Correspondence

Comment: Remarks on the article ‘Genetic code preferentially conserves long-range interactions among the amino acids’ by V. Sitaramam

I. Simon and M. Cserzö

Institute of Enzymology, Biological Research Center, Hungarian Academy of Sciences, PO Box 7, H-1502 Budapest, Hungary

Received 17 May 1989

The author of the above paper [1] has claimed that "it is the long-range/solvent interactions and not the short-range/stereochemical properties which are preferentially conserved in the genetic code".

The origin of this surprising result can be found in the first sentence of the Methods of this paper, namely that the probabilities of 1, 2, 3 nucleotide substitutions are 1/9, 1/27, 1/27, respectively, and not 1/9, 1/81, 1/729, as stated. From a certain codon 3 x 3 = 9 new codons can be generated by one nucleotide replacement. Two replacements result in 3 x 3^2 = 27 new codons and three replacements result in 3^3 = 27 new codons. Note that 1 + 9 + 27 + 27 = 64, i.e. the total number of possible codons. From this point all correlation calculations are wrong.

REFERENCE


Reply to the comment by I. Simon and M. Cserzö

V. Sitaramam and Anil P. Gore*

Biotechnology, Department of Zoology and *Department of statistics, University of Poona, Pune 411 007, India

Received 22 June 1989

We resort to the common definition of a mutation as a nucleotide substitution in the codons. The central assumptions relate to equal probability for substitution by any other nucleotide at any of the three sites of a codon. Thus, the probability of getting AAG from AAA is 1/9; we all agree at this step for a specific mutant by a single substitution. By definition, the above probability is a product of 1/3 probability of place and 1/3 probability of the remaining three nucleotides. Now, the second mutation (considered sequentially for simplicity) again carries 1/3 for position and 1/3 for nucleotide substitution, i.e. 1/81 for two sequential mutations towards a specific mutant.

Correspondence address: V. Sitaramam, Biotechnology, Department of Zoology, University of Poona, Pune 411007, India

Correspondence address: I. Simon, Institute of Enzymology, Biological Research Center, Hungarian Academy of Sciences, PO Box 7, H-1502 Budapest, Hungary

Published by Elsevier Science Publishers B.V. (Biomedical Division) 00145793/89/$3.50 © 1989 Federation of European Biochemical Societies 287