

# **NOTES ABOUT GENETIC CODE, NOTE 1: FOUR DIVERSITY TYPES OF PROTEIN AMINO ACIDS**

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## **Abstract**

For the first time, in this Note is presented the existence of four diversity types of protein amino acids (AAs). First type with two AAs (G; P); second with four AAs (A, L; V, I); third with six AAs (F, Y, H, W; C, M); and fourth type with eight AAs (S, T, D, E; N, Q; K, R).

## **1 INTRODUCTION**

With this note we begin a series of notes on some new insights about the relations between the constituents of the genetic code, with a system-chemical interpretation; a system in terms of Mendeleev: for him it was a system of atoms, and here it comes a complete system of molecules, a system that is able to make something: to produce and maintain the life.

## **2 RESULTS AND DISCUSSION**

For the first time, in this Note is presented the existence of four diversity types of protein amino acids (AAs). First type with two AAs (G; P); second with four AAs (A, L; V, I); third with six AAs (F, Y, H, W; C, M); and fourth type with eight AAs (S, T, D, E; N, Q; K,

R). All 20 AAs as a realization of a pattern of first four even natural numbers in decimal numbering system  $(2+4+6+8)^1$ ; the 20 AAs as a full system, in accordance with both Crick hypotheses (Crick, 1966, 1968; Rakočević, 2009a,b). So, in this research we find that there are four diversity types<sup>2</sup> of protein amino acids (Figure 1):

1. Without a "standard" hydrocarbon side chain (G, P);
2. With hydrocarbon side chain (L, A, I, V);
3. With aromatic ring, and/or with a hetero atom in side chain (F, Y, H, W; C, M);
4. The rest of eight AAs (S, T, D, E; N, Q; K, R) with the same (or near to the same) functional groups within "head" and "body". (A scientific puzzle: the side chain is a "body" or a "head"?)

[Remark 1: If 20 AAs  $(2+4+6+8)$  make a whole (and full) system, then sulfur is also a "hetero" atom!]

The presented strict regularities, through a connection between particles number (number of atoms as well as of amino acid molecules) and physico-chemical properties<sup>3</sup> give a satisfaction to the ideas according to which the genetic code is a complete, unique and unifying system (Rumer, 1966; Swanson, 1984; Doolittle, 1985;

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<sup>1</sup> That natural numbers and decimal numbering system are valid for the genetic code, more than others has repeatedly demonstrated V. Shcherbak (1993, 1994, 2003, 2008); an alternative (or parallel?) approach, based on the p-adic numbers, one can find in the works of Dragovich & Dragovich (2006, 2007a,b).

<sup>2</sup> Cf. four diversity types with four stereochemical types (Popov, 1989; Rakočević & Jokić, 1996). [Remark 2. In References all two (my) works on the same scientific problem are given together in two colors: first paper in red, and second one in blue color. Some references are not cited, but they stay in relation to cited ones.]

<sup>3</sup> Viewing such regularity (number of nucleons in a specific relation to amino acid classification), V. Shcherbak (1993) concluded: "The physical nature of such a phenomenon is so far not clear". After our opinion the answer, *mutatis mutandis*, lie in the title of the first Mendeleev work on the periodicity (*see* Appendix 1).

Damjanović, 1998; Dlyasin, 1998; Qiu, Zhu 2000; Yang, 2004; Negadi, 2009,a,b); and/or a complete system from the beginning, from prebiotic times (Sukhodolec, 1981, 1985; Rakočević, 2004b).

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.** 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")

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## APPENDIX 1. Mendeleev's first work on the periodic system

**ESSAI D'UNE SYSTÈME DES ÉLÉMENTS**  
 D'APRÈS LEURS POIDS ATOMIQUES ET FONCTIONS CHIMIQUES,  
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	Ti=50	Zr= 90	?=180.		
	V=51	Nb= 94	Ta=182.		
	Cr=52	Mo= 96	W=186.		
	Mn=55	Rh=104,4	Pt=197,4.		
	Fe=56	Ru=104,4	Ir=198.		
	Ni=Co=59	Pt=106,6	Os=199.		
	Cu=63,4	Ag=108	Hg=200.		
H=1	Be= 9,4	Mg=24	Zn=65,2	Cd=112	
	B=11	Al=27,4	?=68	Ur=116	Au=197?
	C=12	Si=28	?=70	Sn=118	
	N=14	P=31	As=75	Sb=122	Bi=210?
	O=16	S=32	Se=79,4	Te=128?	
	F=19	Cl=35,5	Br=80	I=127	
Li=7	Na=23	K=39	Rb=85,4	Cs=133	Tl=204.
		Ca=40	Sr=87,6	Ba=137	Pb=207.
		?=45	Ce=92		
		?Er=56	La=94		
		?Yt=60	Di=95		
		?In=75,5	Th=118?		

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