Open Access Library Journal
2021, Volume 8, e7123
ISSN Online: 2333-9721
ISSN Print: 2333-9705

What Is the Meaning of the Square Root of the Number Three in Biochemistry?

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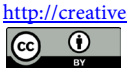
How to cite this paper: Ölmez, T. (2021) What Is the Meaning of the Square Root of the Number Three in Biochemistry? *Open Access Library Journal*, **8**: e7123.
https://doi.org/10.4236/oalib.1107123

Received: December 29, 2020
Accepted: January 24, 2021
Published: January 27, 2021



Abstract

According to Quantum Perspective Model, this article researches whether there is a link between the square root of **three** numbers and the genetic codes. At first, when the digits of the square root of **three** numbers [1] after the comma are converted from decimal (10) number base system to binary (2) number base system, it corresponds to nucleotide bases. Secondly, the results obtained by this way are expressed as nucleotide bases (**A, T, C, G, and U**), (**A**) Adenine, (**T**) Thymine, (**C**) Cytosine, (**G**) Guanine, (**U**) **U**racil. From this point of view, when the first three hundred and sixty digits of the square root of the two numbers after the comma are calculated, the gene sequence is obtained as follows: [**GGATGACTACGGGTTTAGAAA**]. Thirdly, the search result is similar to **DENTICLE HERRING**, after the NCBI (National Biotechnology Information Center) searched this sequence. Fourthly, the genetic codes of bony fish were found to be similar to human genetic codes. In summary, with these results, the link between the square root of three in mathematical science and the genetic codes in biochemistry was determined.

Subject Areas

Mathematics, Number Theory

Keywords

Quantum Perspective Model, Denticle Herring, Binary Number Base System, The Square Root of Three and NCBI (National Biotechnology Information Center)

1. Introduction and Calculation of the Square Root of Three Numbers from Decimal Base System (10) to Binary Base System (2) and Binary Base System (2) to Decimal Base System (10)

The relationships between numbers and genetic codes are not only researched

with velocity of light numbers [2] but also researched with the golden ratio numbers, too [3]. The name of this relationship research is called **Quantum Perspective Model** by Kevser Köklü [4]. Then, the relationships between the square root of the number two and the genetic codes are researched by Tahir ÖLMEZ [5]. Now, as per this model, this paper attempts to search the relationships between the square root of the number three and the genetic codes (see Table 1).

2. Methods and Discussion

The chemical structures of bases include Carbon(**C**), Nitrogen (**N**), Oxygen (**O**), and Hydrogen (**H**). **Calculation of bases with chemical atoms** (See also Table 2) (Ölmez T, 2020) [3].

The atomic numbers of them: Carbon (**C**): 6, Nitrogen (**N**): 7, Oxygen (**O**): 8, Hydrogen (**H**): 1 (Wieser E M *et al*., 2013) [6]. The chemical structures of bases (**A**, **T**, **C**, **G, and U**) are shown below (Ölmez T, 2020) [3].

Table 1. The representation of decimal numbers in the binary base and vice versa.

DECIMAL	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
BINARY	*01*	*10*	*11*	*100*	*101*	*110*	*111*	*1000*	*1001*	*1010*
DECIMAL	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
BINARY	*1011*	*1100*	*1101*	*1110*	*1111*	*10000*	*10001*	*10010*	*10011*	*10100*
DECIMAL	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
BINARY	*10101*	*10110*	*10111*	*11000*	*11001*	*11010*	*11011*	*11100*	*11101*	*11110*
DECIMAL	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
BINARY	*11111*	*100000*	*100001*	*100010*	*100011*	*100100*	*100101*	*100110*	*100111*	*101000*
DECIMAL	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
BINARY	*101001*	*101010*	*101011*	*101100*	*101101*	*101110*	*101111*	*110000*	*110001*	*110010*
DECIMAL	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
BINARY	*110011*	*110100*	*110101*	*110110*	*110111*	*111000*	*111001*	*111010*	*111011*	*111100*
DECIMAL	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**
BINARY	*111101*	*111110*	*111111*	*1000000*	*1000001*	*1000010*	*100011*	*1000100*	*1000101*	*1000110*
DECIMAL	**71**	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
BINARY	*1000111*	*1001000*	*1001001*	*1001010*	*1001011*	*1001100*	*1001101*	*1001110*	*1001111*	*1010001*
DECIMAL	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**
BINARY	*1010001*	*1010010*	*1010011*	*1010100*	*1010101*	*1010110*	*1010111*	*1011000*	*1011001*	*1011010*
DECIMAL	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
BINARY	*1011011*	*1011100*	*1011101*	*1011110*	*1011111*	*1100000*	*1100001*	*1100010*	*1100011*	*1100100*

Table 2. Representation of nucleotide bases (**A**, **T**, **C**, **G** and **U**) in chemical atoms.

