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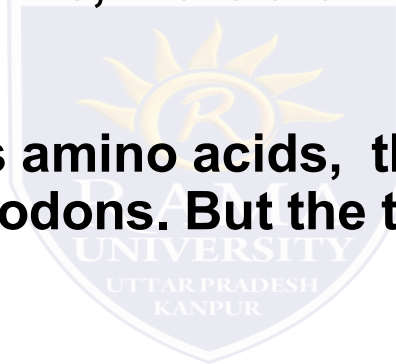
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FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

Crick (1966) proposed the 'wobble hypothesis' to explain the degeneracy of the genetic code.

Except for tryptophan and methionine, more than one codons direct the synthesis of one amino acid.

There are 61 codons that synthesis amino acids, therefore, there must be 61 tRNAs each having different anticodons. But the total number of tRNAs is less than 61.



This may be explained that the anticodons of some tRNA read more than one codon.

In addition identity of the third codon seems to be unimportant. For example CGU, CGC, CGA and CGG all code for arginine.

It appears that CG specifies arginine and the third letter is not important. Conventionally the codons are written from 5'end to 3'end.

Therefore the first and second bases specify amino acids in some cases.

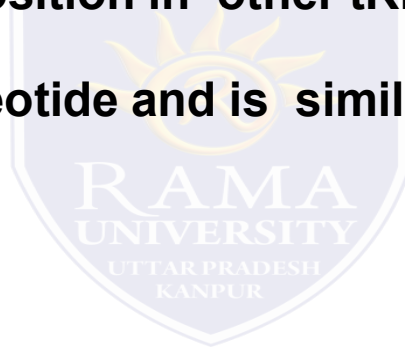
According to the wobble hypothesis only the first and second bases of the triple codon 5'→3' mRNA pair with the bases of the anticodon of tRNA, i.e., A with U or G with C.

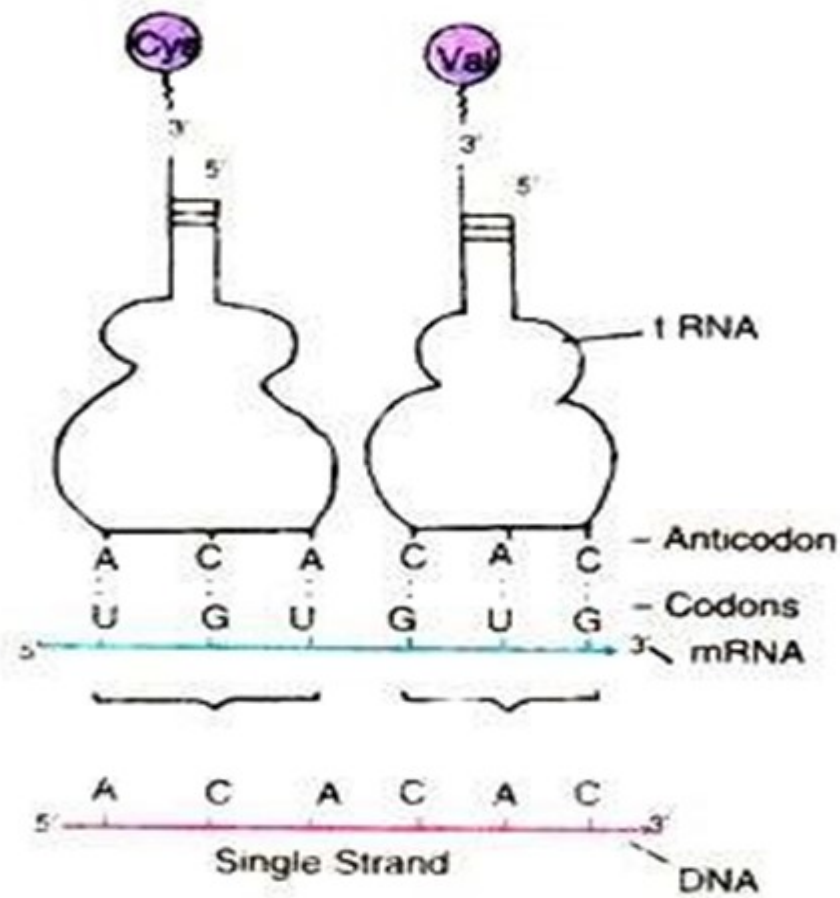
The pairing of the third base varies according to the base at this position for example G may pair with C the conventional pairing [A=U, G=C] is known as Watson - Crick pairing and the second nonnormal pairing is called wobble pairing.

