

GENETIC CODE

It has been established that 20 amino acids take part in protein synthesis and there are only four nitrogen bases in DNA that makes the code for protein synthesis. Hence, it was suggested that a three letter word can form a codon or triplet codon. They are sufficient to code for 20 amino acids. There are also more than one codon for single amino acid. These include UUU and UUC which code for Phenylalanine. Similarly UAU and UAC code for Tyrosine. There are three codons namely UAA, UAG and UGA which can not translate amino acids. They are called chain termination codons. Similarly AUG and GUG are chain initiation codon.

DEFINITION → Genetic code is the arrangement of nucleotides in the DNA molecule (gene) that control the synthesis of a particular protein having definite arrangement of amino acids.

THE CODE IN DETAIL → The codes for protein synthesis are present on m-RNA in form of base sequences. If we presume that single base is coded in m-RNA for single amino acid

it be not cover all the amino acids. If two letter words are taken into condensation, they create only 16 words. Hence, it was fined out that 3 letter words create 64 words which is 3 times more than the number of amino acid. This has been experimentally supported. The table below shows 64 codon which constitute the genetic code.

	U	C	A	G	
U	UUU	UCU	UAU	UGU	U
	UUC	UCC	UAC	UGC	C
	UUA	UCA	•UAA	•UGA	A
	UUG	UCG	•UAG	UGG	G
C	CUU	CCU	CAU	CGU	U
	CUC	CCC	CAC	CGC	C
	CUA	CCA	CAA	CGA	A
	CUG	CCG	CAG	CGG	G
A	AUU	ACU	AAU	AGU	U
	AUC	ACC	AAC	AGC	C
	AUA	ACA	AAA	AGA	A
	*AUG	ACG	AAG	AGG	G
G	GUU	GCU	GAU	GGU	U
	GUC	GCC	GAC	GGC	C
	•GUA	GCA	GAA	GGA	A
	*GUG	GCG	GAG	GGG	G

$$4 \times 4 \times 4 = 64$$

- Non sense codon.
- * Initiation codon.
- Termination codon.

CHARACTERISTICS OF GENETIC CODE →

The genetic code bears the following properties —

1. **The code is triplet** → The three nitrogen base sequences form a codon. Hence, there are 64 triplet codons.
2. **The code is degenerate** → More than one words can be used for a particular amino acids. This can be illustrated with the codons UUU and UUC. They code for phenyl alanine.
3. **The code is non-overlapping** → It means that two codons do not overlap with each other. In simple words the same letter is not shared by two neighbouring codons.
4. **The code comma less** → The codons are continuous and there is no waste letter in between the two.
5. **The code is non-ambiguous** → It indicates that codons are specific for an amino acid. One codon can not code for more than one different amino acids at different places.
6. **The code is universal** → There is the same genetic code for all plants and animals except the cell organelles like mitochondrion.