ATOMS/NUCLEOTIDE BASES	*C* = 6	*H* = 1	*O* = 8	*N* = 7	*SUM*
ADENINE: $C_5H_5N_5$	5	5	-	5	70
THYMINE: $C_5H_6N_2O_2$	5	6	2	2	66
CYTOSINE: $C_4H_5N_3O_1$	4	5	1	3	64
GUANINE: $C_5H_5N_5O_1$	5	5	1	5	78
URACIL: $C_4H_4N_2O_2$	4	4	2	2	58

(**A**) Adenine: $C_5H_5N_5$: **70**;
(**T**) Thymine: $C_5H_6N_2O_2$: **66**,
(**C**) Cytosine: $C_4H_5N_3O_1$: **64**,
(**G**) Guanine: $C_5H_5N_5O_1$: **78**, and
(**U**) Uracil: $C_4H_4N_2O_2$: **58**
(Lodish H *et al.*, 2018) [7].

Before this work, the fourteen group of Pi number can be shown as: Continuous **UTA**'s by Kevser Köklü [4]. Secondly, another favorite sample of this research is done with velocity of light numbers by Kevser Köklü again [2]. This relationship between the numbers and genetic codes is called **Quantum Perspective Model** by Kevser Köklü [4]. Thirdly, in another article with identical cis regulatory elements examined the links between the Golden Ratio numbers [3]. Fourthly, there is a connection between Euler numbers and the Fibonacci series. When the numbers of Euler after the comma were converted from a decimal (10) number-based system to a binary (2) number-based system, they corresponded to the number "55" in the Fibonacci series [2]. Fifthly, there is a link between the square root of **two** [5] and the genetic codes. This can be shown as: [**GGATGTCTATTGAGTGACAA**] [5]. After all these studies, the square root of the number three and the genetic codes are now being investigated in relation to the **Quantum Perspective Model**.

3. Calculation of the Square Root of Three Numbers and Genetic Codes

The first two hundred digits of the square root of three [1] after the comma are here:

The square root of three =
1.73205080756887729352744634150587236694280525381038062805580697945193301690880003708114618675724857567562614141540670302996994509499895247881165551209437364852809323190230558206797482010108467492326501531234326690332288665067225466892183797122704713166036786158801904998653737985938946765034750657605075661834812960610094760218

At first, the first two digits after the comma were taken each time. For example, **73, 20, 50, 80, 75, 68, 87, 72 …** and so on. Then these numbers are found in the **binary number system in** Table 1. (For instance, **"73"**, *1001001* and so on). Secondly, convert these **binary** numbers to **decimal** number base (For instance, **"73"** *1001001*; 100 = 4, 100 = 4 and 1 = 1).Thirdly, all **decimal** numbers are subjected to the addition process, respectively. (4 + 4 + 1 = **6**). All of the first result of the addition is "**77**". Just like as in Guanine (**G**): **78** (See also Table 1).

73	**20**	**50**	**80**	**75**	**68**	**87**	**72**
1001001	10100	110010	1010001	1001011	1000100	1010111	1001000
100 100 1	10 100	1 100 10	10 1000 1	100 10 11	1000 100	10 10 111	100 1000
4 + 4 + 1	+2 + 4	+1 + 4 + 2	2 + 8 + 1	+4 + 2 + 3	8 + 4	2 + 2 + 7	+4 + 8 = **77** (**G**) Guanine: **78**

