

The Atomic Genetic Code

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Abstract

The modern science mainly treats the biochemical basis of sequencing in bio-macromolecules and processes in biochemistry. One can ask weather the language of biochemistry is the adequate scientific language to explain the phenomenon in that science. Is there maybe some other language, out of biochemistry, that determines how the biochemical processes will function and what the structure and organization of life systems will be? The research results provide some answers to these questions. They reveal to us that the process of sequencing in bio-macromolecules is conditioned and determined not only through biochemical, but also through cybernetic and information principles.

Keywords: Digital genetics; Genetics code; RNA code; Amino acids code; Evolution

Methods

The genetic code tables used by the modern science are characterized and determined by principles of biochemistry. However, if in those tables, instead of the UCAG nucleotides we put the number of atoms of those nucleotides, we will get the new tables of the genetic code characterized and determined by programmatic and information principles. Therefore, biochemistry can be explained through a phenomenon out of biochemistry. Particularly interesting results we will get when determining numeric values for the information content of atoms and molecules. We will then find out that those values express physical and chemical characteristics of molecules. For example: in a DNA molecule, the polynucleotide chains are connected through an exact cyber-information connections. In those molecules there are also mathematical matrixes of DNA, represented by the number of atoms of four ATCG bases. These matrixes determine the positioning of nucleotides in that molecule. With this, the biological particularities of DNA are determined. Similar mathematical matrixes determine the positioning of nucleotides in the RNA molecule. In the amino acid proteins, they are interconnected into the respective mathemati-

cal chains. In those chains are also matrixes where particular mathematical principles apply, the principles that determine the positioning of each amino acid in the chain.

Results

The herewith discussed research results show that the process of sequencing in bio-macromolecules is conditioned and determined not only through biochemical, but also through cybernetic information principles.

We would particularly like to stress here that the genetic, as well as biochemical information in a broader sense of the word, is determined and characterized by very complex cybernetic and information principles. The constantans in those principles are: the number of atoms and molecules, atomic numbers, atomic weight, physical and chemical parameters, even and odd values, codes and analogue codes, standard deviations, frequencies, primary and secondary values, and many other things. How functioning of biochemistry is determined through cybernetic information principles, will be discussed further in this text.

The Atomic Genetic Code (RNA)

A = 15 atoms; U = 12 atoms; C = 13 atoms; G = 16 atoms;
Number of atoms

UUU=36 Phe=23	UUC=37 Phe=23	CUC=38 Leu=22	UUA=39 Leu=22	UUG=40 Leu=22	CUG=41 Leu=22	CGC=42 Arg=26	GAU=43 Asp=16	GAC=44 Asp=16	CGG=45 Arg=26	AGA=46 Arg=26	AGG=47 Arg=26	GGG=48 Gly=10
	UCU=37 Ser=14	UCC=38 Ser=14	AUU=39 Ile=22	AUC=40 Ile=22	UGC=41 Cys=14	AUA=42 Ile=22	AUG=43 Met=20	UGG=44 Trp=27	AAA=45 Lys=24	AAG=46 Lys=24	GGA=47 Gly=10	
	CUU=37 Leu=22	CCU=38 Pro=17	CCC=39 Pro=17	CUA=40 Leu=22	CCA=41 Pro=17	CCG=42 Pro=17	AAC=43 Asn=17	ACG=44 Thr=17	GGC=45 Gly=10	GAA=46 Glu=19	GAG=47 Glu=19	
			UAU=39 Tyr=24	GUU=40 Val=19	GUC=41 Val=19	GCC=42 Ala=13	GUA=43 Val=19	GUG=44 Val=19	GCG=45 Ala=13			
				UCA=40 Ser=14	UCG=41 Ser=14	UAA=42 STOP	AGU=43 Ser=14	AGC=44 Ser=14				
				ACU=40 Thr=17	ACC=41 Thr=17	AAU=42 Asn=17	ACA=43 Thr=17	GGU=44 Gly=10				
				UAC=40 Tyr=24	GCU=41 Ala=13		UAG=43 STOP	GCA=44 Ala=13				
				CAU=40 His=20	CAC=41 His=20		CAA=43 Gln=20	CAG=44 Gln=20				
				UGU=40 Cys=14	CGU=41 Arg=26		UGA=43 STOP	CGA=44 Arg=26				

Number of atoms in triplets UCAG

UUU 36	UUC 37	CUC 38	UUA 39	UUG 40	CUG 41	CGC 42	GAU 43	GAC 44	CGG 45	AGA 46	AGG 47	GGG 48
	UCU 37	UCC 38	AUU 39	AUC 40	UGC 41	AUA 42	AUG 43	UGG 44	AAA 45	AAG 46	GGA 47	
	CUU 37	CCU 38	CCC 39	CUA 40	CCA 41	CCG 42	AAC 43	ACG 44	GGC 45	GAA 46	GAG 47	
			UAU 39	GUU 40	GUC 41	GCC 42	GUA 43	GUG 44	GCG 45			
				UCA 40	UCG 41	UAA 42	AGU 43	AGC 44				
				ACU 40	ACC 41	AAU 42	ACA 43	GGU 44				
				UAC 40	GCU 41		UAG 43	GCA 44				
				CAU 40	CAC 41		CAA 43	CAG 44				
				UGU 40	CGU 41		UGA 43	CGA 44				

.(36+48) = (37+47) = (38+46) = (39+45) = (40+44) = (41+43) etc.

In fact, we discovered that the *mathematical balance* in the distribution of codons and amino acids in the genetic code is achieved.

Mathematical Position of the Nucleotides in Codon

The development of prediction methods based on digital theory is focused on the exploration of new digital formulas and algorithms. The genetic code is stored in DNA molecules as sequences of bases: adenine (A) which pairs with thymine (T), and cytosine (C) which pairs with guanine (G), The analog of DNA in a digital genetic algorithm is a number of atoms, atomic numbers, analog codes, etc.

