

# **Genetic Material**

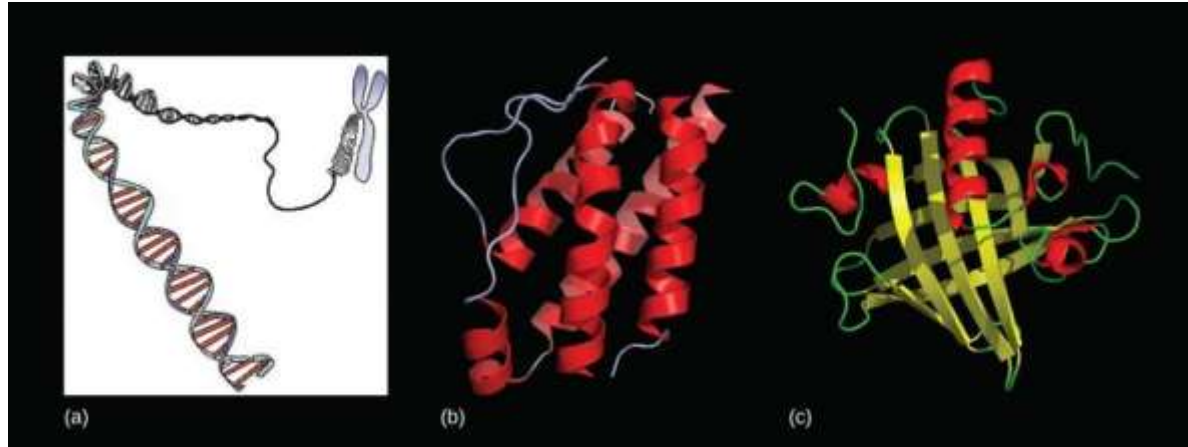
**B. Sc. III Sem VI Sec I Unit I**

**“Molecular Biology and Biotechnology and Horticulture, Forestry  
and Herbal Technology”**

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***RNA***  
*(Ribonucleic acid)*



# INTRODUCTION OF RNA

Types of *RNA* :-

- 1) m *RNA*
- 2) t *RNA*
- 3) r *RNA*

□ Nucleic acid play main important role in storage transfer & expression of genetic information.

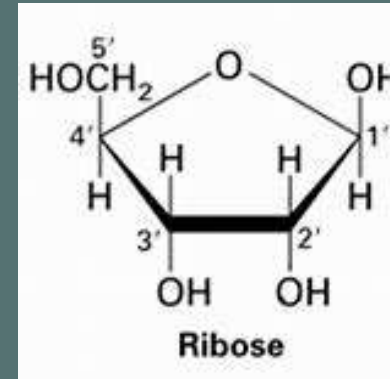
■ There are two types :-

1) DNA ( Deoxyribonucleic acid )

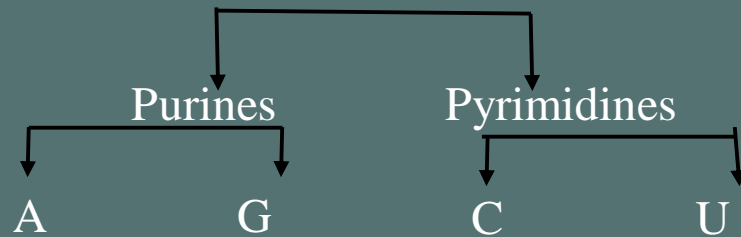
2) RNA ( Ribonucleic acid )

# RNA ( Ribonucleic acid )

- RNA is a nucleic acid containing ribose sugar.
- Found in large amount in cytoplasm.
- In cytoplasm mainly found nucleolus.
- It consist several units called ribonucleotide.
- Each RNA molecule formed nucleotide.
- Each nucleotide contain 3 different molecule.
- Ex :-
  - 1) Phosphate group
  - 2) Ribose sugar
  - 3) Nitrogen base



Ribose sugar



□ RNA single strands may be folded back upon itself & double strands may be coiled to form helical structure like that of DNA.

All the 3 kinds of RNA are synthesized of DNA during transcription process for protein synthesis.

□ Types of RNA :-

- 1) mRNA
- 2) tRNA
- 3) rRNA

## 1. mRNA ( messenger RNA )

- Term coined :- Jacob & Monod (1961).
- It is ribonucleic acid.
- Which carries genetic information for protein synthesis from DNA to cytoplasm.
- Forms about 3-5% total cellular RNA.
- mRNA carries message in the form of triple codes.

