Mutations and Genetic Code

Mutation best explains the relationships between genes and DNA. Effects of large deletions and rearrangements in a segment of DNA may result in loss or gain of a gene and so a function. A classical example of point mutation is a change of single base pair in the gene for beta globin chain that results in the change of amino acid residue glutamate to valine.

It results into a diseased condition called as sickle cell anemia.

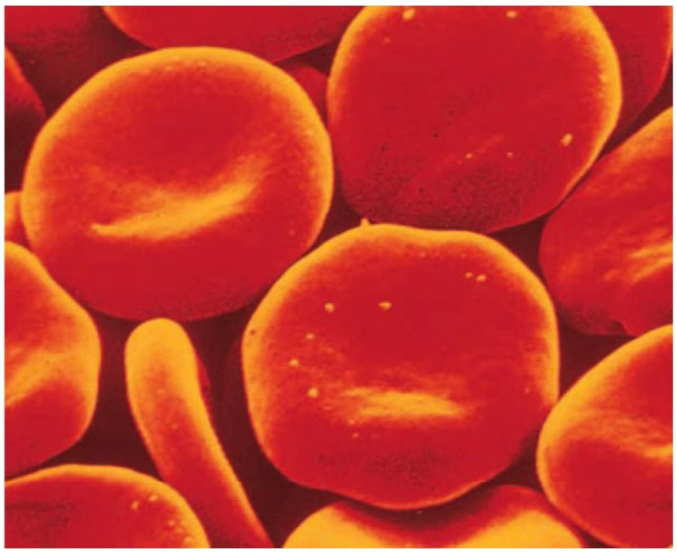

Figure 1 Normal RBC

Figure 2 Sickle celled

point mutation is the insertion or deletion of a base in structural gene. Its effect can be understood by the following example:

This statement which is made up of the following words each having three letters like genetic code.

RAM HAS RED CAP

If we insert a letter B in between HAS and RED and rearrange the statement, it would read as follows:

RAM HAS BRE DCA P

Similarly, if we now insert two letters at the same place, say BI. Now it would read,

RAM HAS BIR EDC AP

Now we insert three letters together, say BIG, the statement would read

RAM HAS BIG RED CAP

The same exercise can be repeated, by deleting the letters R, E and D, one by one and rearranging the statement to make a triplet word.

RAM HAS EDC AP

RAM HAS DCA P

RAM HAS CAP

Conclusion: Insertion or deletion of one or two bases changes the reading frame from the point of insertion or deletion. Insertion or deletion of three or its multiple bases insert or delete one or multiple codon hence one or multiple amino acids, and reading frame remains unaltered from that point onwards. Such mutations are referred to as **frame-shift insertion** or **deletion mutations**. This forms the genetic basis of proof that codon is a triplet and it is read in a contiguous manner.