At mathematical evolution of genetic processes, nucleotides TCAG are being transformed to codons UCAG and later to amino acids and various organic composition.

Number of atoms

Second Position of Codon																																																																
T	C	A	G																																																													
<table border="1"> <tr><td>13,13,15</td><td>41</td><td>Pro</td></tr> <tr><td>13,13,13</td><td>39</td><td>Pro</td></tr> <tr><td>13,13,15</td><td>41</td><td>Pro</td></tr> <tr><td>13,13,16</td><td>42</td><td>Pro</td></tr> <tr><td colspan="3">163</td></tr> </table>	13,13,15	41	Pro	13,13,13	39	Pro	13,13,15	41	Pro	13,13,16	42	Pro	163			<table border="1"> <tr><td>15,16,15</td><td>46</td><td>Cys</td></tr> <tr><td>15,16,13</td><td>44</td><td>Cys</td></tr> <tr><td>15,16,15</td><td>46</td><td>Ter</td></tr> <tr><td>15,16,16</td><td>47</td><td>Trp</td></tr> <tr><td colspan="3">183</td></tr> </table>	15,16,15	46	Cys	15,16,13	44	Cys	15,16,15	46	Ter	15,16,16	47	Trp	183			<table border="1"> <tr><td>15,15,15</td><td>45</td><td>Tyr</td></tr> <tr><td>15,15,13</td><td>43</td><td>Tyr</td></tr> <tr><td>15,15,15</td><td>45</td><td>Ter</td></tr> <tr><td>15,15,16</td><td>46</td><td>Ter</td></tr> <tr><td colspan="3">179</td></tr> </table>	15,15,15	45	Tyr	15,15,13	43	Tyr	15,15,15	45	Ter	15,15,16	46	Ter	179			<table border="1"> <tr><td>16,15,15</td><td>46</td><td>Asp</td></tr> <tr><td>16,15,13</td><td>44</td><td>Asp</td></tr> <tr><td>16,15,15</td><td>46</td><td>Glu</td></tr> <tr><td>16,15,16</td><td>47</td><td>Glu</td></tr> <tr><td colspan="3">183</td></tr> </table>	16,15,15	46	Asp	16,15,13	44	Asp	16,15,15	46	Glu	16,15,16	47	Glu	183			708
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Diagonal D1 = 708; Diagonal D2 = 708;

The digital genetic code describe a genotype, which is translated into an organism a phenotype by the processes of cell division.

Mathematical evolution of genetic processes is manifested in different ways. Evolution of groups of atoms is especially interesting. Here are some examples

Digital Codon Square

A digital codon square of order n is an arrangement of n^2 numbers, usually distinct integers, in a square, such that the n numbers in all rows, all columns, and both diagonals sum to the same constant. A digital square contains the integers from 1 to n^2 . The term “digital square” is also sometimes used to refer to any of various types of word square.

Number of atoms

163	183	179	183	708
183	179	171	175	708
179	171	187	171	708
183	175	171	179	708
708	708	708	708	

$D1 = (163+179+187+179) = 708;$

$D2 = (183+171+171+183) = 708;$

The constant sum in every row, column and diagonal is called the magic analogue constant or magic sum, *M*.

163	183	179	183
183	179	171	175
179	171	187	171
183	175	171	179

$$(163+183+183+179)=708;$$

$$(179+183+171+175)=708;$$

$$(179+171+183+175)=708;$$

$$187+171+171+179)=708;$$

163	183	179	183
183	179	171	175
179	171	187	171
183	175	171	179



708

163	183	179	183
183	179	171	175
179	171	187	171
183	175	171	179



708

etc.

Analogue Atomic Genetic Code

How could we adapt the program, cybernetic, and informational system to convey more information? Here's one way. This is an analogue code.

“Theoretically the ancient book of DNA could have been analogue. But, for the same reason as for our analogue armada beacons, any ancient book copied and recopied in analogue language would degrade to meaninglessness in very few scribe generations. Fortunately, human writing is digital, at least in the sense we care about here. And the same is true of the DNA books of ancestral wisdom that we carry around inside us. Genes are digital, and in the full sense not shared by nerves”(20).

Correlation of the Code and Analogue Code

The atomic and analogue genetic code is the set of rules by which information encoded in genetic material (DNA or RNA sequences) is translated into proteins (amino acid sequences) by living cells. Specifically, those codes defines a mapping between tri-nucleotide sequences called codons and amino acids; every triplet of nucleotides in a nucleic acid sequence specifies a single amino acid. Because the vast majority of genes are encoded with exactly the same code.

Those codes are universal. The same codons are assigned to the same amino acids and to the same START and STOP signals in the vast majority of genes in animals, plants, and microorganisms.

Analogue Code | | Code Code

Example:

Analogue Code of the number 12 is number 21:

21 | | 12;

Analogue Code of the number 15 is number 51:

51 | | 15;

etc.

At this stage of our research we replaced nucleotides from the Amino Acid Code Matrix with analogue numbers of the atoms in those nucleotides.

