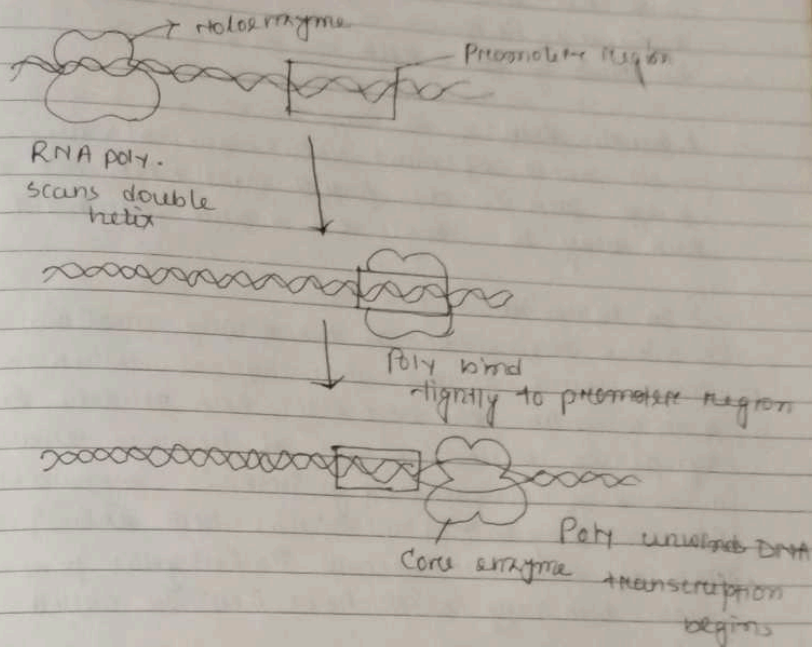


## Different forms of RNA:



Eukaryotes:

## RNA

Ribonucleic acid is single stranded nucleic acid found in all living cells. Its different forms are associated with the transmission of information from nucleus into cytoplasm by regulation of synthesis of proteins. Ribozymes are catalytic RNA which function as storage of information. RNA can be detected from mitochondria, chloroplast, and eukaryotic chromosomes.

The RNA are mainly two types:

1. Genetic RNA
2. Non-genetic RNA

### 1. Genetic RNA:

In most of plant virus, animal virus, bacteriophage DNA is not found and RNA act as hereditary RNA may be single or double stranded.

#### i) In Retrovirus:

Virus having RNA as hereditary material have an enzyme called reverse transcriptase. When a virus particle enters the host cell, RNA released in the host cytoplasm. Here, by help of reverse transcriptase a strand of complementary DNA is synthesised using RNA as template. The viral DNA then joins the DNA of host cell become its integral part. The integrated DNA copy with host DNA is called provirus.

#### ii) In RNA-RNA viruses:

These viruses synthesise new genomic RNA or RNA template with help of an enzyme called replicase.

### 2. Non-genetic RNA:

In all organisms, where DNA is the hereditary material, non-genetic RNA is synthesised from DNA template. It is of three types —

#### i) mRNA or nuclear RNA

##### ii) rRNA

##### iii) tRNA

mRNA or nuclear RNA :-

mRNA carries genetic information from chromosomal DNA to cytoplasm, act as a template for protein synthesis. Uracil constitute about 5% of the total RNA of the cell. The term used by Francis Jacob and Jacques Monod (1961). In the cytoplasm, mRNA molecules become attached to ribosome and act as template.

Str. of mRNA:

The main part of mRNA code for sequence of nucleotides that codes for polypeptide. It has following str.

1. A cap of methylated guanine (G-cap) at its proximal/5' end.
2. Initiation codon (AUG or GUG) next to G cap.
3. A long coding region.
4. A termination codon or stop codon (UAA, UAG or UGA) at the end of coding region at the distal end.
5. A poly-A tail of many adenine containing nucleotides.
6. A small noncoding segment may present after G-cap before poly-A tail. The noncoding seq. at 5' of mRNA called the leader. The noncoding seq. at 3' end is the trailer.

Characters of mRNA:

→ It is formed as a complementary strand to

- one of the two strands of DNA.
- The same sequence of base arrangement in that part of DNA from it is copied
  - After synthesis it immediately diffuses out of the nucleus into cytoplasm -
  - It act as template for protein synthesis
  - It has short life span.
  - mRNA from different organisms alike gross base content
  - The molecules of mRNA are linear
  - There is one mRNA for each polypeptide chain
  - It has great variation in the size of mRNA molecule. mRNA is called heterogeneous nuclear RNA.

### Biosynthesis of mRNA :-

mRNA accomplished by using one of two DNA strands. It is carried out from 5' → 3' ends. RNA pol. attaches to initiation site of structural gene of DNA cistron. The phenomenon of synthesis of mRNA from DNA is known as transcription.

hnRNA molecules are much bigger in size than the functional mRNA molecules, because these are copies of both introns and exons. These are called primary transcripts. A seq. Polyadenylic acid is added to the 3' end. pri. transcripts and intron segment are cleaved. The transcripts of exons then join, finally 5' end of hnRNA release poly-A(H) and diffuses out in the cytoplasm.

### Role of mRNA:

In DNA, nucleotide seq. is present in nucleus. Protein synthesis occurs in cytoplasm, seq. of nucleotides in the polypeptide chain determine DNA. mRNA act as an intermediate in flow of information from DNA to protein.

mRNA assembled as complementary copy of 5' → 3' DNA strands that make up a gene. The synthesis of 5' → 3' strand of DNA called coding strand. The process of form<sup>n</sup> of RNA from coding strand of DNA is called transcription. Gramov discovered seq. of 3 nucleotides codes for one amino acid in polypeptide chain. It means code words for amino acid in DNA and mRNA are nucleotide triplets.

### tRNA: Types

Inside the ribosome of eukaryotic cells, tRNA occurs in form of particles of three different dimensions. These are designated 80S, 18S and 5S. 80S and 5S molecules occur in large subunit (60S subunit) of ribosome, whereas 18S molecule is present in small subunit (50S subunit). In prokaryotic cells two types ribosomal RNAs → 23S and 16S rRNA.

### Base composition of tRNA:

It is relatively rich in guanine and cytosine. The base components in tRNA of *E. coli* have molar ratio A 21 : U 19 : G 36 : cytosine 23.

**Biosynthesis:** DNA seq. encoding rRNA are normally repeated hundreds of times showing tandem arrangement. This DNA is called rDNA. It is situated one or more nucleoli. The part of chromosome contains