Abstract

God's creation is really amazing. In his world someone is beautiful, someone ugly, someone clever, someone energetic, someone lazy, someone having black hair, someone having gray hair. Have we ever thought Why this variation?. In essence we can say that a change in the environment brings about change in "needs", resulting in change in "behavior", bringing change in "organ usage" and "development", which bringing change in different species. In other words we can say it simply evolution and the main source of evolution is mutation. Nucleotide sequences found within a DNA are subject to change. This phenomenon called mutation. As Nucleotide and DNA coming in front of the picture; we can define that DNA is made by the sequential arrangements of four different nucleotides (A, T, G and C). After transcription DNA is becoming mRNA which is consisted of A, U, G and C. Further it is translated to protein sequence which read in the form of triplets (known as CODON). So 4 different nucleotides, read 3 at a time, i.e. 64 (4p3) codons. For representing this 64 codon Universal genetic code table is evolved and different codons encoding the same amino acids are called synonymous codons. It is observed that most genes and organisms don't use synonymous codon uniformly; but certain synonymous codons are used preferentially, this phenomenon is called CODON USAGE BIAS (CUB).

Without prior knowledge of the preferred codons, a simple measure was proposed by Frank Wright at 1990 i.e. counting Effective Number of codons (N_c). Later in 2012, Xiaoyan Sun suggested several modifications on the original formula of Nc, because Wright's formula often give erroneous result for codon families with a small number of codons. We did a thorough analysis on the proposed modifications by Sun et al. Our analysis and comparative study with gene expression in E. coli suggests that not all modifications by Sun et al are acceptable and accordingly we proposed an improved version of N_c.

Keywords:Genetic code,Codon,Amino Acid, Synonymous Codons, Mutation, Codon Usage Bias (CUB), Effective Number of codons(ENC).