A = 15 atoms; T = 15 atoms; C = 13 atoms; G = 16 atoms

A = 51; T = 51; C = 31; G = 61;

Analogue Codon Table

Mathematical position of the nucleotides in codon

Second Position of Codon																																																																
T	C	A	G																																																													
<table border="1"> <tr><td>31,31,51</td><td>113</td><td>Pro</td></tr> <tr><td>31,31,31</td><td>93</td><td>Pro</td></tr> <tr><td>31,31,51</td><td>113</td><td>Pro</td></tr> <tr><td>31,31,61</td><td>123</td><td>Pro</td></tr> <tr><td colspan="3">642</td></tr> </table>	31,31,51	113	Pro	31,31,31	93	Pro	31,31,51	113	Pro	31,31,61	123	Pro	642			<table border="1"> <tr><td>51,61,51</td><td>163</td><td>Cys</td></tr> <tr><td>51,61,31</td><td>143</td><td>Cys</td></tr> <tr><td>51,61,51</td><td>163</td><td>Ter</td></tr> <tr><td>51,61,61</td><td>173</td><td>Trp</td></tr> <tr><td colspan="3">642</td></tr> </table>	51,61,51	163	Cys	51,61,31	143	Cys	51,61,51	163	Ter	51,61,61	173	Trp	642			<table border="1"> <tr><td>51,51,51</td><td>153</td><td>Tyr</td></tr> <tr><td>51,51,31</td><td>133</td><td>Tyr</td></tr> <tr><td>51,51,51</td><td>153</td><td>Ter</td></tr> <tr><td>51,51,61</td><td>163</td><td>Ter</td></tr> <tr><td colspan="3">602</td></tr> </table>	51,51,51	153	Tyr	51,51,31	133	Tyr	51,51,51	153	Ter	51,51,61	163	Ter	602			<table border="1"> <tr><td>61,51,51</td><td>163</td><td>Asp</td></tr> <tr><td>61,51,31</td><td>143</td><td>Asp</td></tr> <tr><td>61,51,51</td><td>163</td><td>Glu</td></tr> <tr><td>61,51,61</td><td>173</td><td>Glu</td></tr> <tr><td colspan="3">642</td></tr> </table>	61,51,51	163	Asp	61,51,31	143	Asp	61,51,51	163	Glu	61,51,61	173	Glu	642			2328
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61,51,61	173	Glu																																																														
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<table border="1"> <tr><td>51,61,51</td><td>163</td><td>Ser</td></tr> <tr><td>51,61,31</td><td>143</td><td>Ser</td></tr> <tr><td>51,61,51</td><td>163</td><td>Arg</td></tr> <tr><td>15,16,16</td><td>173</td><td>Arg</td></tr> <tr><td colspan="3">642</td></tr> </table>	51,61,51	163	Ser	51,61,31	143	Ser	51,61,51	163	Arg	15,16,16	173	Arg	642			<table border="1"> <tr><td>51,51,51</td><td>153</td><td>Phe</td></tr> <tr><td>51,51,31</td><td>133</td><td>Phe</td></tr> <tr><td>51,51,51</td><td>153</td><td>Leu</td></tr> <tr><td>51,51,61</td><td>163</td><td>Leu</td></tr> <tr><td colspan="3">602</td></tr> </table>	51,51,51	153	Phe	51,51,31	133	Phe	51,51,51	153	Leu	51,51,61	163	Leu	602			<table border="1"> <tr><td>51,31,51</td><td>133</td><td>Ser</td></tr> <tr><td>51,31,31</td><td>113</td><td>Ser</td></tr> <tr><td>51,31,51</td><td>133</td><td>Ser</td></tr> <tr><td>51,31,61</td><td>143</td><td>Ser</td></tr> <tr><td colspan="3">522</td></tr> </table>	51,31,51	133	Ser	51,31,31	113	Ser	51,31,51	133	Ser	51,31,61	143	Ser	522			<table border="1"> <tr><td>31,61,51</td><td>143</td><td>Arg</td></tr> <tr><td>31,61,31</td><td>123</td><td>Arg</td></tr> <tr><td>31,61,51</td><td>143</td><td>Arg</td></tr> <tr><td>31,61,61</td><td>153</td><td>Arg</td></tr> <tr><td colspan="3">562</td></tr> </table>	31,61,51	143	Arg	31,61,31	123	Arg	31,61,51	143	Arg	31,61,61	153	Arg	562			2328
51,61,51	163	Ser																																																														
51,61,31	143	Ser																																																														
51,61,51	163	Arg																																																														
15,16,16	173	Arg																																																														
642																																																																
51,51,51	153	Phe																																																														
51,51,31	133	Phe																																																														
51,51,51	153	Leu																																																														
51,51,61	163	Leu																																																														
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51,31,51	133	Ser																																																														
51,31,31	113	Ser																																																														
51,31,51	133	Ser																																																														
51,31,61	143	Ser																																																														
522																																																																
31,61,51	143	Arg																																																														
31,61,31	123	Arg																																																														
31,61,51	143	Arg																																																														
31,61,61	153	Arg																																																														
562																																																																
<table border="1"> <tr><td>51,51,51</td><td>153</td><td>Ile</td></tr> <tr><td>51,51,31</td><td>133</td><td>Ile</td></tr> <tr><td>51,51,51</td><td>153</td><td>Ile</td></tr> <tr><td>51,51,61</td><td>163</td><td>Met</td></tr> <tr><td colspan="3">602</td></tr> </table>	51,51,51	153	Ile	51,51,31	133	Ile	51,51,51	153	Ile	51,51,61	163	Met	602			<table border="1"> <tr><td>31,51,51</td><td>133</td><td>Leu</td></tr> <tr><td>31,51,31</td><td>113</td><td>Leu</td></tr> <tr><td>31,51,51</td><td>133</td><td>Leu</td></tr> <tr><td>31,51,61</td><td>143</td><td>Leu</td></tr> <tr><td colspan="3">522</td></tr> </table>	31,51,51	133	Leu	31,51,31	113	Leu	31,51,51	133	Leu	31,51,61	143	Leu	522			<table border="1"> <tr><td>61,61,51</td><td>173</td><td>Gly</td></tr> <tr><td>61,61,31</td><td>153</td><td>Gly</td></tr> <tr><td>61,61,51</td><td>173</td><td>Gly</td></tr> <tr><td>61,61,61</td><td>183</td><td>Gly</td></tr> <tr><td colspan="3">682</td></tr> </table>	61,61,51	173	Gly	61,61,31	153	Gly	61,61,51	173	Gly	61,61,61	183	Gly	682			<table border="1"> <tr><td>31,51,51</td><td>133</td><td>His</td></tr> <tr><td>31,51,31</td><td>113</td><td>His</td></tr> <tr><td>31,51,51</td><td>133</td><td>Gln</td></tr> <tr><td>31,51,61</td><td>143</td><td>Gln</td></tr> <tr><td colspan="3">522</td></tr> </table>	31,51,51	133	His	31,51,31	113	His	31,51,51	133	Gln	31,51,61	143	Gln	522			2328
51,51,51	153	Ile																																																														
51,51,31	133	Ile																																																														
51,51,51	153	Ile																																																														
51,51,61	163	Met																																																														
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31,51,51	133	Leu																																																														
31,51,31	113	Leu																																																														
31,51,51	133	Leu																																																														
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61,61,51	173	Gly																																																														
61,61,31	153	Gly																																																														
61,61,51	173	Gly																																																														
61,61,61	183	Gly																																																														
682																																																																
31,51,51	133	His																																																														
31,51,31	113	His																																																														
31,51,51	133	Gln																																																														
31,51,61	143	Gln																																																														
522																																																																
<table border="1"> <tr><td>61,51,51</td><td>163</td><td>Val</td></tr> <tr><td>61,51,31</td><td>143</td><td>Val</td></tr> <tr><td>61,51,51</td><td>163</td><td>Val</td></tr> <tr><td>61,51,61</td><td>173</td><td>Val</td></tr> <tr><td colspan="3">642</td></tr> </table>	61,51,51	163	Val	61,51,31	143	Val	61,51,51	163	Val	61,51,61	173	Val	642			<table border="1"> <tr><td>61,31,51</td><td>143</td><td>Ala</td></tr> <tr><td>61,31,31</td><td>123</td><td>Ala</td></tr> <tr><td>61,31,51</td><td>143</td><td>Ala</td></tr> <tr><td>61,31,61</td><td>153</td><td>Ala</td></tr> <tr><td colspan="3">562</td></tr> </table>	61,31,51	143	Ala	61,31,31	123	Ala	61,31,51	143	Ala	61,31,61	153	Ala	562			<table border="1"> <tr><td>51,31,51</td><td>133</td><td>Thr</td></tr> <tr><td>51,31,31</td><td>113</td><td>Thr</td></tr> <tr><td>51,31,51</td><td>133</td><td>Thr</td></tr> <tr><td>51,31,61</td><td>143</td><td>Thr</td></tr> <tr><td colspan="3">522</td></tr> </table>	51,31,51	133	Thr	51,31,31	113	Thr	51,31,51	133	Thr	51,31,61	143	Thr	522			<table border="1"> <tr><td>51,51,51</td><td>153</td><td>Asn</td></tr> <tr><td>51,51,31</td><td>133</td><td>Asn</td></tr> <tr><td>51,51,51</td><td>153</td><td>Lys</td></tr> <tr><td>51,51,61</td><td>163</td><td>Lys</td></tr> <tr><td colspan="3">602</td></tr> </table>	51,51,51	153	Asn	51,51,31	133	Asn	51,51,51	153	Lys	51,51,61	163	Lys	602			2328
61,51,51	163	Val																																																														
61,51,31	143	Val																																																														
61,51,51	163	Val																																																														
61,51,61	173	Val																																																														
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61,31,51	143	Ala																																																														
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51,31,51	133	Thr																																																														
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51,51,51	153	Lys																																																														
51,51,61	163	Lys																																																														
602																																																																
2328	2328	2328	2328																																																													

