

According to Quantum Perspective Model, Is Euler's Identity also Meaningful in Biochemistry?

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Abstract

According to Quantum Perspective Model, this article researches whether there is a link between the Euler's identity and the genetic sequences. At first, Euler's identity is squared (See **Figure-1**). Then, the digits of pi number after the comma are sequenced "TCGATTATACTGGTTGGTTTTAACGGTAC"[18]. Secondly, the resulting sum corresponds to the nucleotide bases, the results obtained in this way are expressed as nucleotide bases. (**A, T, C, G, and U**). (**A**)Adenine, (**T**) Thymine, (**C**) Cytosine, (**G**) Guanine, (**U**) Uracil. From this point of view, the reason pi number's sequence is written twice is because Euler's identity is squared. Then, add Euler's nucleotide bases [7] to this gene sequence respectively, the result is obtained by:[AAAGGUCCGUUAAUAAGUAAAUUUAGGU]. Thirdly, after researching this sequence at NCBI (National Biotechnology Information Center), the search result is similar to **Danio Rerio** (Zebra fish), **Danio Kyathit** and even **Timema**. Fourthly, the genetic codes of Zebra fish have been proven to be very similar to human genetic codes. Lastly, Even **Timema** reproduces asexually. As a result, Euler's identity is not only related to irrational numbers in Mathematics, but also to genetic codes in Biochemistry.

Key words: Quantum Perspective Model; Danio Rerio; Euler's identity; NCBI (National Biotechnology Information Center); Timema.

1. Introduction

In this research, genetic codes were used as a new formula (Nirenberg and his colleagues 1965) just like as (**A, T, C, G, and U**). (**A**)Adenine, (**T**) Thymine, (**C**) Cytosine, (**G**) Guanine, (**U**)Uracil. Before this work, the fourteen group of Pi number can be shown as: Continuous **UTA's** by [4]. Secondly, another favorite sample of this research is done with velocity of light numbers by [3]. This relationship between the numbers and genetic codes is called **Quantum Perspective Model** by [4].

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Thirdly, in another article with identical cis regulatory elements examined the links between the Golden Ratio numbers [6]. 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. Fifthly, there is a link between the square root of **two**, the square root of **three** and the square root of **five** numbers and the genetic codes. After all these studies, pi numbers and the genetic codes were investigated in relation to the **Quantum Perspective Model** [18]. The results obtained in this way were expressed as nucleotide bases as follows: "TCGATTATACTGGTTGGTTGTTAACGGTAC" [7]. Now, Euler's equation (See **Figure-1**) and the genetic codes are now being investigated in relation to this Model.

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-1**). (Ölmez T, 2020)

Table 1: 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 ₅ H ₅ N ₅	5	5	-	5	70
THYMINE: C ₅ H ₆ N ₂ O ₂	5	6	2	2	66
CYTOSINE: C ₄ H ₅ N ₃ O ₁	4	5	1	3	64
GUANINE: C ₅ H ₅ N ₅ O ₁	5	5	1	5	78
URACIL : C ₄ H ₄ N ₂ O ₂	4	4	2	2	58

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

(A) Adenine: C₅H₅N₅: **70**;

(T) Thymine: C₅H₆N₂O₂: **66**,

(C) Cytosine: C₄H₅N₃O₁: **64**,

(G) Guanine: C₅H₅N₅O₁: **78**, and

(U) Uracil: C₄H₄N₂O₂: **58**

(Lodish H and his colleagues 2018).

Before this study, some of the irrational numbers were researched as in pi numbers [4], the golden ratio numbers [6], Euler's numbers [7], the square root of number two [16], the square root of number three [17] and the square root of number five [18]. According to Quantum Perspective Model, the meanings of Pi number is forever UTA's [(U) Uracil, (T) Thymine and (A) Adenine, 4]. Also the sum of chemical formulas of TATA and CAAT Box is nearly as the same as the golden mean numbers of "618". (Remember, approximately the golden ratio is

1,618) [6]. Besides, after the comma, **Euler's** eighteen fifteen-group numbers are converted to nucleotide bases. The results obtained in this way are expressed as nucleotide bases as follows: "AUGUUGAUAUTAAUCATC" [7] **Pi** numbers and genetic codes have been studied in relation to the quantum perspective model [18]. The results obtained in this way were expressed as nucleotide bases as follows: "TCGATTATACTGGTTGGTTTTTAACGGTAC" In Quantum field theory, the theoretical aspects of Reflection positivity were discussed by Nebb K.H. and Olafsson G. in connection with different scientific fields. In quantum physics, reflection positivity is often associated with Wick rotation, which means multiplying the time coordinate by the imaginary unit "*i*" to provide a way to commute between real and unusual time [16]. That's why, in this article, when multiplying with imaginary unit "*i*", genetic sequence is converted from "**T**" Thymine to "**U**" Uracil (See, Table-2).

