L2

▼ Gut Microbiome

1. helps in digestion
2. helps in processing medicines
3. trains the immune system
4. helpful in producing essential vitamins

▼ Chromosomes

- All cells store their hereditary information in the same linear chemical code: DNA
- organized in coiled structures called chromosomes
- The complete DNA content of an organism is called genome

▼ DNA

- Composed of four basic units - called nucleotides
- Each nucleotide contains - a sugar, a phosphate, and one of the four bases;
  - A, T, G, C
- Information carrying : pairing of these 4 bases
- DNA is helix due to H-bonds
- reverse strand == forward strand ka complement leke read it 5’ to 3’

First write its complement:

5′ CATTGCCAGT 3′

3′ GTAACGGTCA 5′

When read in 5′ to 3′ orientation, the sequence on the reverse strand is:

5′ ACTGGCAATG 3′

- DNA replication hota hai on a template , so divide hone se pehle poora genome copy krke on each resulting daughter

▼ RNA

- single stranded
- sugar (ribose) + phosphate + A/U/G/C

Intra-strand base pairing is a characteristic feature of RNA

Base Pairing – formed by weak H-bonds and follows the following complementarity rule:

A ⟷ U, G ⟷ C, and G ⟷ U

- RNA molecules that are copied from the genes (which ultimately direct the synthesis of proteins) are called messenger RNA (mRNA) molecules.

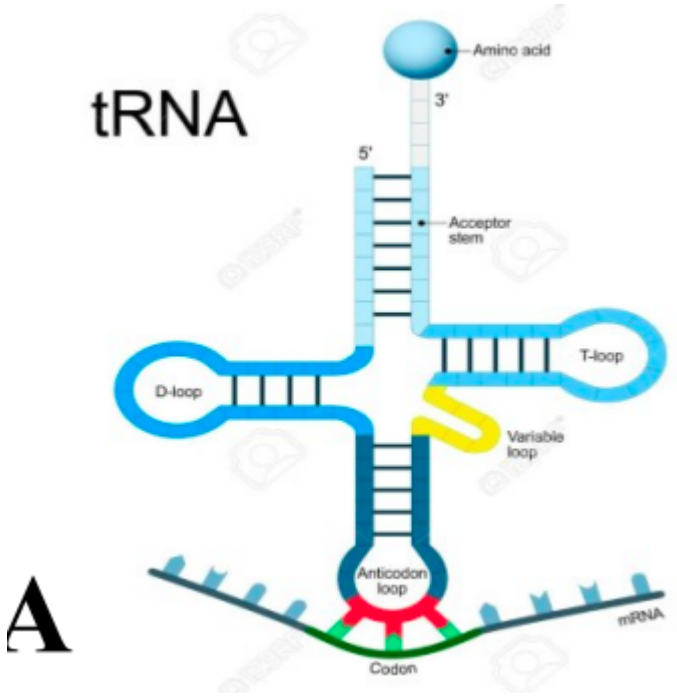
▼ RNA synthesis

- i.e., synthesized RNA sequence is basically the DNA sequence in the forward strand with T replaced by U

- i.e., synthesized RNA sequence is basically the complement of the template DNA sequence with T replaced by U, when read in the 5′ to 3′ orientation

▼ Protein Synthesis

- rRNA, tRNA and snRNA play an important role in protein synthesis
- Translation: process of protein synthesis, information in mRNA is read out in groups of three nucleotides called codons.
- tRNA helps in reading this genetic code



- This process occurs on ribosome, composed of both proteins and ribosomal RNA

▼ Proteins

Protein structure is divided in 4 hierarchical levels:

- **Primary structure - represented by AA sequences**
- **Secondary structure - α-helices & β-sheets**
- **Tertiary and Quaternary structures - represented by 3D structures**