Diagonal D1 = 2328; Diagonal D2 = 2328;

Row 1 = Column 1; Row 2 = Column 2; Row 3 = Column 3; Row 4 = Column 4;

Analogue Codon Square

A analogue codon square of order *n* is an arrangement of *n*² numbers, usually distinct integers, in a square, such that the *n* numbers in all rows, all columns, and both diagonals sum to the same constant.

442	642	602	642	2328
642	602	522	562	2328
602	522	682	522	2328
642	562	522	602	2328
2328	2328	2328	2328	

$$D1 = (442+602+682+602) = 2328;$$

$$D2 = (642+522+522+642) = 2328;$$

The constant sum in every row, column and diagonal is called the magic analogue constant or magic sum, $M = 2328$;

Correlation:

442	642	602	642
642	602	522	562
602	522	682	522
642	562	522	602

$$(442+642+642+602) = 2328;$$

$$(602+642+522+562) = 2328;$$

etc.

442	642	602	642
642	602	522	562
602	522	682	522
642	562	522	602



2328

442	642	602	642
642	602	522	562
602	522	682	522
642	562	522	602



2328

Determinants in Digital analogue Genetic Code

DET (4 x 4)

442	642	602	642
642	602	522	562
602	522	682	522
642	562	522	602



2681856000

$$2681856000 = (2328 + 2328 + 2328.... + 2328);$$

There is a mathematical balance within all of the phenomena in the analogue genetic code matrix.

Mathematical correlation of groups of nucleotides are a proof that genetic processes have evolved from one mathematical shape to another one. They are a proof that we can uncover some of hidden secrets in that science, with the help of mathematics.

