



FACULTY OF ENGINEERING & TECHNOLOGY  
DEPARTMENT OF BIOTECHNOLOGY

# Types of RNA

In all prokaryotic and eukaryotic organisms, three main classes of RNA molecules exist-

1) Messenger RNA (m RNA)

2) Transfer RNA (t RNA)

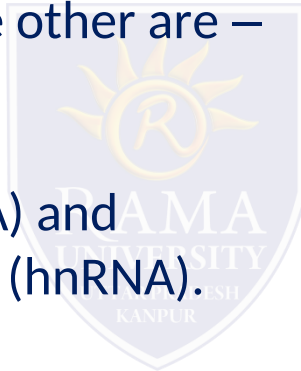
3) Ribosomal RNA (r RNA) The other are –

○ small nuclear RNA (SnRNA),

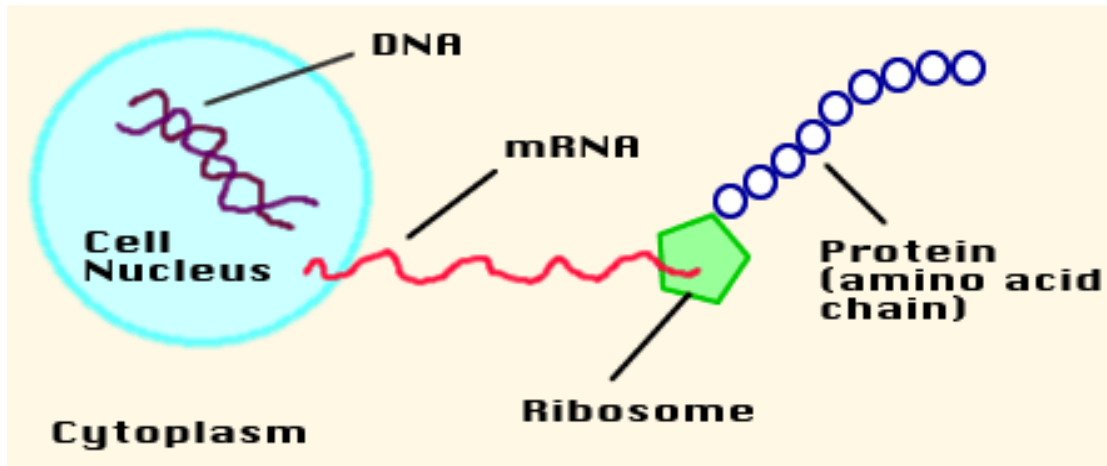
○ micro RNA (mi RNA) and

○ small interfering RNA (Si RNA) and

○ heterogeneous nuclear RNA (hnRNA).



## Messenger RNA (m-RNA)



- ❑ Comprises only 5% of the RNA in the cell
- ❑ Most heterogeneous in size and base sequence
- ❑ All members of the class function as messengers carrying the information in a gene to the protein synthesizing machinery

- ❑ The 5' terminal end is capped by 7-methyl guanosine triphosphate cap.
- ❑ The cap is involved in the recognition of mRNA by the translating machinery
- ❑ It stabilizes m RNA by protecting it from 5' exonuclease

## Structural Characteristics of m-RNA(contd.)

- ❑ The 3' end of most m-RNAs have a polymer of Adenylate residues( 20-250)
- ❑ The tail prevents the attack by 3' exonucleases
- ❑ Histones and interferons do not contain poly A tails
- ❑ On both 5' and 3' end there are non coding sequences which are not translated (NCS)
- ❑ The intervening region between non coding sequences present between 5' and 3' end is called coding region. This region encodes for the synthesis of a protein.

## Structural Characteristics of m-RNA

### Eukaryotic mRNA molecule



Leader

Coding sequence

Trailer

5'-cap-AGGAUU AUGCCUGGACUGAGCGCUUAG AUUAUAUAAAAAAAAAAAA

Start

Stop

5' cap and 3' tail impart stability to mRNA by protecting from specific exonucleases.

## Structural Characteristics of m-RNA(Contd.)

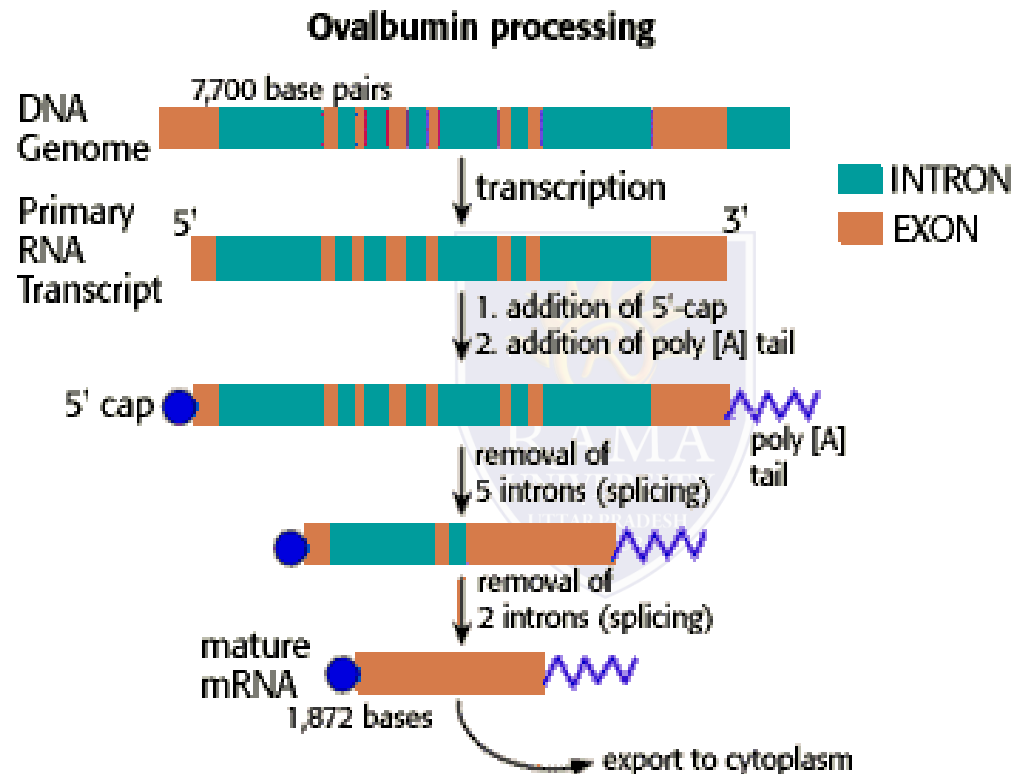
- ❑ The m- RNA molecules are formed with the help of DNA template during the process of transcription.
- ❑ The sequence of nucleotides in m RNA is complementary to the sequence of nucleotides on template DNA.
- ❑ The sequence carried on m -RNA is read in the form of codons.
- ❑ A codon is made up of 3 nucleotides
- ❑ The m-RNA is formed after processing of heterogeneous nuclear RNA

## Heterogeneous nuclear RNA (hnRNA)

- ❑ In mammalian nuclei, hnRNA is the immediate product of gene transcription
- ❑ The nuclear product is heterogeneous in size (Variable) and is very large.
- ❑ Molecular weight may be more than  $10^7$ , while the molecular weight of m RNA is less than  $2 \times 10^6$
- ❑ 75 % of hnRNA is degraded in the nucleus, only 25% is processed to mature m RNA



# Heterogeneous nuclear RNA (hnRNA)



- Mature m –RNA is formed from primary transcript by capping, tailing, splicing and base modification.