Continued

93	**52**	**74**	**46**	**34**	**15**	**05**	**87**	**23**		
1011101	110100	1001010	101110	100010	1111	101	1010111	10111		
10 11 101	110 100	100 10 10	10 11 10	1000 10	11 11	10 1	10 10 111	10 111		
2 + 3 + 5	+6 + 4	+4 + 2 + 2	2 + 3 + 2	+8 + 2	+3 + 3	2 + 1	2 + 2 + 7	2 + 7 = **77** (**G**) Guanine: **78**		
66	**94**	**28**	**05**	**25**	**38**	**10**	**38**	**06**	**28**	**05**
1000010	1011110	11100	101	11001	100110	1010	100110	110	11100	101
10000 10	101 11 10	11 100	10 1	11001	100 110	10 10	10 01 10	1 10	11 100	101
+16 + 2	+5 + 3 + 2	+3 + 4	+2 + 1	+1 + 2 + 1	+4 + 6	2 + 2	2 + 1+	2 + 1 + 2	+3 + 4	+2 + 1 = 70 (**A**) Adenine: **70**
58	**06**	**97**	**94**	**51**	**93**	**30**				
111010	110	1100001	1011110	110011	1011101	11110				
11 10 10	1 10	1 10000 1	10 11 110	1 100 11	10 11 101	11 110				
3 + 2 + 2	+1 + 2	+1 + 16 + 1	+5 + 3 + 2	+1 + 4 + 3	+2 + 3 + 5	+3 + 6 = 65 (**T**) Thymine: **66**				
16	**90**	**88**	**00**	**03**	**70**	**81**	**14**	**61**		
10000	1011010	1011000	0	11	1000110	1010001	1110	111101		
10000	10 110 10	101 1000	0	11	1000 110	10 1000 1	11 10	11		
16	+2 + 6 + 2	+5 + 8	+0+	3	+8 + 6	+2 + 8 + 1	+3 + 2	+3 = **76** (**G**) Guanine: **78**		
61(MORE)	**86**	**75**	**72**	**48**	**57**	**56**				
111101	1010110	1001011	1001000	110000	111001	111000				
11 01	10 10 110	100 10 11	100 1000	1 10000	11 100 1	11 1000				
3 + 1	+2 + 2 + 6	+4 + 2 + 3	+4 + 8	+1 + 16	+3 + 4 + 1	+3 + 8 = 71 (**A**) Adenine: **70**				
75	**62**	**61**	**41**	**41**	**54**	**06**	**70**			
1001011	111110	111101	101001	101001	110110	110	1000110			
100 10 11	11 11 10	11 11 01	10 10 01	10 10 01	110110	1 10	1000 110			
+4 + 2 + 3	+3 + 3 + 2	+3 + 3 + 1	+2 + 4 + 1	+2 + 4 + 1	+3 + 1 + 2	+1 + 2	+8 + 6 = 62 (**C**) Cytosine: **64**			
30	**29**	**96**	**99**	**45**						
11110	11101	1100000	1100011	101101						
11 110	11 10 1	1 100000	1 1000 11	10 11 01						
+3 + 6	+3 + 2 + 1	+1 + 32	+1 + 8 + 2	+2 + 3 + 1 = 65 (**T**) Thymine: **66**						
09	**49**	**98**	**95**	**24**	**78**	**81**				
1001	110001	1100010	1011111	11000	1001110	1010001				
10 01	1 100 01	1 1000 10	10 11 11 1	1 1000	100 11 10	10 10001				
2 + 1	+1 + 8 + 1	+1 + 8 + 2	2 + 3 + 3 + 1	+1 + 8	+4 + 3 + 2	+2 + 17 = 70 (**A**) Adenine: **70**				
16	**55**	**51**	**20**	**94**	**37**	**36**	**48**			
10000	110111	110011	10100	1011110	100101	100100	110000			
10000	110 111	1 100 11	10 100	10 11 110	100 1 01	100 100	1			
16	+6 + 7	+1 + 4 + 3	+2 + 4	+2 + 3 + 6	+4 + 1 + 1	+4 + 4	1 = 69 (**A**) Adenine: **70**			
48(MORE)	**52**	**80**	**93**	**23**	**19**	**02**				
110000	110100	1010001	1011101	10111	10011	10				
10000	110 100	10 1000 1	10 11 101	10111	10011	10				
16	+6 + 4	+2 + 8 + 1	+2 + 3 + 5	+2 + 7	+4 + 3+	2 = 64 (**C**) Cytosine: **64**				
30	**55**	**82**	**06**	**79**	**74**	**82**	**01**	**01**	**08**	**46**	**74**
11110	110111	1010010	110	1001111	1001010	1010010	01	01	1000	101110	1001010
11 1 10	110 111	10 100 10	1 10	100 11 11	100 10 10	10 100 10	01	01	1000	10 11 10	10
3 + 1 + 2	**+**6 + 7	+2 + 4 + 2	+1 + 2	+6 + 3 + 3	+4 + 2 + 2	+2 + 4 + 2	1	1	8	2 + 3 + 2	+4 = 77 (**G**) Guanine: **78**