		Atomic numbers																									
		U				C				A				G													
F i r s t P o s i t i o n	U	58,58,58	174	Phe	70,78,58	206	Ser	58,70,58	186	Tyr	58,78,58	194	Cys		58,58,58	174	Phe	70,78,58	206	Ser	58,70,58	186	Tyr	58,78,58	194	Cys	
		58,58,70	186	Leu	70,78,70	218	Arg	58,70,70	198	Ter	58,78,70	206	Ter	3168	58,58,70	186	Leu	70,78,70	218	Arg	58,70,70	198	Ter	58,78,70	206	Ter	3168
		58,58,78	194	Leu	70,78,78	226	Arg	58,70,78	206	Ter	58,78,78	214	Trp		58,58,78	194	Leu	70,78,78	226	Arg	58,70,78	206	Ter	58,78,78	214	Trp	
		728				856				776				808													
	C	78,70,58	206	Asp	58,58,58	174	Ser	58,70,58	186	His	58,78,58	194	Arg		78,70,58	206	Asp	58,58,58	174	Ser	58,70,58	186	His	58,78,58	194	Arg	
		78,70,70	218	Glu	58,58,70	186	Ser	58,70,70	198	Gln	58,78,70	206	Arg	3168	78,70,70	218	Glu	58,58,70	186	Ser	58,70,70	198	Gln	58,78,70	206	Arg	3168
		78,70,78	226	Glu	58,58,78	194	Ser	58,70,78	206	Gln	58,78,78	214	Arg		78,70,78	226	Glu	58,58,78	194	Ser	58,70,78	206	Gln	58,78,78	214	Arg	
		856				728				776				808													
	A	70,58,58	186	Ile	70,58,58	186	Thr	78,78,58	214	Gly	58,58,58	174	Leu		70,58,58	186	Ile	70,58,58	186	Thr	78,78,58	214	Gly	58,58,58	174	Leu	
		70,58,70	198	Ile	70,58,70	198	Thr	78,78,70	226	Gly	58,58,70	186	Leu	3168	70,58,70	198	Ile	70,58,70	198	Thr	78,78,70	226	Gly	58,58,70	186	Leu	3168
		70,58,78	206	Met	70,58,78	206	Thr	78,78,78	234	Gly	58,58,78	194	Leu		70,58,78	206	Met	70,58,78	206	Thr	78,78,78	234	Gly	58,58,78	194	Leu	
		776				776				888				728													
	G	78,58,58	194	Val	78,58,58	194	Ala	58,58,58	174	Pro	70,70,58	198	Asn		78,58,58	194	Val	78,58,58	194	Ala	58,58,58	174	Pro	70,70,58	198	Asn	
		78,58,70	206	Val	78,58,70	206	Ala	58,58,70	186	Pro	70,70,70	210	Lys	3168	78,58,70	206	Val	78,58,70	206	Ala	58,58,70	186	Pro	70,70,70	210	Lys	3168
		78,58,78	214	Val	78,58,78	214	Ala	58,58,78	194	Pro	70,70,78	218	Lys		78,58,78	214	Val	78,58,78	214	Ala	58,58,78	194	Pro	70,70,78	218	Lys	
		808				808				728				824													
		3168				3168				3168				3168													

Diagonal D1 = 3168; Diagonal D2 = 3168;

The atomic genetic code describe a genotype, which is translated into an organism a phenotype by the processes of cell division.

Mathematical evolution of genetic processes is manifested in different ways. Evolution of groups of atoms is especially interesting. Here are some examples.

Digital Codon Square

A atomic codon square of order n is an arrangement of n^2 numbers, usually distinct integers, in a square, such that the n numbers in all rows, all columns, and both diagonals sum to the same constant. A digital square contains the integers from 1 to n^2 . The term “digital square” is also sometimes used to refer to any of various types of word square.

Number of atoms

728	856	776	808	3168
856	728	776	808	3168
776	776	888	728	3168
808	808	728	824	3168
3168	3168	3168	3168	

$$D1 = (728+856+776+808) = 3168; D2 = (808+776+776+808) = 3168;$$

The constant sum in every row, column and diagonal is called the magic analogue constant or magic sum, M

728	856	776	808
856	728	776	808
776	776	888	728
808	808	728	824



3168

728	856	776	808
856	728	776	808
776	776	888	728
808	808	728	824



3168

728	856	776	808
856	728	776	808
776	776	888	728
808	808	728	824



3168

etc.

At this stage of our research we replaced nucleotides from the Amino Acid Code Matrix with analogue of the atomic numbers in those nucleotides.

Analogue Codon Table

		Atomic numbers															
		U				C				A				G			
F	I	U	85,85,85	255	Phe	07,87,85	179	Ser	85,07,85	177	Tyr	85,87,85	257	Cys			
			85,85,85	255	Phe	07,87,85	179	Ser	85,07,85	177	Tyr	85,87,85	257	Cys			
			85,85,07	177	Leu	07,87,07	101	Arg	85,07,07	99	Ter	85,87,07	179	Ter	3168		
			85,85,87	257	Leu	07,87,87	181	Arg	85,07,87	179	Ter	85,87,87	259	Trp			
		944				640				632				952			
P	O	C	87,07,85	179	Asp	85,85,85	255	Ser	85,07,85	177	His	85,87,85	257	Arg			
			87,07,85	179	Asp	85,85,85	255	Ser	85,07,85	177	His	85,87,85	257	Arg			
			87,07,07	101	Glu	85,85,07	177	Ser	85,07,07	99	Gln	85,87,07	179	Arg	3168		
			87,07,87	181	Glu	85,85,87	257	Ser	85,07,87	179	Gln	85,87,87	259	Arg			
		640				944				632				952			
S	I	A	07,85,85	177	Ile	07,85,85	177	Thr	87,87,85	259	Gly	85,85,85	255	Leu			
			07,85,85	177	Ile	07,85,85	177	Thr	87,87,85	259	Gly	85,85,85	255	Leu			
			07,85,07	99	Ile	07,85,07	99	Thr	87,87,07	181	Gly	85,85,07	177	Leu	3168		
			07,85,87	179	Met	07,85,87	179	Thr	87,87,87	261	Gly	85,85,87	257	Leu			
		632				632				960				944			
T	I	G	87,85,85	257	Val	87,85,85	257	Ala	85,85,85	255	Pro	07,07,85	99	Asn			
			87,85,85	257	Val	87,85,85	257	Ala	85,85,85	255	Pro	07,07,85	99	Asn			
			87,85,07	179	Val	87,85,07	179	Ala	85,85,07	177	Pro	07,07,07	21	Lys	3168		
			87,85,87	259	Val	87,85,87	259	Ala	85,85,87	257	Pro	07,07,87	101	Lys			
		952				952				944				320			
		3168				3168				3168				3168			

