ENIGMAS OF THE GENETIC CODE, ENIGMA 2: A SECOND HIDDEN ARITHMETICAL ALGORITHM (Version 1)

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Abstract

This second enigma is standing in relation to enigma 1 in our previous communication. It is relating to total number of atoms (204) in side chains of 20 protein amino acids, within standard genetic code.

INTRODUCTORY NOTES

1. From the aspect of symmetry, the relation between the numbers 2 and 5 appears to be special (Table 1). Namely, in the binary numbering system, the pair 2-5 is the first possible pair with both symmetry – direct (vertical) and indirect (horizontal):

0 1 0

0 1 0 / 1 0 1 (1)

1 0 1

2. It is known that the balances of atom number and/or nucleon number in amino acid molecules (within genetic code) are determined by the differences for 00, 01, 10 and/or 11, writing in decimal numbering system [see about that in our works; for example, References in Note 1 (version 2) in our site (www.rakocevcode.rs)].

3. The question is whether the standpoints of point 1 and point 2 may be related? The answer to this question incorporates arithmetic system presented in Table 2.

THE PROBLEM

Find such an arrangement of amino acids (5 x 4) that the number of atoms (in the side amino acid chains), in five rows (Table 3), corresponds to 10^{th} event within the system in Table 2. (Hint: In a series of even natural numbers just 10^{th} case is the number 20.)

COMMENT

The solutions of this enigma give the satisfaction to our hypothesis that the genetic code was complete from the very beginning and that it represents a unique (full and whole) system in which the position of each amino acid is strictly determined, and that with several different aspects (Rakočević, 2004).

(1)	0 1
(2)	1 0
(2)	**0 1 0**
(5)	**1 0 1**
(5)	0 1 0 1
(10)	1 0 1 0
(10)	**0 1 0 1 0**
(21)	**1 0 1 0 1**
(21)	0 1 0 1 0 1
(42)	1 0 1 0 1 0
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Table 1. The pairs of numbers (from the sequence of natural numbers) that have mutual symmetry [*see* binary number presentation (1)].

00	02	04	06	08	10	12
11	13	15	17	19	21	23
22	24	26	28	30	32	34
11	16	21	26	31	36	41
00	05	10	15	20	25	30
44	**60**	**76**	**92**	**108**	**124**	**140**
	12	14	16	18	***20***	22
	23	25	27	29	***31***	33
	34	36	38	40	***42***	44
	41	46	51	56	***61***	66
	30	35	40	45	***50***	55
	140	**156**	**172**	**188**	**204**	**220**
	22	24	26	28	*30*	*32*
	33	35	37	39	*41*	*43*
	44	46	48	50	*52*	*54*
	66	71	76	81	*86*	*91*
	55	60	65	70	*75*	*80*
	220	**236**	**252**	**268**	**284**	**300**
	32	34	36	38	40	42
	43	45	47	49	51	53
	54	56	58	60	62	64
	91	96	101	106	111	116
	80	85	90	95	100	105
	300	**316**	**332**	**348**	**364**	**380**
	…					

Table 2. A specific arithmetical system. Start with 00-11-22-11-00, and then adding the number 2 in the first three cases, and number 5 in the last two cases. As a result we have 10th event, correspondent with number of atoms within 4 x 5 amino acids as it is shown in Table 3. (Notice, that the pair 220-284 is the first pair of friendly numbers; cf. Figures A.1 and A.2 in Appendix A.)

a_1	a_2	a_3	a_4	$\rightarrow$	20
b_1	b_2	b_3	b_4	$\rightarrow$	31
c_1	c_2	c_3	c_4	$\rightarrow$	42
d_1	d_2	d_3	d_4	$\rightarrow$	61
e_1	e_2	e_3	e_4	$\rightarrow$	50
51-1	51+1	51-1	51+1		

Table 3. The number of atoms within side chains of five rows of amino acids (a_1-a_4, b_1-b_4, ... , e_1-e_4) corresponds to the five results in 10^{th} case of an arithmetical system presented in Table 2.

REFERENCES

Rakočević, M. M. (1998) The genetic code as a Golden mean determined system, Biosystems 46, 283-291.

Rakočević, M. M. (2004) A harmonic structure of the genetic code, J. Theor. Biol. 229, 221–234.

APPENDIX A

The six-bit binary code tree of the genetic code (Rakočević, 1998) in Figure A.1 and its determination with third perfect number (496) as well as first pair of friendly numbers (220, 284) in Figure A.2.

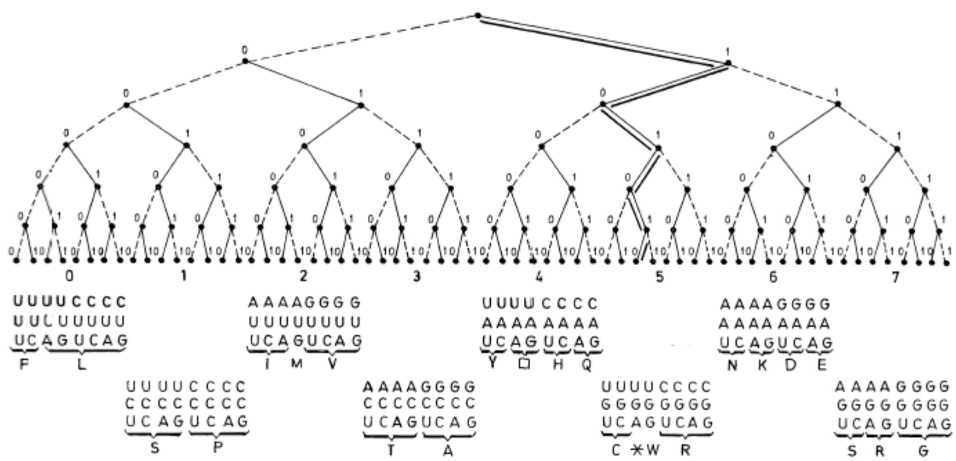

Figure A.1. The six-bit binary code tree of the genetic code (Rakočević, 1998)

/00 - 07/08 - 15/16 - 23/24 - 31//32 - 39/40 - 47/48 - 55/56 - 63/
28 92 156 220 284 348 412 476
64 64 64 64 64 64 64

/00 - 07/00 - 15/00 - 23/00 - 31//00 - 39/00 - 47/00 - 55/00 - 63/
28 120 276 496 780 1128 1540 2016
92 156 220 284 348 412 476

Figure A.2. The determination of six-bit binary code tree (Figure A.1) with third perfect number (496) and with first pair of friendly numbers (220, 284).