3. Calculation of euler's identity and genetic codes

e is Euler's number, *i* is the imaginary unit, π is π .

Pi numbers nucleotide bases: "TCGATTATACTGGTTGGTTTTTAACGGTAC"[18].

Euler's numbers nucleotide bases: "AUGUUGAUAUTAAUCATC" [7] Since Euler's identity [1] includes many irrational numbers, this article will also be examined within the framework of genetic codes. In Euler's equation; triple codons are needed to make sense in terms of genetic code sequence. Therefore, Euler's identity is squared (See Figure-1). Thus, meaningful conclusions are drawn from Euler's identity. Adenine (**A**) pairs with Thymine (**T**) by two hydrogen bonds. Cytosine(**C**) - Guanine (**G**) pairs with by three hydrogen bonds [10]. That's why, base pairs of DNA codons are written in third row " $2\pi i$ bases". Euler's nucleotide Bases: "AUGUUGAUAUTAAUCATC" [7] (See, *e* bases, Table-2). After adding "*e* bases" to " $2\pi i$ bases", the fifth row in the table, respectively, is obtained, the basis of Euler's identity with Thymine. Lastly, because the absence of Thymine in Universal Genetic Code Table [15], Instead of "**T**" Thymine, "**U**" Uracil were used. The result is as follows: AAAGGUCCGUUUAUAAGUUAUUUAGGU. (The sixth row in the table Euler's identity bases with Uracil, See Table-2). This result is searched in the NCBI Blast database; the results are also significant and related to Biochemistry [14].

Table 2: Representation of codons of Euler's identity "AAAGGUCCGUUUAUAAGUUAUUUAGGU"

π bases	T	C	G	A	T	T	A	T	A	C	NOTE: Instead of " T " Thymine use " U " Uracil. Because the absence of Thymine in Universal Genetic Code Table [15].
2π bases (<i>twice</i>)	TT	CC	GG	AA	TT	TT	AA	TT	AA	CC	
$2\pi i^*$ (" <i>REVERSE</i> ") bases	AA	GG	CC	TT	AA	AA	TT	AA	TT	GG	
<i>e</i> bases	A	U	G	U	U	G	A	U	A	U	
Euler's identity bases <i>with Thymine</i>	AAA	GGU	CCG	TTU	AAU	AAG	TTA	AAU	TTA	GGU	
Euler's identity bases <i>with Uracil</i>	AAA	GGU	CCG	UUU	AAU	AAG	UUA	AAU	UUA	GGU	

4. Results

After searching for Euler's identity in National Biotechnology Information Center (NCBI) databases, some conceptual relationships with bony fish can be found [13]. Types of **bony fishes** (Orbiculate cardinal fish, zig-zag eel, *Echeneis naucrates*) are based on **DANIO RERIO (Zebra fish)** (See **Figure-2**). Because Danio Rerio, one of the results obtained, was one of the creatures resembling the human gene. Types of other living creatures are **Timema shepardii**, **Timema douglasi**, **Timema bartmani**, **Timema poppensis**, **Timema cristina**, **Timema tahoe**, **Danio Kyathit** and *Danio aesculapii*. Another interesting result of NCBI is **Timema** (See **Figure-3**). The longest known asexual period for **Timema**, including two species that have not engaged in sexual reproduction for a million years [11]. **Asexuality** in animals is rare, and the Timema-insect lineage that evolved without sex has been proven to have survived for centuries and even Timema reproduces asexually [12]. Types of other living creatures are cats, alligators, flies, ants, tomato, Japanese rice fish, birds, musk melon and potato [13]. The NCBI Blast result is: **AAAGGUCCGUUAAUAAGUAAAUUUAGGU**. The "stop" codon (UAA) in the universal genetic code table [15] is found twice in this gene sequence in reversed form (AAU). Euler's equation mostly consist of pi number " π ", Euler number "e" and imaginary unit "i" [1]. Until now, some of this irrational numbers have been researched as in pi numbers [4,18] and Euler numbers [7]. But since no study has been done so far between the imaginary unit "i" and the genetic codes, new research to shed light on Euler's theorem in the future may contribute to achieving new results.