Diagonal D1 = 3168; Diagonal D2 = 3168;

Row 1 = Column 1; Row 2 = Column 2; Row 3 = Column 3; Row 4 = Column 4;

Analogue Codon Square

A analogue codon square of order n is an arrangement of n^2 numbers, usually distinct integers, in a square, such that the n numbers in all rows, all columns, and both diagonals sum to the same constant.

944	640	632	952	3168
640	944	632	952	3168
632	632	960	944	3168
952	952	944	320	3168
3168	3168	3168	3168	

$D1 = (944+944+960+320) = 3168;$

$D2 = (952+632+632+952) = 3168;$

The constant sum in every row, column and diagonal is called the magic analogue constant or magic sum, $M = 3168$;

Correlation:

944	640	632	952
640	944	632	952
632	632	960	944
952	952	944	320



3168

944	640	632	952
640	944	632	952
632	632	960	944
952	952	944	320



3168

944	640	632	952
640	944	632	952
632	632	960	944
952	952	944	320



3168

Determinants in Digital analogue Genetic Code

DET (4 x 4)

944	640	632	952
640	944	632	952
632	632	960	944
952	952	944	320

197237145600

$197237145600 = (3168+ 3168 + 3168...., + 3168);$

There is a mathematical balance within all of the phenomena in the analogue genetic code matrix.

Mathematical correlation of groups of nucleotides are a proof that genetic processes have evolved from one mathematical shape to another one. They are a proof that we can uncover some of hidden secrets in that science, with the help of mathematics.

Atomic Weight

	C	H	N	O	S	
A	5	5	5	0	0	15
U	4	4	2	2	0	12
C	4	5	3	1	0	13
G	5	5	5	1	0	16

C = 12,0111; H = 1,00797; N = 14,0067; O = 15,9994; S = 32,064;

A = 135; U = 112; C = 111; G = 151;

The Digital Genetic Code

At the first stage of our research we replaced nucleotides from the Genetic Code with atomic weight of those nucleotides.

Mathematical Position of the Nucleotides in Codon3

The development of prediction methods based on digital theory is focused on the exploration of new digital formulas and algorithms. The genetic code is stored in DNA molecules as sequences of bases: adenine (A) which pairs with thymine (T), and cytosine (C) which pairs with guanine (G), The analog of DNA in a digital genetic algorithm is a number of atoms, atomic numbers, analog codes, etc.

At mathematical evolution of genetic processes, nucleotides TCAG are being transformed to codons UCAG and later to amino acids and various organic composition.

		Second Position of Codon															
		U				C				A				G			
F	i	112,111,112	335	Ser	135,151,112	398	Ser	111,135,112	358	His	112,151,112	375	Cys	112,151,111	374	Cys	
		112,111,111	334	Ser	135,151,111	397	Ser	111,135,111	357	His	112,151,111	374	Cys				
		112,111,135	358	Ser	135,151,135	421	Arg	111,135,135	381	Gln	112,151,135	398	Ter	6108			
		112,111,151	374	Ser	135,151,151	437	Arg	111,135,151	397	Gln	112,151,151	414	Trp				
		1401				1653				1493				1561			
P	o	151,135,112	398	Asp	111,112,112	335	Leu	135,111,112	359	Thr	151,112,112	375	Val	151,112,111	374	Val	
		151,135,111	397	Asp	111,112,111	334	Leu	135,111,111	358	Thr	151,112,111	374	Val				
		151,135,135	421	Glu	111,112,135	358	Leu	135,111,135	382	Thr	151,112,135	398	Val				
		151,135,151	437	Glu	111,112,151	374	Leu	135,111,151	398	Thr	151,112,151	414	Val				
		1653				1401				1493				1561			
S	i	112,135,112	359	Tyr	135,112,112	359	Ile	151,151,112	414	Gly	111,111,112	334	Pro	111,111,111	333	Pro	
		112,135,111	358	Tyr	135,112,111	358	Ile	151,151,111	413	Gly	111,111,111	333	Pro				
		112,135,135	382	Ter	135,112,135	382	Ile	151,151,135	437	Gly	111,111,135	357	Pro	6108			
		112,135,151	398	Ter	135,112,151	398	Met	151,151,151	453	Gly	111,111,151	373	Pro				
		1497				1497				1717				1397			
n	G	111,151,112	374	Arg	151,111,112	374	Ala	112,112,112	336	Phe	135,135,112	382	Asn	135,135,111	381	Asn	
		111,151,111	373	Arg	151,111,111	373	Ala	112,112,111	335	Phe	135,135,111	381	Asn				
		111,151,135	397	Arg	151,111,135	397	Ala	112,112,135	359	Leu	135,135,135	405	Lys	6108			
		111,151,151	413	Arg	151,111,151	413	Ala	112,112,151	375	Leu	135,135,151	421	Lys				
		1557				1557				1405				1589			
		6108				6108				6108				6108			

Diagonal D1 = 6108; Diagonal D2 = 6108

The atomic genetic code describe a genotype, which is translated into an organism a phenotype by the processes of cell division.