Continued

74	**92**	**32**	**65**					
1001010	1011100	100000	1000001					
10 10	101 1 100	100000	100000					
2 + 2	**+**5 + 1 + 4	32	32 = 78 (**G**) Guanine: **78**					
65(MORE)	**01**	**53**	**12**	**34**	**32**	**66**		
1000001	01	110101	1100	100010	100000	1000010		
1	**01**	110 101	1 100	1000 10	100000	10000 10		
1	**+1**	**+**6 + 5	+1 + 4	8 + 2+	32	+16 + 2 = 66 (**T**) Thymine: 66		
90	**33**	**22**	**88**	**66**				
1011010	100001	10110	1011000	1000010				
10 110 10	10000 1	10 110	101 1000	10000 10				
+2 + 6 + 2	+16 + 1	+2 + 6	+5 + 8	+16 + 2 = 66 (**T**) Thymine: 66				
50	**67**	**22**	**54**	**66**	**89**			
110010	100011	10110	110110	1000010	1011001			
1 100 10	1000 11	10 110	11 01 10	10000 10	101 10 01			
+1 + 4 + 2	+16 + 3	+2 + 6	+3 + 1 + 2	+16 + 2	+5 + 2 + 1 = 66 (**T**) Thymine: 66			
21	**83**	**79**	**71**	**22**	**70**			
10101	1010011	1001111	1000111	10110	1000110			
10 101	10 100 11	100 11 11	1000 111	10 110	1000 110			
2 + 5	+2 + 4 + 3	6 + 3 + 3	+8 + 7 +	+2 + 6	+8 + 7 = 66 (**T**) Thymine: **66**			
47	**13**	**16**	**60**	**36**	**78**	**61**	**58**	
101111	1101	10000	111100	100100	1001110	111101	111010	
10 11 11	11 01	10000	111 100	100 100	100 11 10	11 11 01	11 10 10	
2 + 3 + 3	+3 + 1	16	+7 + 4	4 + 4	+4 + 3 + 2	+3 + 3 + 1	+3 + 2 + 2 = 70 (**A**) Adenine: **70**	
80	**19**	**04**	**99**	**86**	**53**	**73**	**79**	**85**
1010001	10011	100	1100011	1010110	110101	1001001	1001111	1010101
10 1000 1	100 11	100	1 1000 11	10 10 110	110 101	100 100 1	100 11 11	10 10 101
2 + 8 + 1	+4 + 3	+4	+1 + 8 + 2	+2 + 2 + 6	+6 + 5	+4 + 4 + 1	6 + 3 + 3	+2 + 2 + 5 = 78 (**G**) Guanine: **78**
93	**89**	**46**	**76**	**50**	**34**	**75**	**06**	
1011101	1011001	101110	1001100	110010	100010	1001011	110	
10 11 101	101 10 01	10 11 10	100 1100	1100 10	1000 10	100 10 11	1 10	
2 + 3 + 5	+5 + 2 + 1	2 + 3 + 2	+4 + 12	+1 + 4 + 2	+8 + 2	+4 + 2 + 3	+1 + 2 = 70 (**A**) Adenine: **70**	
57	**60**	**50**	**75**	**66**	**18**	**34**		
111001	111100	110010	1001011	1000010	10010	100010		
11 100 1	111 100	1100 10	100 10 11	10000 10	100 10	1000 10		
3 + 4 + 1	+7 + 4	1 + 4 + 2	+4 + 2 + 3	+16 + 2	+4 + 2+	+8 + 2 = 69 (**A**) Adenine: **70**		
81	**29**	**60**	**61**	**00**	**94**	**76**	**02**	**18**
1010001	11101	111100	111101	0	1011110	1001100	10	10010
10 100 01	11101	111 100	11 11 01	0	101 11 10	100 1100	10	100 10
2 + 8 + 1	3 + 2 + 1	+ 7 + 4	+2 + 2 + 1	0	+2 + 3 + 6	+4 + 12	+2	+4 + 2 = 68 (**A**) Adenine: **70**

