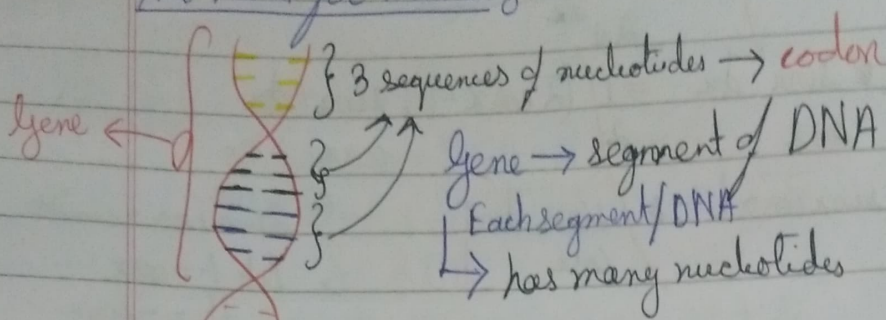


The Need for Protein?



The sequence of 3 nucleotides
(codon)

3 nucleotides in gene \rightarrow Codon
Each codon codes for 1 amino acid

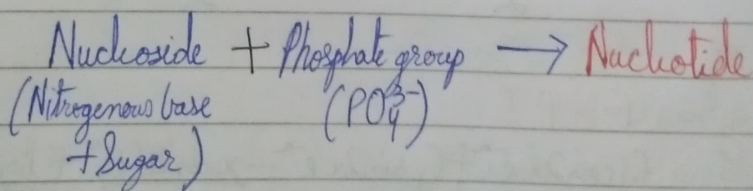
Note:- Every codon codes for unique amino acid

Eg:- AUG \rightarrow codes for methionine
 \rightarrow start codon

- 1) These amino acids link together by peptide bonds to form polypeptides
- 2) These polypeptides fold into specific shape to form functional protein

In Summary:-

Step 1:- Formation of nucleotides:-



Polymer of Nucleotides \rightarrow ~~Amino~~ acid/DNA

- Nitrogenous base + Sugar bonded by glycosidic bond \rightarrow Nucleoside
- Nucleoside + Phosphate group bonded by phosphoester bond \rightarrow Nucleotide
- Polymer of Nucleotides bonded by phosphodiester bond \rightarrow Nucleic acid/DNA

Step 2: Genes & Codons

- DNA is divided into segments called genes
- Each gene has various nucleotides
- 3 nucleotides in sequence \rightarrow Codon
- Each Codon codes for a unique amino acid

* These Codons are continuous

Eg:- 5'-AUG UUU UGC UAA-3'

start codon \leftarrow (codes for methionine) | (codes for phenylalanine) | (codes for cysteine) \rightarrow stop codon (end of translation)

Codons:-

- Start Codon:- It signals start of translation
AUG \rightarrow codes for methionine

- Stop Codon:- It signals end of translation
UAA \rightarrow
UAG \rightarrow
UGA \rightarrow (Does not code for any protein/amino acid)

⇒ Each Codon has 3 bases

U | A | G
1st | 2nd | 3rd 3 base

1st base \rightarrow sets the general category of amino acid

2nd base \rightarrow has significant impact on specificity of codon

3rd base \rightarrow Contributes to "wobble" position in the codon

Step 3: Protein synthesis:-

Two stages:-

- 1) Transcription
- 2) Translation

In Transcription:- (DNA \rightarrow mRNA)

- DNA acts as template strand
- pre-mRNA gets synthesized and becomes complementary to DNA

After mRNA is synthesized from DNA template,
After processing, it becomes mature mRNA

In Translation:- (mRNA \rightarrow Amino acid)

- mRNA is exported from nucleus and reach cytoplasm
- The site of translation is Rough ER / Free Ribosomes (cytoplasm)
- mRNA acts as a template strand for ribosomes
- Ribosomes reads the codon sequence in mRNA to synthesise the corresponding protein

- Each codon is delivered by tRNA (anti-codon)
- Ribosomes catalyzes the formation of peptide bonds between amino acids

Amino acids $\xrightarrow{\text{peptide bond}}$ Peptide $\xrightarrow{\text{stop codon}}$ Proteins

- After adding amino acid to the chain, ribosomes shift to next codon & adds next one to the chain
- When a stop codon is reached, there is no tRNA as the translation ends
- The released factor becomes the newly synthesized protein

Step 4:- Newly formed Protein:-