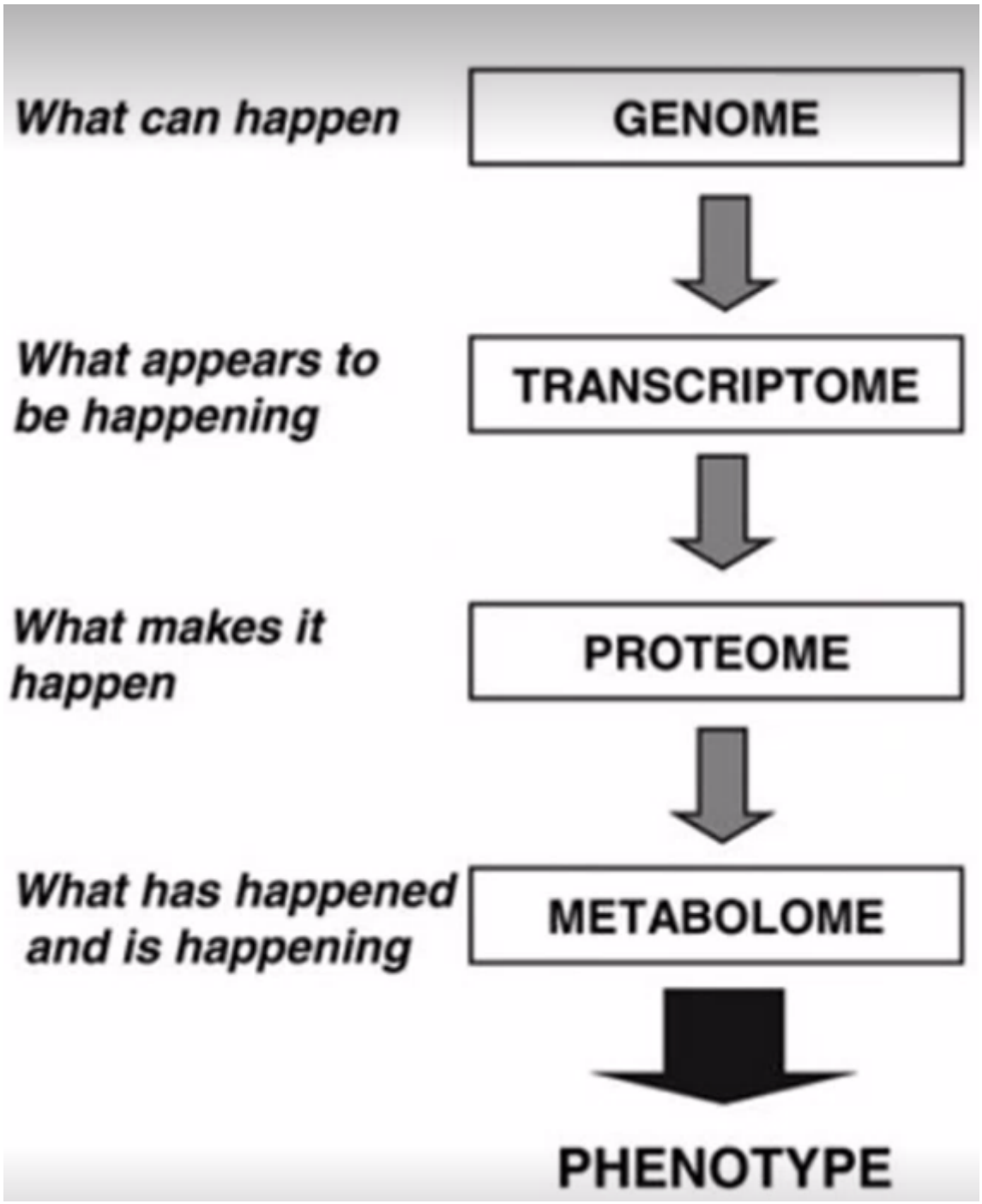
- make up the cellular structure
- act as catalysts (called enzymes) for rxns at cell level
- help in transcription
- act as receptors
- recognize RNA DNA and bind with them for cell functioning

▼ Genes

There are two types of Genes:

1. Protein coding : final product is protein
2. Non-coding RNA: final product = RNA

- Genotype: set of genes of an organism
- phenotype: characterstics of an organism which are decided by the genotype and environment



- Genes store and express the genetic info
- Mutations create alleles
- 2% genome is genes, a significant part used for structural integrity of chromosomes and rest is repetitive

▼ Mutations

types:

1. Substitution
2. Insertion/Deletion
3. Rearrangement

role:

1. evolution is based on mutation
2. phenotype variations bhi mutation se aate hai
3. inherited diseases ka karan hai
4. new species isiliye bne

▼ Biological Sequence Analysis

- Pattern Recognition
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