NOTES ABOUT GENETIC CODE, NOTE 2: THE RELATIONS BETWEEN FOUR DIVERSITY TYPES OF PROTEIN AMINO ACIDS

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Abstract

This Note follows from Note 1 and it shows further distinctions and splittings within four diversity types of protein amino acids (AAs). First type as in Note 1 (G, P) and second one, also as in Note 1 (A, L; V, I). Within third type there is a chemicaly directed splitting into 4 + 2 AAs [(F, Y, H, W) + (C, M)]. Forth type consists of two halves in form of 4 + 4 AAs; four AAs with nitrogen, and four without: [(N, Q; K, R) + (S, T, D, E)]. All these distinctions are followed by specific arithmetical regularities.

In a previous Note (Note 1, Version 2) we presented the existence of four diversity types of protein amino acids (AAs). Fist type with two AAs (G; P); second one with four AAs (A, L; V, I); third with six (F, Y, H, W; C, M), and fourth type with eight AAs (S, T, D, E; N, Q; K, R) (Figure 1). In this Note we show further distinctions and splittings within four diversity types. First type as in Note 1 (G, P), second one also as in Note 1 (A, L; V, I). Within third type there is a chemicaly directed splitting into 4 + 2 AAs [(F, Y, H, W) + (C, M)]. Forth type consists of two halves in form of 4 + 4 AAs; four AAs with nitrogen, and four without nitrogen: [(N, Q; K, R) + (S, T, D,

E)]. All these distinctions are followed by specific arithmetical regularities. As we see from Figure 2, the chemistry as well as arithmetic show that there are two (G, P) and two (C, M) “non-standard” AAs. First two (G, P) are “non-standard” through their whole side chains, whereas the second two (C, M) through their functional groups within side chain.

S	T	L	A	G	31
D	E	M	C	P	41
F	Y	W	H	I	71
K	R	Q	N	V	61

Figure 1. As Figure 1 in Note 1: a modified "Gauss algorithm" Table - third and fourth row replaced their positions. (About algorithm see in: arXiv:q-bio/0610044v1 [q-bio.OT]) ("Genetic code as a harmonic system")

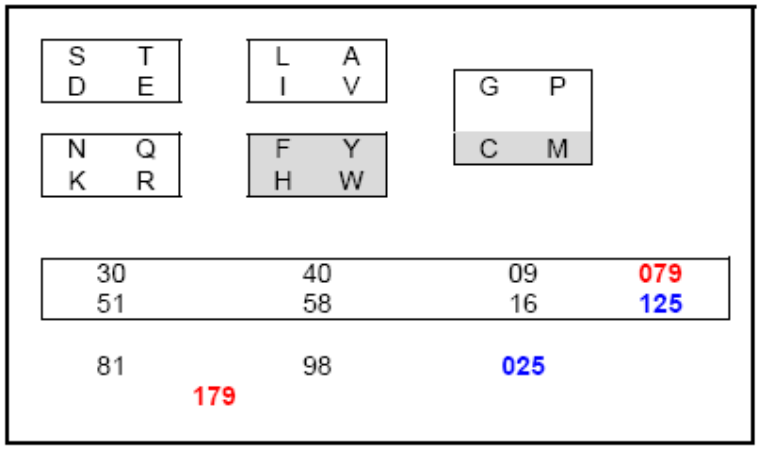

Figure 2. This Figure follows from Figure 1. The AAs are presented in a manner which demonstrates the existence of 4 x 4 chemically classified AAs, plus 2 x 2 "non-standard" AAs. Notice that for atom number within side chains of four "non-standard" AAs a specific arithmetical rule is valid; the same rule as for nucleon number in Shcherbak's system, for nucleon number in eight four-codon AAs (G, P; A, V, L; S, T, R) (Shcherbak, 1994, p. 475: "... the sums demonstrate the squares of the first three Pythagorean numbers").

Remark 1: Nucleon number within *whole molecules* of 8 four-codon AAs: $(3^2 \times 037) + (4^2 \times 037) = (5^2 \times 037)$[1].

Remark 2: Atom number within *side chains* of 4 "non-standard" AAs: $(3^2 \times 001) + (4^2 \times 001) = (5^2 \times 001)$.

Remark 3: In the set of 8 four-codon AAs the distinction occurs in this way: the 8 different side chains plus 8 times the same functional amino acid group (aaFG). On the other side, in the set of 4 "non-standard" AAs the distinction occurs in a different way: atom

[1] Notice that "037" is a quantum with the status of "1"; more precisely, it is a "Prime Quantum" [Shcherbak, 1994, p. 475: "The sums of nucleons ... are multiples of the Prime Quantum (PQ) 037".]

number within side chains of two non-sulfur AAs plus atom number within side chains of two sulfur AAs.

In conclusion we can say that all presented regularities give the satisfaction to two things, to my general hypothesis on the genetic code and to an earlier conclusion; to the hypothesis that the genetic code was complete from the beginning (from the prebiotic area!); and the conclusion, according to which, at least in the genetic code, Aristotle's thesis about the unity of form and essence appears to be valid (Rakočević, 2004)[2].

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[2] Rakočević, 2004, p. 233: "... the existence of such a harmonic structure with unity of a determination with physical-chemical characteristics and atom and nucleon number at the same time appealed to Aristotle and to his idea of unity of form and essence".

ADDITIONAL COMMENTS

This Note, as "Note 2", together with Note 1 (viXra:1612.0127, submitted on 2016-12-08 07:01:10) corresponds with the paper "Genetic Code: Four Diversity Types of Protein Amino Acids", published in arXiv (arXiv:1107.1998v2 [q-bio.OT]). Also, the key ideas about four diversity types of protein amino acids are given in the paper: Rakočević, M.M. (2011) Genetic code as a coherent system. *Neuroquantology*, 9 (4), 821–841;

These key ideas are as follows:

The first type includes two amino acids (G, P), both without standard hydrocarbon side chains; the second one four amino acids, as two pairs [(A, L), (V, I)], all with standard hydrocarbon side chains; the third type comprises the six amino acids, as three pairs [(F, Y), (H, W), (C, M)], two aromatic, two hetero aromatic and two "hetero" non-aromatic (all six without functional group in side chain, that is in "body", from the amino acid "head"); finally, the fourth type consists of eight amino acids, as four pairs [(S, T), (D, E), (N, Q), (K, R)], all with a functional group which also exists in amino acid functional group, that is "head" (wholly presented amino acid functional group: H2N-\.CH-COOH; separately: OH, COOH, CONH2, NH2). The insight into existence of four types of diversity was possible only after an insight into the existence of some very new arithmetical regularities, which were so far unknown. Also, as for showing these four types was necessary to reveal the relationships between several key harmonic structures of the genetic code, which we presented in our previous works).

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