Mathematical evolution of genetic processes is manifested in different ways. Evolution of groups of atoms is especially interesting. Here are some examples.

Atomic Codon Square

A atomic codon square of order n is an arrangement of n^2 numbers, usually distinct integers, in a square, such that the n numbers in all rows, all columns, and both diagonals sum to the same constant. A digital square contains the integers from 1 to n^2 . The term “digital square” is also sometimes used to refer to any of various types of word square.

Number of atoms

1401	1653	1493	1561	6108
1653	1401	1493	1561	6108
1497	1497	1717	1397	6108
1557	1557	1405	1589	6108
6108	6108	6108	6108	

$D1 = (1401+1401+1717+1589) = 6108; D2 = (1561+1493+1497+1557) = 6108;$

The constant sum in every row, column and diagonal is called the magic analogue constant or magic sum, M .

1401	1653	1493	1561
1653	1401	1493	1561
1497	1497	1717	1397
1557	1557	1405	1589

↓
6108

1401	1653	1493	1561
1653	1401	1493	1561
1497	1497	1717	1397
1557	1557	1405	1589

↓
6108

1401	1653	1493	1561
1653	1401	1493	1561
1497	1497	1717	1397
1557	1557	1405	1589

↓
6108

etc.

At this stage of our research we replaced nucleotides from the Amino Acid Code Matrix with analogue of the atomic weight in those nucleotides.

A = 135; U = 112; C = 111; G = 151;

A = 531; U = 211; C = 111; G = 151;

Analogue Codon Table

		Second Position of Codon															
		U				C				A				G			
F i r s t P o s i t i o n	U	211,111,211	533	Ser	531,151,211	0893	Ser	111,531,211	0853	His	211,151,211	573	Cys				
		211,111,111	433	Ser	531,151,111	0793	Ser	111,531,111	0753	His	211,151,111	473	Cys				
		211,111,531	853	Ser	531,151,531	1213	Arg	111,531,531	1173	Gln	211,151,531	893	Ter	12048			
		211,111,151	473	Ser	531,151,151	0833	Arg	111,531,151	0793	Gln	211,151,151	513	Trp				
			2292				3732				3572					2452	
	C	151,531,211	0893	Asp	111,211,211	533	Leu	531,111,211	0853	Thr	151,211,211	573	Val				
		151,531,111	0793	Asp	111,211,111	433	Leu	531,111,111	0753	Thr	151,211,111	473	Val				
		151,531,531	1213	Glu	111,211,531	853	Leu	531,111,531	1173	Thr	151,211,531	893	Val	12048			
		151,531,151	0833	Glu	111,211,151	473	Leu	531,111,151	0793	Thr	151,211,151	513	Val				
			3732				2292				3572					2452	
	A	211,531,211	0953	Tyr	531,211,211	0953	Ile	151,151,211	513	Gly	111,111,211	433	Pro				
		211,531,111	0853	Tyr	531,211,111	0853	Ile	151,151,111	413	Gly	111,111,111	333	Pro				
		211,531,531	1273	Ter	531,211,531	1273	Ile	151,151,531	833	Gly	111,111,531	753	Pro	12048			
		211,531,151	0893	Ter	531,211,151	0893	Met	151,151,151	453	Gly	111,111,151	373	Pro				
			3972				3972				2212					1892	
	G	111,151,211	473	Arg	151,111,211	473	Ala	211,211,211	633	Phe	531,531,211	1273	Asn				
111,151,111		373	Arg	151,111,111	373	Ala	211,211,111	533	Phe	531,531,111	1173	Asn					
111,151,531		793	Arg	151,111,531	793	Ala	211,211,531	953	Leu	531,531,531	1593	Lys	12048				
111,151,151		413	Arg	151,111,151	413	Ala	211,211,151	573	Leu	531,531,151	1213	Lys					
		2052				2052				2692					5252		
		12048				12048				12048					12048		

Diagonal D1 = 3168; Diagonal D2 = 3168;

Analogue Codon Square

A analogue codon square of order n is an arrangement of n^2 numbers, usually distinct integers, in a square, such that the n numbers in all rows, all columns, and both diagonals sum to the same constant.

2292	3732	3572	2452	12048
3732	2292	3572	2452	12048
3972	3972	2212	1892	12048
2052	2052	2692	5252	12048
12048	12048	12048	12048	

D1 = 12048; D2 = 12048

The constant sum in every row, column and diagonal is called the magic analogue constant or magic sum, $M = 12048$;

Correlation:

2292	3732	3572	2452
3732	2292	3572	2452
3972	3972	2212	1892
2052	2052	2692	5252
↓			
12048			

2292	3732	3572	2452
3732	2292	3572	2452
3972	3972	2212	1892
2052	2052	2692	5252



12048

2292	3732	3572	2452
3732	2292	3572	2452
3972	3972	2212	1892
2052	2052	2692	5252



12048

etc.

Determinants in Digital Analogue Genetic Code

DET (4 x 4)

944	640	632	952
640	944	632	952
632	632	960	944
952	952	944	320



74615095296000



(12048+ 12048 + 12048..., + 12048) ;

There is a mathematical balance within all of the phenomena in the analogue genetic code matrix.

Mathematical correlation of groups of nucleotides are a proof that genetic processes have evolved from one mathematical shape to another one. They are a proof that we can uncover some of hidden secrets in that science, with the help of mathematics.

It is obvious that digital matrix of amino acid code evolved from digital matrix of nucleotide code.

Mathematical correlation of groups of nucleotides are a proof that genetic processes have evolved from one mathematical shape to another one. They are a proof that we can uncover some of hidden secrets in that science, with the help of mathematics.