This sequence can be shown as [**GGATGACTACGGGTTTAGAAA**]. Let me try to explain this sequence with the "**Quantum Perspective Model**." For example, The **first** groups of the square root of three after comma equal to Guanine (**G**): 77 with the lack of one "1" Hydrogen bond (**H: 1**). (Remember, See Table 2; Guanine (**G**): 78) This result may mean the sequence of the square root of three in groups [**GGATGACTACGGGTTTAGAAA**]. The **fourth** groups of

the square root of three after the comma is regarded as Thymine (T) with the lack of one Hydrogen bond (**H: 1**). (Remember, See Table 2; Thymine (T): 66) (Because the **deviations** in the calculation of the square root of three numbers can be derived from the Adenine (A) - Thymine (T) Hydrogen bonds because of Adenine (A) pairs with Thymine (T) by *two* hydrogen bonds. Cytosine (**C**) - Guanine (**G**) pairs with by *three* hydrogen bonds [4]. The reason for the lack of hydrogen bonds: **Hydrogen bonding** is a very versatile attraction (Ölmez T, 2020) [3]. Hydrogen bonds are relatively *weak and easily broken* by increasing hardness (Farrell R E, 2010) [8].

4. Results

After searching the square root of the three numbers with the National Biotechnology Information Center (NCBI) databases, some conceptual relationships with bony fish can ultimately be found. Types of **bony fishes** are based on **DENTICLE HERRING** (See Figure 1). Types of other living creatures are Barber pole worm, human chromosome 15, golden spiny mouse and bacterium [9] (See Figure 2).

Description	Common Name	Max Score	Total Score	Query Cover	E value	Per. Ident	Acc. Len	Accession
Denticeps clupeoides genome assembly, chromosome: 14	denticle herring	36.2	36.2	85%	8.9	100.00%	21670620	LR535826.1
Dyadobacter sp. 32 isolate Dyadobacter sp. 32 sample 2 genome assembly, chromosome: 1	Dyadobacter sp. 32	34.2	34.2	80%	35	100.00%	7101228	LR735258.1
Prunus dulcis DNA, unplaced-scaffold_1126	almond	34.2	34.2	80%	35	100.00%	15750	AP021463.1
Haemonchus contortus strain NZ_Hco_NP chromosome 1	barber pole worm	34.2	94.6	80%	35	100.00%	83295456	CP035805.1
Complete annotated genome sequence of the bacterium Dyadobacter sp. 32	Dyadobacter sp. 32	34.2	34.2	80%	35	100.00%	7101228	LR732074.1
Lactobacillus sp. 3B(2020) chromosome, complete genome	Lactobacillus sp. 3B(2020)	34.2	34.2	80%	35	100.00%	2150064	CP047410.1
Arvicola amphibius genome assembly, chromosome: 16	Eurasian water vole	32.2	32.2	76%	139	100.00%	51382976	LR862396.1
Gadus morhua genome assembly, chromosome: 19	Atlantic cod	30.2	30.2	71%	549	100.00%	22015597	LR633961.1
Homo sapiens DNA, chromosome 15, nearly complete genome	human	30.2	30.2	71%	549	100.00%	95537968	AP023475.1
Acomys russatus genome assembly, chromosome: 8	golden spiny mouse	30.2	30.2	71%	549	100.00%	77196262	LR877219.1
Escherichia coli strain RH-048-CS chromosome	Escherichia coli	30.2	30.2	71%	549	100.00%	7567896	CP050205.1
Oscheius tipulae isolate CEW1 chromosome V	Oscheius tipulae	30.2	30.2	71%	549	100.00%	10817478	CP059032.1
Arabidopsis thaliana genome assembly, chromosome: 1	thale cress	30.2	30.2	71%	549	100.00%	30871886	LR797807.1
Arabidopsis thaliana genome assembly, chromosome: 1	thale cress	30.2	30.2	71%	549	100.00%	29915687	LR797802.1
Schistosoma mansoni strain Puerto Rico genome assembly, chromosome: 3	Schistosoma mansoni	30.2	30.2	71%	549	100.00%	50458499	HE601626.2
Schistosoma mansoni strain Puerto Rico genome assembly, chromosome: 2	Schistosoma mansoni	30.2	30.2	71%	549	100.00%	48130368	HE601625.2

