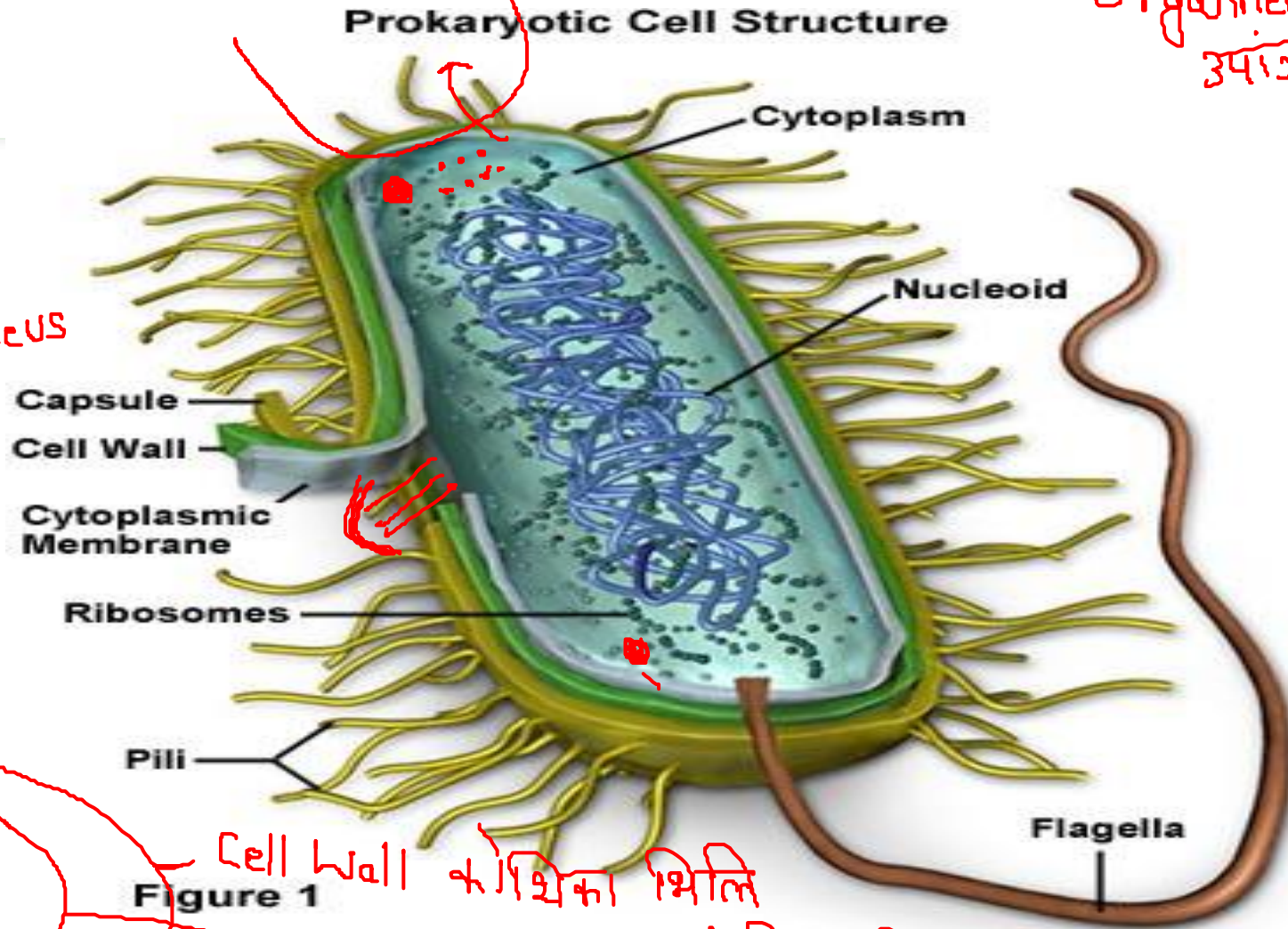
अकोशिकीय



Nuclear Membr

• Prokaryotic Cell (Bacterial Cell):

~~Mitochondria, Golgi, Lys, ER~~
Organelles
अंग



Pro-Primitive

Karyon - Nucleus
केंद्रक

Eu-True

Karyon - Nucleus



Figure 1

Cell Wall कोशिका भित्ति
Cell Memb. कोशिका झिल्ली

Cell Wall:

It is the outermost layer of plant, bacteria and fungal cell.

