GENETIC CODE

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What is genetic code..???

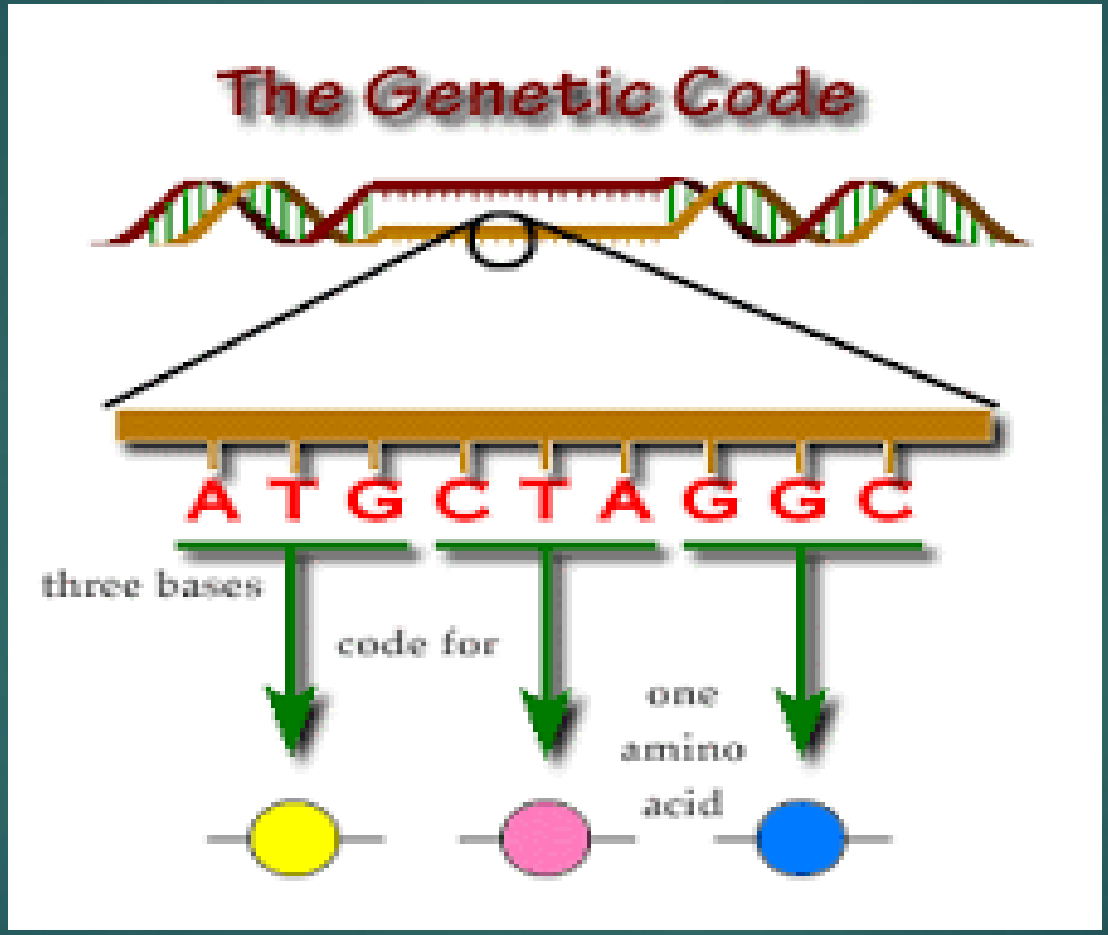
- Genetic code is dictionary that corresponds with sequence of nucleotides and amino acids.
- Genetic code is a set of rules by which information encoded in a genetic material (DNA or RNA sequences) is translated into proteins by living cells.
- Term was given by George Gamow.