## Types :-

There are two types :-

- 1) Monocistronic mRNA
- 2) Polycistronic mRNA

### 1) Monocistronic mRNA :-

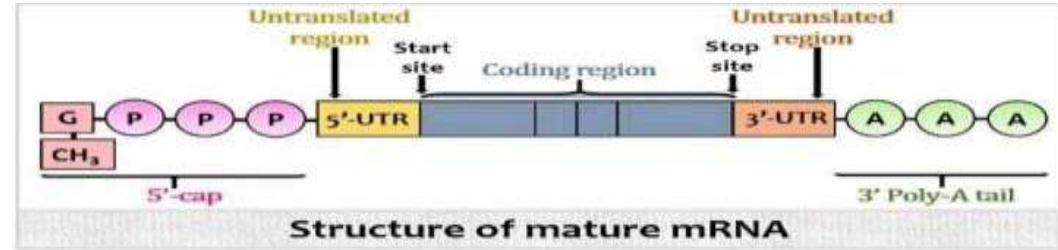
- Cistron is a DNA segment.
- Formed single cistron.
- The eukaryotic mRNA is monocistronic.

### 2) Polycistronic mRNA :-

- A polycistronic mRNA is from many cistron.
- The prokaryotic mRNA is polycistronic.



# Structure of mRNA:-



BIOLOGY READER

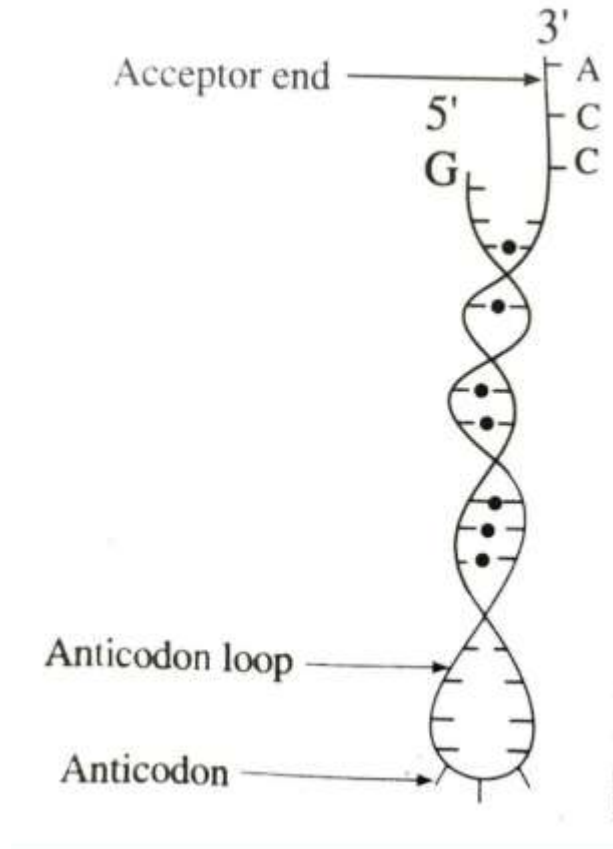
- mRNA consist of 2 end that is 5' end & 3' end.
- 5' end start codon & 3' end stop codon.
- At 5' end show initiation codon that is AUG while at 3' end shows termination codon that is UAA/UAG/UGA.
- Synthesis of mRNA is called transcription.
- mRNA carries genetic information in the form of triplet codon.
- Each codon is a sequence of 3 nitrogen bases called triplet codon.
- Contain 900-15000 nucleotide

## *II . tRNA*

- Smallest RNA found in cytoplasm.
  - Mostly synthesized in nucleus on DNA template
  - Forms about 10-20% RNA
  - Contain 73-83 nucleotide per tRNA
  - They also called soluble RNA
- ☐ Single stranded tRNA folded upon itself to form two patterns
- I.e. 1. Hair pin like structure  
2. clover leaf pattern