Composition:

- Plant Cell: Cellulose (carbohydrates) ***
- Bacteria cell: Pectin (protein+ carbohydrates)
- Fungal Cell: Chitin (carbohydrates) *

Function of Cell wall:

- Provides rigidity to cell. मजबूती
- Provides Protection to Cell.

Temp → Light

Permeable परिवार

40-50 °C
Lactobacillus
↓
Milk

पौधा जीवाणु फंगस

Cell Membrane/ Plasma Membrane:

कोशिका झिल्ली

It is the outermost layer of animal cell while second most layer of plant, bacteria and fungal cell.

Composition: It is composed of "Lipoprotein" (fat + protein).

Function: Transportation of nutrients from one cell to another.

Nature: Semi permeable in nature.

अर्ध पारगम्य

लपोप्रोटीन

Lipo
↓
Lipid
(Fat वसा)

कोशिकाद्रव्य

Cytoplasm: It is the liquid part of cell.

Composition: Water + salt



Function:

तरलता

- It provides liquidity to cell.
- * Sites of anaerobic respiration
- Provides energy (2 ATP)
- Transportation of nutrients within the cell.

Anaerobic resp. अवायुवीच	Aerobic वायुवीच
→ Absence of O_2	→ Presen of O_2
↓	↓
Cytoplasm	Mitochondria

Adenosine Tri Phosphate - Currency of Energy

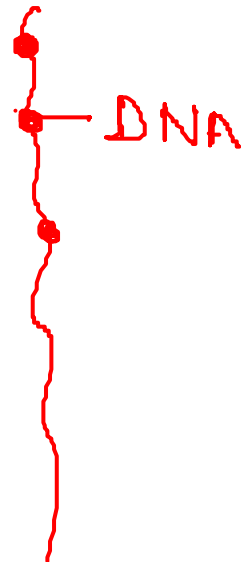
कृमि

Chromosome: DNA molecule is packed in a thread like structure called Chromosome.

Composition: "DNA + Histone protein"

Function: Helps in inheritance. आनुवंशिकता

Smallest unit of chromosome: Gene (discovered by Johannsen).



जीन
↓
DNA + Histone

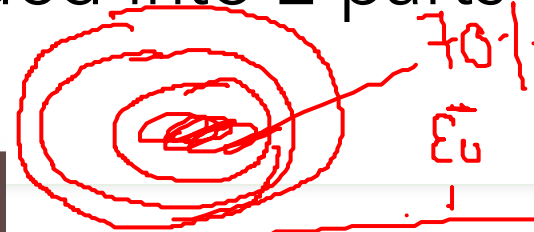
~~Nucleus, Mitochondria~~

Eukaryotic Cell: It can be divided into 2 parts-

↓
Developed
Nucleus

PLANT CELLS VERSUS ANIMAL CELLS

Plant cells are usually larger in size	Animal cells are smaller in size
Have a rectangular, fixed shape	Have a round, irregular shape
Composed of a cell wall made up of cellulose	Don't have a cell wall
Have one or more, comparatively very smaller vacuoles	Have one, large, central vacuole taking 90% of cell volume
Centrioles are present in lower forms of plants	Centrioles are present in all animals
Composed of chloroplast to produce their own food	Do not contain chloroplast
Don't consist of lysosomes	Consist of lysosomes
Composed of glyoxysomes	Not composed of glyoxysomes
Reserve food in the form of starch	Reserve food in the form of glycogen



↓
Plant
cell

↓
Animal



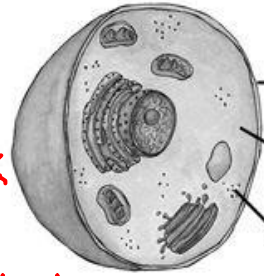
Present Absent
= एरिनात
→ Chloroplast

↓
Vacuoles
रिक्त

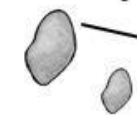
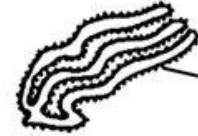
• Animal Cell:

जीव कोशिका

- Cell / Dead Cell - Robert Hook
- Living / Bacteria; Leuwenhok
Unicellular
- Largest cell: Ostrich egg
- Smallest Cell: Mycoplasma
(Bacteria)
- Longest cell of human: Neuron
नर्वस को
- Largest Cell of human: Egg cell
अणु
- Smallest cell of h: Sperm