Figure 1. The NCBI (National Biotechnology Information Center) result for nucleotide sequence "GGATGACTACGGGTTTAGAAA" [9].

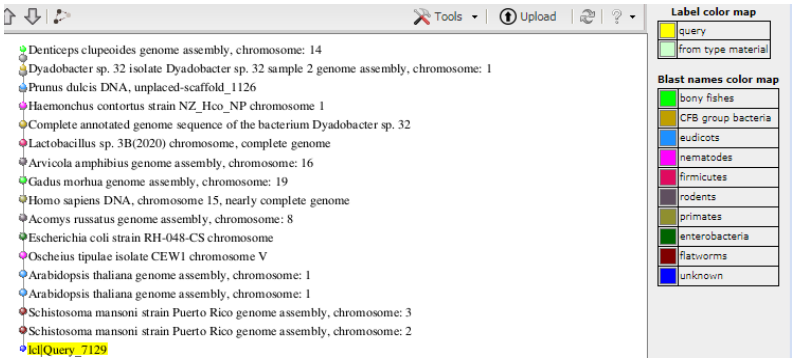


Figure 2. The NCBI (National Biotechnology Information Center) result blast tree view widget for "GGATGACTACGGGTTTAGAAA" nucleotide sequence [9].

5. Conclusions

Although the most widely used number digit system today is the decimal system, in this study, the square root of the number three is expressed as a binary number base system instead of a decimal base system [10]. When the numbers of Euler after the comma were converted from the decimal (10) number base system to the binary (2) number base system, they corresponded to the number "**55**" in the Fibonacci series (0, 1, 1, 2, 3, 5, 8, 13, 21, 34, **55**…) [11]. In the same way, the binary (2) number-based system was used in this research. The alphabet of DNA and RNA is associated with binary numbers [12]. However, almost all the studies so far into perception of irrational numbers have focused on numbers, on the other hands, future studies should be studied in detail later in the perspective of genetic codes.

Firstly, the result of this research can be summarized as the expression of the numbers of three roots after commas by chemical formulas in genetic codes. Secondly, both digits after the comma were thought to be an indicator of genetic codes. As a common feature of Biochemistry and Mathematical sciences, NCBI blasts are obtained. Because these results include both bony fish and especially **DENTICLE HERRING**. The common feature of pi numbers [4] and Euler numbers [13] along with the square of the speed of light is that the NCBI results are bony fish [2] [3]. Let alone this result, NCBI result for CAAT Box also consists of **bony fishes**, especially **DENTICLE HERRING** [3]. **Denticle Herring** is the most primitive living clupeiform [14]. Here is the consequence of how a single amino acid change on fish can have a major impact on ecological adaptation which is described [15]. Therefore, in the calculation of the golden ratio numbers, triplet codons were also used to express cis-regulatory elements (TATA Box, CAAT Box and GC box) [3]. Thirdly, with the genetic codes of the square root of two, the genetic codes of the square root of three consist of the same gene sequence in the following sequence: [**GGATGACT**] [5]. Finally, the results of calculating the square root of three numbers with genetic codes can be expressed by: [(**A**) Adenine, (**T**) Thymine, (**C**) Cytosine, (**G**) Guanine and (**U**) **Uracil**]. So, these can be associated with both Biochemistry and Mathematics. Namely, the square root numbers of the three after the comma can be attributed not only to numbers in mathematics, but also to genetic codes and chemical formulas in Biochemistry. In summary, researching this interesting connection in terms of the **Quantum Perspective Model** basically reveals the comparability of small units of analysis of the sciences, as in genetic codes and mathematical numbers.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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