

# 70s ribosome

**Ram Balak Mahto**

**Guest faculty**

**Department of Zoology**

**V.S.J College Rajnagar Madhubani**

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# Ribosomes Definition

- ✓ The ribosome word is derived – ‘ribo’ from ribonucleic acid and ‘somes’ from the Greek word ‘soma’ which means ‘body’.
- ✓ Ribosomes are tiny spheroidal dense particles (of 150 to 200 Å diameters) that are primarily found in most prokaryotic and eukaryotic.
- ✓ They are sites of **protein synthesis**.
- ✓ They are structures containing approximately equal amounts of RNA and proteins and serve as a scaffold for the ordered interaction of the numerous molecules involved in protein synthesis.
- ✓ The ribosomes occur in cells, both prokaryotic and eukaryotic cells.
- ✓ In prokaryotic cells, the ribosomes often occur freely in the cytoplasm.

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- ✓ In eukaryotic cells, the ribosomes either occur freely in the cytoplasm or remain attached to the outer surface of the membrane of the endoplasmic reticulum.
- ✓ The location of the ribosomes in a cell determines what kind of protein it makes.
- ✓ If the ribosomes are floating freely throughout the cell, it will make proteins that will be utilized within the cell itself.
- ✓ When ribosomes are attached to the endoplasmic reticulum, it is referred to as rough endoplasmic reticulum or rough ER.
- ✓ Proteins made on the rough ER are used for usage inside the cell or outside the cell.
- ✓ The number of ribosomes in a cell depends on the activity of the cell.
- ✓ On average in a mammalian cell, there can be about 10 million ribosomes.

# Structure of ribosome

- ✓ Ribosomes are made of proteins and ribonucleic acid (abbreviated as RNA), in almost equal amounts.
- ✓ It comprises of two sections, known as subunits.
- ✓ The tinier subunit is the place the mRNA binds and it decodes, whereas the bigger subunit is the place the amino acids are included.
- ✓ Both subunits comprise of both ribonucleic acid and protein components and are linked to each other by interactions between the proteins in one subunit and the rRNAs in the other subunit.
- ✓ The ribonucleic acid is obtained from the nucleolus, at the point where ribosomes are arranged in a cell.

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- Around 37 to 62% of RNA is comprised of RNA and the rest is proteins.
- Prokaryotes have 70S ribosomes respectively subunits comprising the little subunit of 30S and the bigger subunit of 50S. Eukaryotes have 80S ribosomes respectively comprising of little (40S) and substantial (60S) subunits.
- The ribosomes seen in the chloroplasts and mitochondria of eukaryotes are comprised of big and little subunits composed of proteins inside a 70S particle.
- Share a center structure which is very much alike to all ribosomes in spite of changes in its size.
- The RNA is arranged in different tertiary structures. The RNA in the bigger ribosomes is into numerous continuous infusions as they create loops out of the center of the structure without disturbing or altering it.

# Ribosome molecular Size

- Ribosomes comprise of two subunits that are suitably composed and function as one to translate the mRNA into a polypeptide chain amid protein synthesis. Due to the fact that they are made from two subunits of differing size, they are a little longer in the hinge than in diameter. They vary in size between prokaryotic cells and eukaryotic cells.
- The prokaryotic is comprised of a 30s (Svedberg) subunit and a 50s (Svedberg) subunit meaning 70s for the entire organelle equal to the molecular weight of  $2.7 \times 10^6$  Daltons.
- Prokaryotic ribosomes are about 20 nm (200 Å) in diameter and are made of 35% ribosomal proteins and 65% rRNA.
- Notwithstanding, the eukaryotic are amidst 25 and 30 nm (250–300 Å) in diameter. They comprise of a 40s (Svedberg) subunit and a 60s (Svedberg) subunit which means 80s (Svedberg) for the entire organelle which is equal to the molecular weight of  $4 \times 10^6$  Daltons.

# Location of ribosome in the cell

- ✓ Ribosomes are organelles located inside the animal, human cell, and plant cells. They are situated in the cytosol, some bound and free-floating to the membrane of the coarse endoplasmic reticulum.
- ✓ They are utilized in decoding DNA (deoxyribonucleic acid) to proteins and no rRNA is forever bound to the RER, they release or bind as directed by the kind of protein they proceed to combine.
- ✓ In an animal or human cell, there could be up to 10 million ribosomes and numerous ribosomes can be connected to the equivalent mRNA strand, this structure is known as a **POLYSOME**.

# Main functions of ribosomes

- When it comes to the main functions of ribosomes, they assume the role of bringing together amino acids to form particular proteins, which are important for completing the cell's activities.
- Protein is required for numerous cell functions, for example, directing chemical processes or fixing the damage.
- Ribosomes can yet be discovered floating inside the cytoplasm or joined to the endoplasmic reticulum.

# The other functions of ribosome include

- ✓ The procedure of creation of proteins, the deoxyribonucleic acid makes mRNA by the step of DNA transcription.
- ✓ The hereditary information from the mRNA is converted into proteins amid DNA translation.
- ✓ The arrangements of protein assembly amid protein synthesis are indicated in the mRNA.
- ✓ The mRNA is arranged in the nucleus and is moved to the cytoplasm for an additional operation of protein synthesis.
- ✓ The proteins which are arranged by the ribosomes currently in the cytoplasm are utilized inside the cytoplasm by itself. The proteins created by the bound ribosomes are moved outside the cell.

# The major differences between 70s and 80s include:

- ✓ Prokaryotes have 70S ribosomes, singly made of a 30S and a 50S subunit. While the Eukaryotes have 80S ribosomes, singly made of a 40S and 60S subunit.
- ✓ 70S Ribosomes are relatively smaller than 80S while the 80S Ribosomes are relatively bigger than 70S ribosomes.
- ✓ Prokaryotes have 30S subunit with a 16S RNA subunit and comprise of 1540 nucleotides bound to 21 proteins. The 50S subunit gets produced from a 5S RNA subunit that involves 120 nucleotides, a 23S RNA subunit that contains 2900 nucleotides and 31 proteins.
- ✓ Eukaryotes have 40S subunit with 18S RNA and also 33 proteins and 1900 nucleotides. The big subunit contains 5S RNA and also 120 nucleotides, 4700 nucleotides and also 28S RNA, 5.8S RNA as well as 160 nucleotides subunits and 46 proteins.
- ✓ Eukaryotic cells have mitochondria and chloroplasts as organelles and those organelles additionally have ribosomes 70S. Hence, eukaryotic cells have different kinds of ribosomes (70S and 80S), while prokaryotic cells just have 70S ribosomes.



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