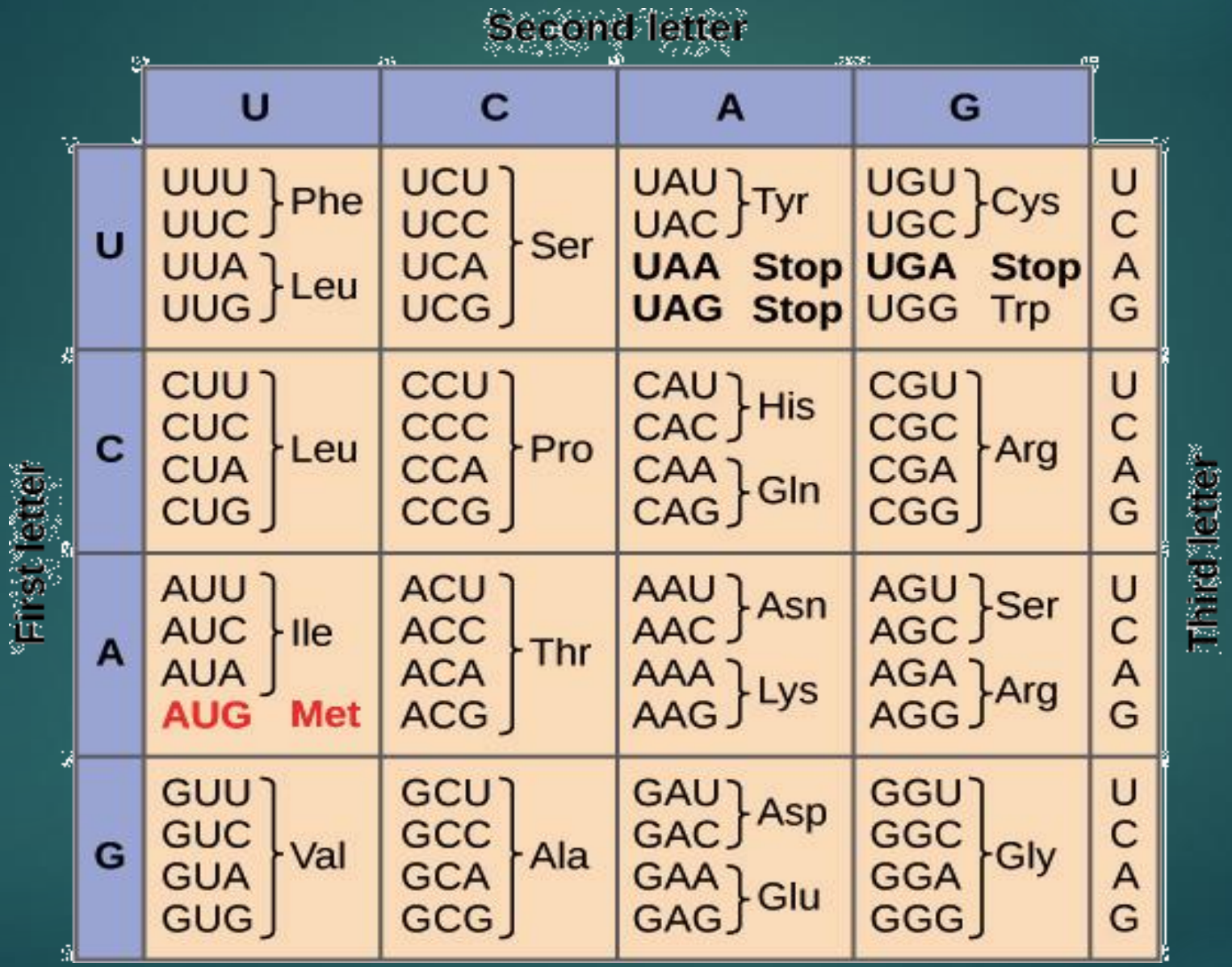
DISCOVERY

- To understand how proteins are encoded began after the structure of DNA was discovered by James Watson and Francis crick.
- George Gamow postulated that a three letter code must be employed to encode the 20 standard amino acids used by living cells to build proteins.

Introduction of genetic code

- The letters A,G,T and C corresponds to the nucleotides found in DNA. They are organized into codon.
- The collection of codons is called genetic code.
- For20 amino acids there should be 20 codons.
- Each codon should have 3 nucleotides to impart specificity to each of the amino acid for a specific codon.


The Genetic Code
A T G C T A G G C
three bases
code for
one
amino
acid


Second letter
First letter
Third letter
U
C
A
G
UUU Phe
UUC
UUA Leu
UUG
UCU
UCC
UCA
UCG Ser
UAU Tyr
UAC
UAA Stop
UAG Stop
UGU Cys
UGC
UGA Stop
UGG Trp
CUU
CUC
CUA
CUG Leu
CCU
CCC
CCA
CCG Pro
CAU His
CAC
CAA Gln
CAG
CGU
CGC
CGA
CGG Arg
AUU
AUC
AUA Ile
AUG Met
ACU
ACC
ACA
ACG Thr
AAU Asn
AAC
AAA Lys
AAG
AGU Ser
AGC
AGA Arg
AGG
GUU
GUC
GUA
GUG Val
GCU
GCC
GCA
GCG Ala
GAU Asp
GAC
GAA Glu
GAG
GGU
GGC
GGA
GGG Gly

Codons and its types

- Genetic code is a dictionary consists of “GENETIC CODE” called codons.
- Each codon consists of three bases (triplets)
- There are 64 codons.
- 61 codons code for 20 amino acids found in protein.
- 3 codons do not code for any amino acid.

Types of codons

- Sense codons
- Signal codons
  - Start codons
  - stop codons
- Sense codon : The codon that code for amino acid are called sense codon.
- Signal codon: Those codons that code forsignal during protein synthesis are called signal codons.
- For eg: AUG,UAA,UAG AND UGA
- There are two types signal codons
  - Terminating codon
  - Initiating codon

TERMINATING CODONS :

UAA,UAG and UGA are terminating codons or nonsense codons and are often referred to as amber, ochre and opal codons.

INITIATING CODONS :

AUG is a initiation codon. It codes for the first amino acid in all proteins.

At the starting point it codes for methionine in eukaryotes and formyl methionine in prokaryotes.

Characteristics of the genetic code

1. Triplet code
2. Comma less
3. Non overlapping code
4. The coding dictionary
5. Degenerate code
6. Universality of code.
7. Non ambiguous code
8. Chain inition code
9. Chain termination codon