Animal Cell Organelles



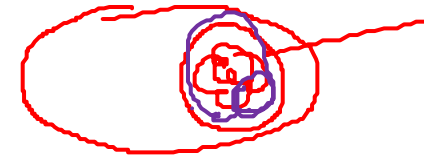
1. Each cell has a protective outer layer – the **plasma membrane**. The plasma membrane lets certain things into the cell that it needs, but keeps other things out. This is called *semi-permeable*.
2. Inside the cell is a watery medium that everything floats in called **cytoplasm**. The cytoplasm contains all the working parts of the cell, the organelles.
3. Little grains floating around inside the cell are **ribosomes**, where proteins are made.
4. The **nucleus** has our **DNA** that contains all our genetic information. The DNA is found on structures in the nucleus called **chromosomes**. There are 23 pairs (46 total) of chromosomes in each nucleus of each cell.
5. The nucleus is surrounded by a **nuclear membrane**, which controls what goes in and out.
6. **Rough endoplasmic reticulum (rough ER)** is a series of folded membrane pathways spotted with ribosomes. Together the **ribosomes** and the rough ER make new proteins and new membranes that the cell needs.
7. **Smooth Endoplasmic Reticulum (smooth ER)** has no ribosomes on it and forms containers called **transport vesicles** that are used to move things around inside the cell.
8. **Golgi apparatus** are made up of saccules that package up things to be transported around the cell or that need to leave the cell, like hormones.
9. **Lysosomes** are vesicles that have digestive enzymes inside them and break down the things that the cell doesn't need. They also kill bacteria that invades the body.
10. **Vacuoles** are membrane large membranous sacs for storing things. **Vesicles** are smaller sacs.
11. **Mitochondria** have a double membrane that folds in on itself forming little finger-like projections called **cristae**. Inside is a gel-like matrix with enzymes that break down sugars to make **ATP**, which is used by the cell as energy. These very important organelles contain their own DNA and ribosomes, reproduce by division and can even produce some of their own proteins.

Fat
Protein

- 2ATP

Nucleus:

हृत्



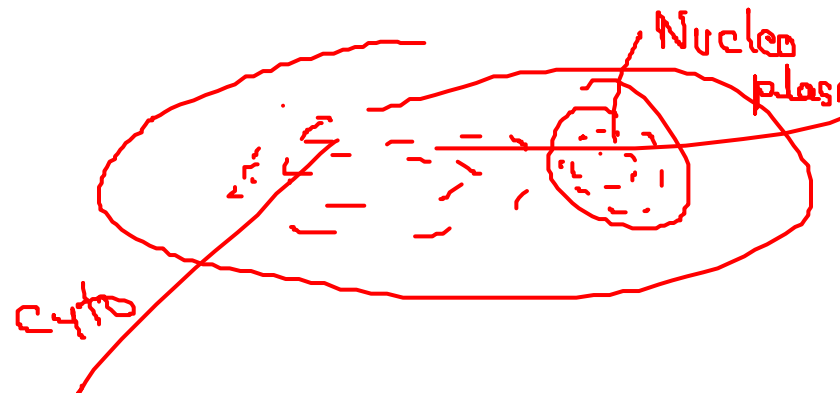
Nuclear Membr

~~The nucleus.~~ The nucleus is the information Centre of the cell and is surrounded by a nuclear membrane in all eukaryotic.

- Discovered by **Robert Brown.**

Function of Nucleus:

- It is commonly known as the Brain of the cell because it controls all the activities of the cell.
- Also known as Genetic Hub because it consists of mother and father's DNA.



Nucleoplasm: Similar to the cytoplasm of a cell, the nucleus contains nucleoplasm, also known as karyoplasm, or karyolymph or nucleus sap.

जीवित द्रव्य → Living Fluid

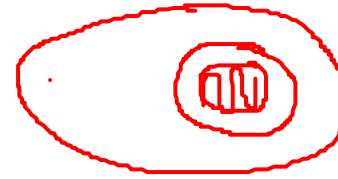
Protoplasm: The colorless material comprising the living part of a cell, including the cytoplasm, nucleus, and other organelles.

Protoplasm = Cytoplasm + Nucleoplasm

It was used in 1839 by J. E. Purkinje for the material of the animal embryo.