Perspectives

About Importance of the Proposal

Development of science in following period will be based on contemporary digital technology. To conquer new technology it would be far more efficient to use method of reverse engineering for comprehension of phenomen in ge-

netics. We'll give a brief description of that method.

The genetic code tables used by the modern science are characterized and determined by principles of biochemistry. However, if in those tables, instead of the UCAG nucleotides we put the number of atoms of those nucleotides, we will get the new tables of the genetic code characterized and determined by programmatic and information principles.

Therefore, biochemistry can be explained through a phenomenon out of biochemistry.

Particularly interesting results we will get when determining numeric values for the information content of atoms and molecules. We will then find out that those values express physical and chemical characteristics of molecules. For example: in a DNA molecule, the polynucleotide chains are connected through an exact cyber-information connections. In those molecules there are also mathematical matrixes of DNA, represented by the number of atoms of four ATCG bases. These matrixes determine the positioning of nucleotides in that molecule. With this, the biological particularities of DNA are determined. Similar mathematical matrixes determine the positioning of nucleotides in the RNA molecule. In the amino acid proteins, they are interconnected into the respective mathematical chains. In those chains are also matrixes where particular mathematical principles apply, the principles that determine the positioning of each amino acid in the chain. Therefore, the herewith discussed research results show that the process of sequencing in bio-macromolecules is conditioned and determined not only through biochemical, but also through cybernetic information principles. The hypothesis here is that the processes in an organism occur only when certain mathematical conditions are met, i.e. when there is a certain mathematical correlation between parameters in those processes. That correlation is expressed by the respective methodology.

We would particularly like to stress here that the genetic, as well as biochemical information in a broader sense of the word, is determined and characterized by very complex cybernetic and information principles. The constantans in those principles are: the number of atoms and molecules, atomic numbers, atomic weight, physical and chemical parameters, even and odd values, codes and analogue codes, standard deviations, frequencies, primary and secondary values, and many other things.

Where it Might be Useful

In view of this, our findings might have a series of impacts to the aforementioned work. We are devoted to provide a digital code for each of 20 native amino acids. These digital codes should more complete and better reflect the essence of each of the 20 amino acids. Therefore, it might stimulate a series of future work by using the author's digital codes to formulate the pseudo amino acid composition

for predicting protein structure class, subcellular location, membrane protein type, enzyme family class, GPCR type, protease type, protein-protein interaction, metabolic pathways, protein quaternary structure, and other protein attributes.

We can expect that this discovery will significantly speed up the research of mutational genesis of humans, molecular etymology, in applied biology and genetic engineering, and also it will provide discoveries in new medicines and methods of medicinal treatments.

Future Steps Required

1. Establish scientific-research project team for development of advanced technologies in genetics, medicine and biochemistry.
2. Project team should make concrete program of scientific-research work, where they should define goals of research, indispensable facilities for implementation of project, project duration, budget, and other conditions.
3. Define rights and duties of all participants in implementation of project.
4. To implement project defined by project documentation.

Research in the Field of Fundamental Sciences

1. Decode matrix of amino acid code and on the experimental way prove that the matrix really exists. And after that, use that matrix to conquer top technologies in the field of genetics.
2. Decode matrix of nucleotide code and digital codes which connect that matrix with matrix of amino acid code. And use that matrix to conquer top technologies in the field of biochemistry.
3. Decode matrix code in Tables of periodic system of chemical elements, and use that matrix to conquer top technologies in the field of chemistry.
4. Decode matrix code in the nature, and use that matrix to conquer top technologies in the field of all natural sciences.
5. Decode matrix code of chromosomes in human body.
6. With the help of above mentioned matrixes, decode map of human DNA.
7. Decode matrix code of processes in the field of nuclear physics.
8. Decode insulin matrix code, as well as all other codes from the field of biochemistry.

9. Other research (Matrix code in Pascal's triangle, Matrix code in astronomy, Matrix code in theoretical physics, determinism, etc.).

Paragraph of Limitations

1. Confirm that the manuscript has been submitted solely to this journal and is not published, in press, or submitted elsewhere.

2. Confirm that all the research meets the ethical guidelines, including adherence to the legal requirements of the study country.

3. Confirm that you have completed and sent a Copyright Transfer Agreement (CTA) to the Editorial Office.

The Obtained Results

The obtained results are valid. In this manuscript, we proposed the universal genetic code. Mathematics could confirm this fact with 100% scientific accuracy. For example, Table mathematical position of the nucleotides in codon, Digital codon square, Analogue atomic genetic code, Correlation of the code and analogue code *Analogue codon table, Analogue codon square, Determinants in Digital analogue Genetic Code, Determinants in Digital analogue Genetic Code, Atomic weight Atomic codon square, etc.* This mathematic system represents that very universal formula of the genetic code which 100% scientific accuracy. was looking for.

Conclusion

It is a rewarding work to translate the biochemical language of amino acids into a digital language because it may be very useful for developing new methods for predicting protein sub cellular localization, membrane protein type, protein structure secondary prediction or any other protein attributes.

This is because ever since the concept of Chou's pseudo amino acid composition was proposed many efforts have been made trying to use various digital numbers to represent the 20 native amino acids in order to better reflect the sequence-order effects through the vehicle of pseudo amino acid composition. Some investigators used complexity measure factor some used the values derived from the cellular automata, some used hydrophobic and/or hydrophilic values, some were through Fourier transform, and some used the physicochemical distance.

Now, it is going to be possible to use the completely new strategy of research in genetics. However, observation of all these relations which are the outcome of the periodic law (actually, of the law of binary coding) is necessary, because it can be of great importance for decoding conformational forms and stereo-chemical and digital structure of proteins.

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