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).
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\(^2\) 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\(^3\) 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;

\(^1\) 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).

\(^2\) 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.]

\(^3\) 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).

![Table](image)

**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")

**REFERENCES**


Rakočević, M. M. (1997a) Genetic code as a unique system, SKC Niš, Bina, Beograd; www.rakocevcode.rs


Rakočević, M. M. (2004a) Further generalization of Golden mean in relation to Euler’s „divine“ equation. FME Transactions (Faculty of Mechanical Engineering, Belgrade, Serbia), 32, 95-98.


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