Mitochondria: Mitochondria are membrane-bound cell organelles that generate most of the chemical energy needed to power the cell's biochemical reactions.

Discovered by Richard Altmann.

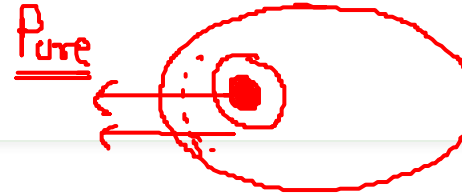


Function:

- Site of aerobic respiration (cellular respiration).
*वायुवीच कोशिकीय श्वसन**
- Provides maximum energy (36 ATP) needed for the functioning of the cell, hence it is known as the "Power House of the Cell."
- Also contains Mother's DNA. *Research*
- Mitochondria is totally dependent upon ATP.

Golgi body: It is a complex of vesicles and folded membranes within the cytoplasm of most eukaryotic cells.

Discovered by Camilleo Golgi.



Function:

- It is the cell's post office. A major function is the modifying, sorting and packaging of proteins for secretion.
- It is also involved in the transport of lipids around the cell.
- Helps in the creation of lysosomes.
- Kidney of the Cell :- Cell debris

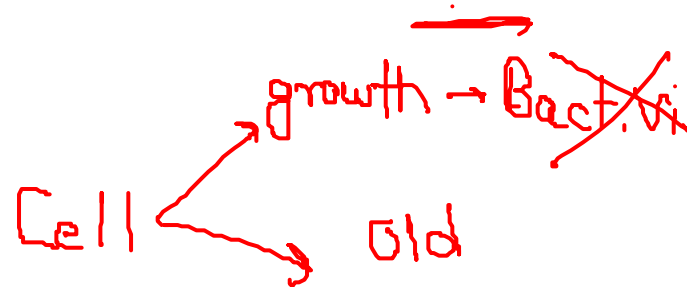
Lysosome:

A lysosome is a membrane-bound cell organelle that contains digestive enzymes.

- Discovered by Christian De Duve.

Function:

- They break down excess or worn-out cell parts. They may be used to destroy invading viruses and bacteria (phagocytosis). कोशिका भक्षण
- Intracellular digestion that's why it is known as Suicidal Bag. अंतरकोशिकीय पाचन
- Help in protein synthesis.
- It is a part of Golgi body.



Enzyme - Biological catalyst
inter intra - some

Ribosome:

S - Svedberg Constant

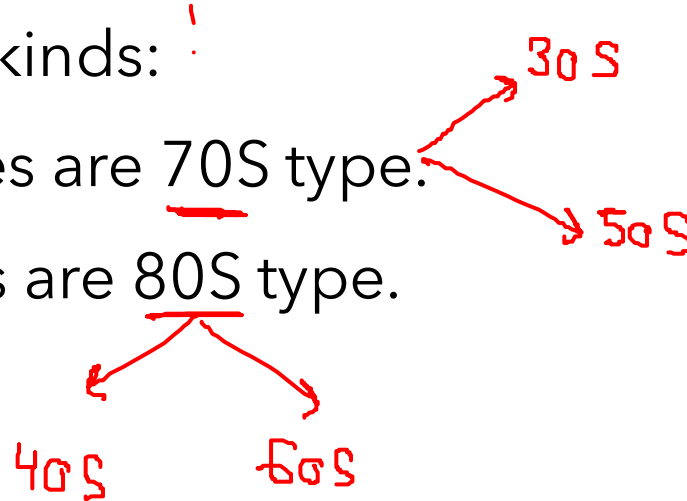
It helps in protein synthesis.

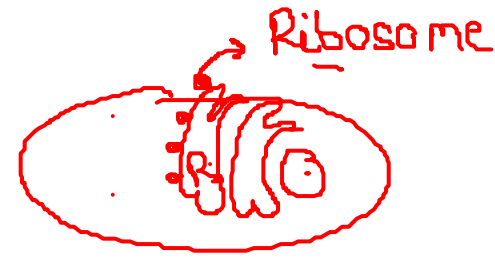
In 1949 Claude observed ribosomes and called them as microsomes. In 1955 Pallade named them as Ribosomes.

Ribosomes are usually two kinds:

1) Ribosomes of prokaryotes are 70S type.

2) Ribosomes of eukaryotes are 80S type.





Endoplasmic Reticulum: (ER)

A network of membranous tubules within the cytoplasm of a eukaryotic cell, continuous with the nuclear membrane.

