

Genetic Code part-1

Ram Balak Mahto

Guest faculty

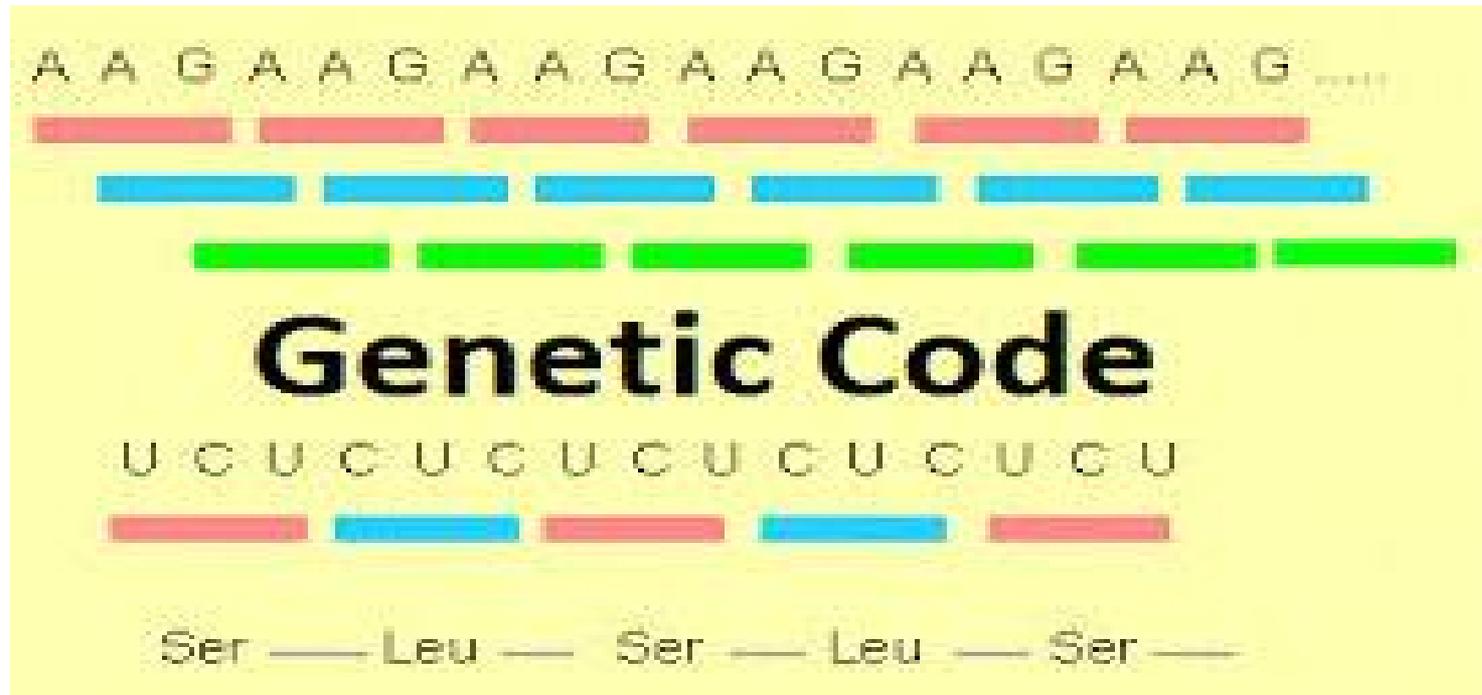
Department of Zoology

V.S.J College Rajnagar Madhubani

Class 12th , 7908055676

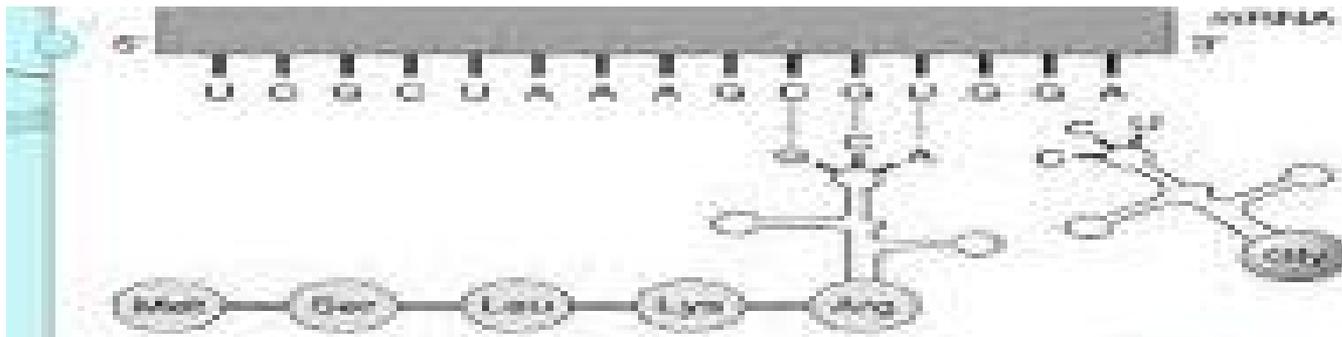
What is a Genetic Code?

- Synthesizing a protein with the help of the information in RNA is similar to translating a language to another.
- A four-letter language (A,T,G,C in mRNA) is translated to 20 letter language during protein synthesis (20 amino acids in the protein).
- Terms given by Goerge Gamow



RELATION AMONG RIBOSOMES, TRANSLATION AND GENETIC CODE

- The **ribosomes** are responsible to accomplish the process of translation. They link the amino acids in a mRNA-specified (messenger RNA) order using tRNA (transfer RNA) molecules to carry amino acids and to read the mRNA three nucleotides at a time.



The pathway of protein synthesis is called **Translation** because the language of nucleotide sequence on mRNA is translated in to the language of an amino acid sequence. The process of Translation requires a **Genetic code**, through which the information contained in nucleic acid sequence is expressed to produce a specific sequence of amino acids.

Importance of genetic code

- A key point of the genetic code is its universal nature. This indicates that virtually all species with minor exceptions use the genetic code for protein synthesis.
- In other words, a genetic code is defined as the nucleotide sequence of the base on DNA which is translated into a sequence of amino acids of the protein to be synthesized.

Properties of Genetic Code

- Triplet code
- Non-ambiguous and Universal
- Degenerate code
- Nonoverlapping code
- Commaless
