

RIBOSOME

classmate

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Introduction :-

- Ribosome was discovered by Palade
- Ribosome was at first seen by Claude in electron microscope in animal cell.
- Ribosome are without any membrane
- Term ribosomes given by Palade.
- Ribosomes are smallest organelles in a cell.

2. OCCURANCE :-

- Ribosomes are small organelles found in all types of cells.
- In Prokaryotes ribosomes are scattered in the cytoplasm, because no E.R. is found.
- In Eukaryotes ribosomes are scattered in cytoplasm and attached to Endoplasmic Reticulum.
- Those ribosome which are attached to the membrane are active in Protein Synthesis.
- They are 15-20 nm in diameter, are found in large no.
- The number of ribosome is directly related to RNA Content.

3. NUMBER :-

- They are found in large numbers in Protein Synthesizing cells.

4. ULTRA STRUCTURE :-

- Each ribosome consist of two sub-units Large Subunit and Small Subunit.
- Large Subunit is dome shaped of 14-16 nm. whereas Small subunit

is cap shaped of 3-6 nm.

- The association or dissociation of subunits depends on magnesium ion concentration.

$Mg^{++} = 0.001 M \rightarrow$ Association of two subunit.

$Mg^{++} < 0.001 M \rightarrow$ Dissociation of two subunit.

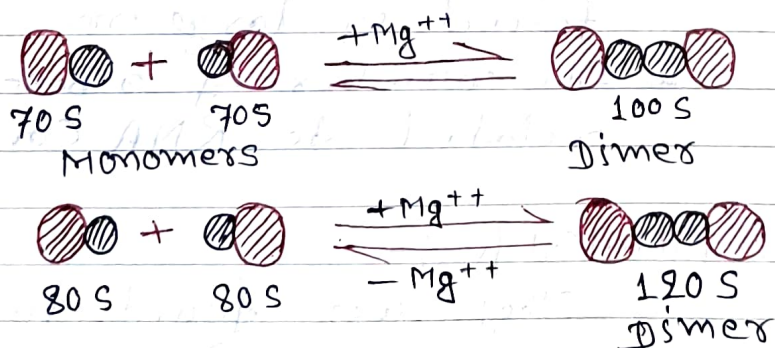
$Mg^{++} > 0.001 M \rightarrow$ Dimer

5. TYPES :-

- Ribosomes are mainly of two types, which are as follow -

[A] PROKARYOTIC RIBOSOME :-

- Prokaryotic Ribosome is 70S
- 70S ribosome have two subunits 50S and 30S.



(a) 50S :-

- It is larger subunit
- Its base is spherical
- Particle wt. is 1.7 million dalton.
- RNA found is 23S rRNA and 16S rRNA.

Note - S = Swedberg unit or sedimentation rate.

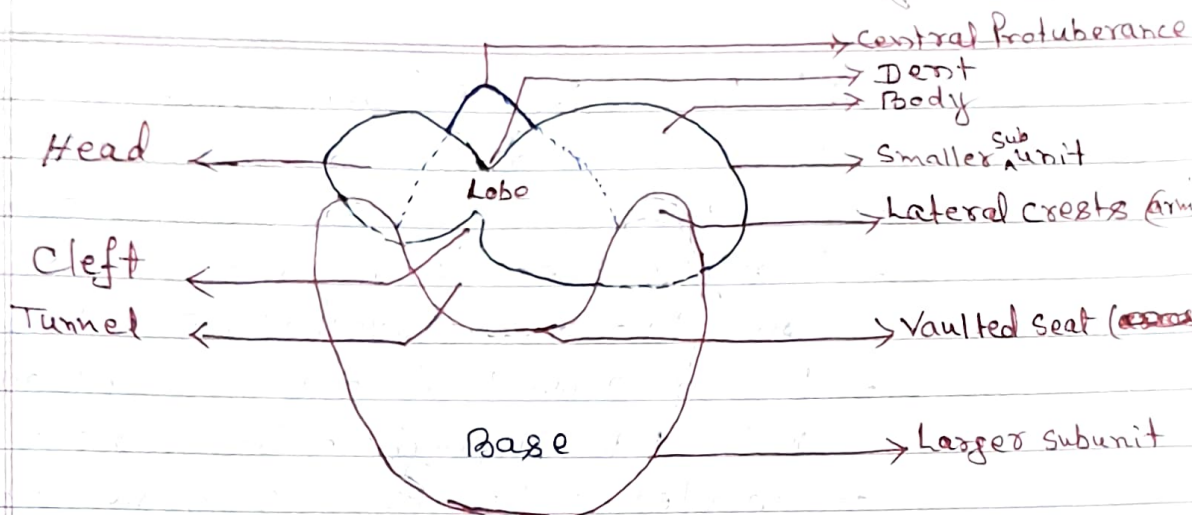


Fig:- STOFFLER AND WITTMAN'S MODEL OF RIBOSOME.

(b) 30 S :-

- It is smallest subunit
- Its base is rod like.
- It particle wt. is 1.0 million dalton.
- RNA found is 16S rRNA

[B] EUKARYOTIC RIBOSOMES :-

- It is 80S ribosomes.
- It is composed of 60S and 40S subunits.

(a) 60 S :-

- It is larger subunit
- Its molecular wt is 2.7 million dalton
- It contains 28S, 5S, 5.8S rRNA

(b) 40 S :-

- It is smaller subunit
- It molecular wt is 1.5-1.7 million dalton
- It contain. 18S rRNA

6. POLYRIBOSOMES OR POLYSOME :-

At the time of Protein Synthesis :-

- Two subunits of ribosomes get attached.
- Many ribosomes get attached with mRNA and known as Polyrisosome or Polysome.
- Larger subunit of ribosome get attached with ER through ribophorine.
- Smaller subunits of ribosome get attached with mRNA.

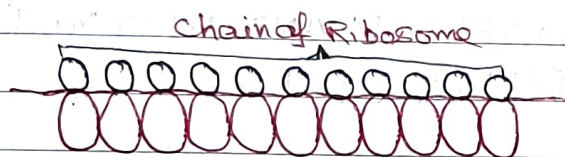


Fig - Polyrisosome or Polysome.

7. CHEMICAL COMPOSITION OF RIBOSOME :-

- It is composed of RNA and Protein (Ribonucleoprotein).
- Protein form the Periphery, RNA lie in the interior interconnected within the two subunits.
- 70S $\rightarrow$ RNA (60-64%) + Protein (36-37%)
- 80S $\rightarrow$ RNA (56-60%) + Protein (40-44%)
- 55 different proteins are found in ribosomes.

8. BIOGENESIS OF RIBOSOME :-

- In Prokaryotes ribosome originate in Cytoplasm.
- In Eukaryotes ribosome originate in nucleolus.
- Therefore nucleolus is also called as ribosomal factory.

9. Main FUNCTION :-

- Main function of ribosome is Protein Synthesis so called Protein Factory or cell Engine.