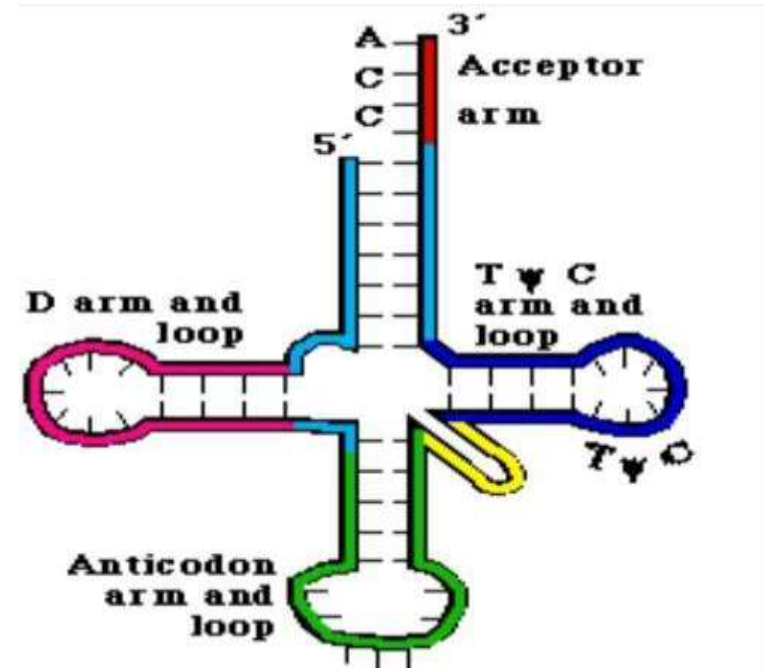
## *a. hair pin pattern*

- Proposed by - Hoagland
- Single stranded tRNA folded upon itself to form hair pin like structure
- In the loop nitrogen bases are paired in specific manner
- In the loop 3 nitrogen base are present I.e. unpaired known as anticodon and paired known as codon.
- E.g. AUG codon- Anticodon UAC
- Short arm are 5' end i.e end in guanine.
- Long arm are 3' end i.e carrier sites ends in CCA.
- CCA ends pick up the activated amino acid.



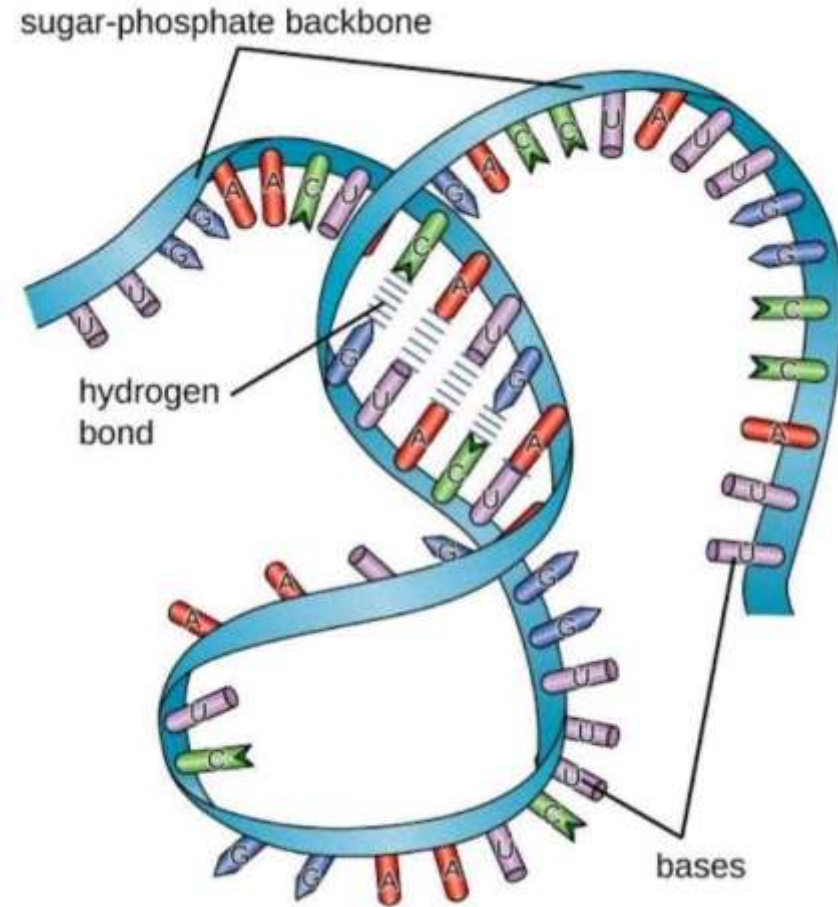
### b) Clover leaf pattern:

- Proposed by – Holley et al (1965)
- Single stranded t-RNA fold upon itself to form clover leaf pattern.
- This pattern consist three arms, one mini arm and two free ends.
- Each arm has a stem and terminal loop.
- In arm region there is base pairing and in loop base pairing is absent.
- **There are three arms of clover leaf pattern:**
  1. D- arm
  2. T- arm
  3. Middle region
- There are 2 ends of clover leaf pattern.
- Functions:  
t RNA carry amino acid to m RNA during protein synthesis.



### 3. rRNA (ribosomal RNA)

- Term proposed by – Karland (1960)
  - Ribonucleic acid present in ribosome
  - It has single stranded & polynucleotide chain
  - Each strand form many nucleotide
  - Each nucleotide form three different molecule
- 
- Structure of rRNA :
  - Which is twisted upon itself
  - Shows paired and unpaired bases
  - Paired region seen in coiled region
  - Unpaired region seen in uncoiled region
- 
- FUNCTION :
  - rRNA play major role in protein synthesis in ribosome





*Thank You*