There are two types of endoplasmic reticulum: rough endoplasmic reticulum (rough ER) and smooth endoplasmic reticulum (smooth ER). Both types are present in plant and animal cells.

→ Protein Factory

- Rough Endoplasmic Reticulum: Their main function is produce proteins in the cells and ribosomes are attached to their surface.

→ Lipid

- Smooth Endoplasmic Reticulum: Their main function is to produce lipids and also detoxify toxins in the body in the liver and kidney cells.

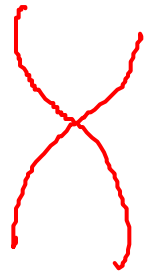


↓ genetic material → Freidrich Mischer

• Organism : Higher organism

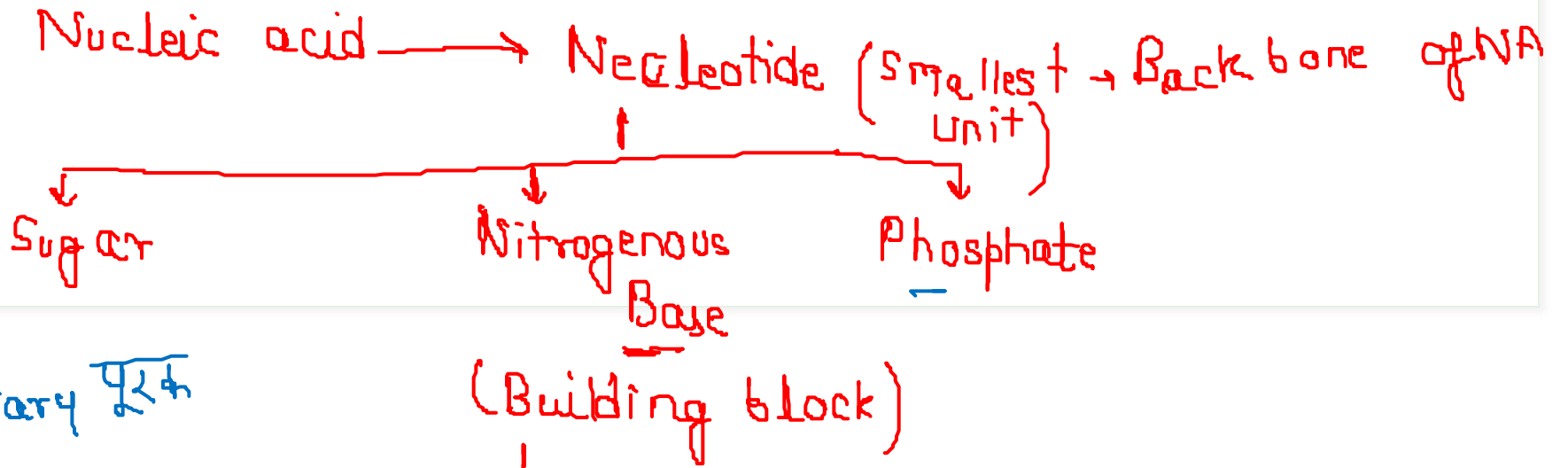
• Sugar : ^{Deoxy + Bacteria} Ribose ($C_5H_{10}O_4$)

Mainly Virus
(Retro Virus)
Ribose (Pentose)

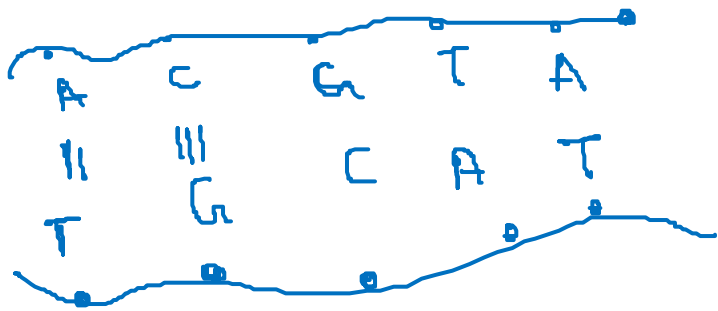
• Structure :  Double helical Str.

→ Watson & Crick

} Single Stranded



Complementary $\frac{A}{T}$



Replication
Transcription
Translation

$A = T$
 $C \equiv G$

Nucleoside \rightarrow Nucleotide -
Phosphate