This was observed from the discovery that the anticodon of Yeast alanine tRNA contains the nucleoside inosine in the first position[5'→3'] that paired with the third base of the codon [5'→3'].

Inosine was also found at the first position in other tRNA. e.g. isoleucine and serine.

The purine inosine is a wobble nucleotide and is similar to guanine which normally pairs with A, U, G, and C.





: DNA triplet, mRNA codons and tRNA anticodons showing Watson-Crick pairing.

For example a glycine tRNA with anticodon 5'TCC 3' will recognise glycine codons GGU, GGA, and GGG.

The U at the wobble position will be able to pair with an adenine or a guanine.

Due to the wobble base pairing one tRNA becomes able to recognise more than one codons for an individual amino acids.

Number-one base in

Number-three base in

5A (5' end)

mRNA (3' end)

G

U or C

C

G

A

U

U

A or G

I

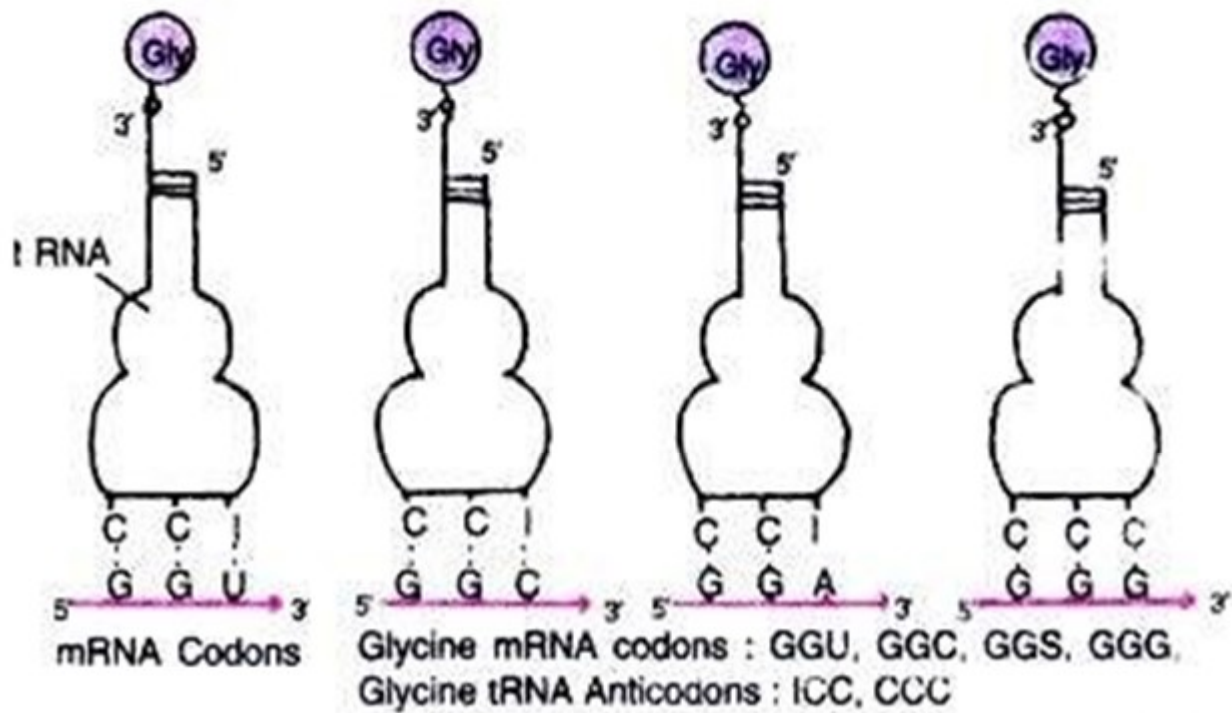
A, U, or C

By direct sequence of several tRNA molecules the wobble hypothesis is confirmed which explain the pattern of redundancy in genetic code in some anticodon [e.g. the anticodons containing U,I, and G in the first position in 5'→3' direction.]

Generally Watson-Crick pairing occurs between AGC and GCU.however in AGU and GCU pairing hydrogen bonds are formed between G and U.

Such abnormal pairing called wobble pairing.





: Wobble pairing of one glycine tRNA with three codons of mRNA due to Wobble in 5'→3' direction.

- Three types of wobble pairing have been proposed.
1. **U** in the wobble position of the tRNA anticodon pairs with **A** or **G** of codon.
 2. **G** pairs with **U** or **C** .
 3. **I** pairs with **A** ,**U**,or **C**.