- Start and Stop Codons
- Polarity

Triplet code

- A codon or a code word is defined as a group of bases that specify an amino acid. The codons are developed by using the bases available in mRNA. There is a strong evidence which proves that a sequence of three nucleotides codes for an amino acid in the protein, i.e., the code is a *triplet*.
- The four bases of nucleotide i.e, (A, G, C, and U) are used to produce three base codons. The 64 codons involve sense codons (that specify amino acids). Hence, there are 64 codons for 20 amino acids since every codon for one amino acid means that there exist more than code for the same amino acid.

Commaless code & Nonoverlapping code

- No room for punctuation in between which indicates that every codon is adjacent to the previous one without any nucleotides between them.
- The code is read sequentially in a group of three and a nucleotide which becomes a part of triplet never becomes part of the next triplet.

For example

- 5'-UCU-3' codes for Serine
- 5'-AUG-3' codes for methionine

Polarity

- Each triplet is read from 5' → 3' direction and the beginning base is 5' followed by the base in the middle then the last base which is 3'. This implies that the codons have a ***fixed polarity*** and if the codon is read in reverse direction, the base sequence of the codon would reverse and would specify two different proteins.

Degenerate code

- Every amino acid except tryptophan (UGG) and methionine (AUG) is coded by various codons, i.e, a few codons are synonyms and this aspect is known as the ***degeneracy of genetic code***. For instance, UGA codes for tryptophan in yeast [mitochondria](#).

Thank u

Next part-2