5. Conclusion

At first, the results of this research can be summarized as taking Euler's identity as the chemical structure of genetic codes. Secondly, the digits of Euler's identity can be considered as an indicator of genetic codes. One result of the common features of both Biochemistry and Mathematical Science was the NCBI blast results, which include both **bony fish** and, in particular [8]. Zebra fish are an excellent favorite sample used in many studies related to Biochemistry and genetics [4]. Another NCBI blast result of Euler's identity is **Timema** which is well known by asexual reproduction [13]. The definition of a *hyper-complex number* by Kantor and Solodovnikov (1989) is given as elements of a finite-dimensional algebra over real numbers generated by a real number coefficients $\{-1, 0, +1\}$ [2]. So, one of the result of hyper-complex numbers is $\{-1\}$ can be the meaning of "REVERSE" as regarding to the imaginary unit. From this perspective, NCBI Blast result of the Euler's equation is "AAAGGUCCGUUAAUAAGUAAAUUUAGGU". In the Universal Genetic Code Table [15], the "stop" codon (UAA) can be explained twice in this gene sequence in the opposite form (AAU). Another reason of this reverse reading can be stem from, gene expression, RNA polymerase can only read the DNA strand in the 3' to 5' direction and synthesizes the DNA strand in the 5' to 3' direction [17]. In sum, in this article, when the Euler's equation is analyzed in terms of genetic codes with the "Quantum Perspective Model", correlated results are obtained. These results have revealed new clues in filling the gaps between sciences and especially between Mathematics and Biochemistry.

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The figures

$$e^{i\pi}$$

Figure 1: The Euler's identity.

blast.ncbi.nlm.nih.gov/Blast.cgi								
Solanum pennellii chromosome ch12, complete genome	Solanum pennellii	38.2	726	63%	10	100.00%	83305730	HG975451.1
Clostridium saccharobutylicum DSM 13864, complete genome	Clostridium sac...	38.2	38.2	63%	10	100.00%	5107814	CP006721.1
Candidatus Endolissoclinum faulkneri L2, complete genome	Candidatus End...	38.2	38.2	63%	10	100.00%	1481191	CP003539.1
Secondary endosymbiont of Heteropsylla cubana isolate Hcub_S chromosome, complete genome	secondary endo...	38.2	38.2	63%	10	100.00%	1121596	CP003547.1
Peptoniphilus harei strain FDAARGOS_1012 chromosome	Peptoniphilus h...	38.2	38.2	63%	10	100.00%	1791970	CP066287.1
4_Tbi_b3v08	Timema bartmani	38.2	38.2	63%	10	100.00%	411198	QD564470.1
1_Tps_b3v08	Timema poppe...	38.2	38.2	63%	10	100.00%	117750	OD001446.1
4_Tbi_b3v08	Timema bartmani	38.2	38.2	63%	10	100.00%	144639	QD565974.1
3_Tce_b3v08	Timema cristinae	38.2	38.2	63%	10	100.00%	1398624	QC316483.1
4_Tte_b3v08	Timema tahoe	38.2	38.2	63%	10	100.00%	136203	QE002103.1
4_Tte_b3v08	Timema tahoe	38.2	38.2	63%	10	100.00%	229159	QE000838.1
2_Tsi_b3v08	Timema shepardii	38.2	38.2	63%	10	100.00%	182818	QC001199.1
1_Tdi_b3v08	Timema douglasi	38.2	38.2	63%	10	100.00%	360562	QA564485.1
1_Tdi_b3v08	Timema douglasi	38.2	38.2	63%	10	100.00%	443415	QA564377.1
Solanum tuberosum cultivar Solyntus chromosome 1	Solanum tubero...	38.2	106	80%	10	95.65%	59557243	CP055234.1
Danio rerio genome assembly, chromosome: 13	Danio rerio	38.2	402	76%	10	100.00%	52957805	LR812050.1
Danio rerio genome assembly, chromosome: 13	Danio rerio	38.2	335	73%	10	100.00%	52210330	LR812606.1
Danio rerio strain Nadia (NA) genome assembly, chromosome: 13	Danio rerio	38.2	368	76%	10	100.00%	54512446	LR812581.1
Danio rerio strain Cooch Behar (CB) genome assembly, chromosome: 13	Danio rerio	38.2	305	73%	10	100.00%	52525257	LR812556.1
Danio aesculapii genome assembly, chromosome: 3	Danio aesculapii	38.2	271	66%	10	100.00%	62918972	LR812517.1
Tetragenococcus halophilus NBRC 12172 DNA, complete genome	Tetragenococcu...	38.2	38.2	63%	10	100.00%	2562720	AP012046.1
Cyanosche sp. PCC 7822 plasmid Cy782206, complete sequence	Gloeosche verr...	38.2	38.2	63%	10	100.00%	13777	CP002204.1
Solanum tuberosum cultivar MSH/14-112 chromosome 5	Solanum tubero...	32.2	64.4	60%	642	100.00%	52062733	CP046698.1

Figure 2: The NCBI (National Biotechnology Information Center) Result for Nucleotide Sequence
“AAAGGUCCGUUAAUAAGUAAAUUUAGGU” [13].

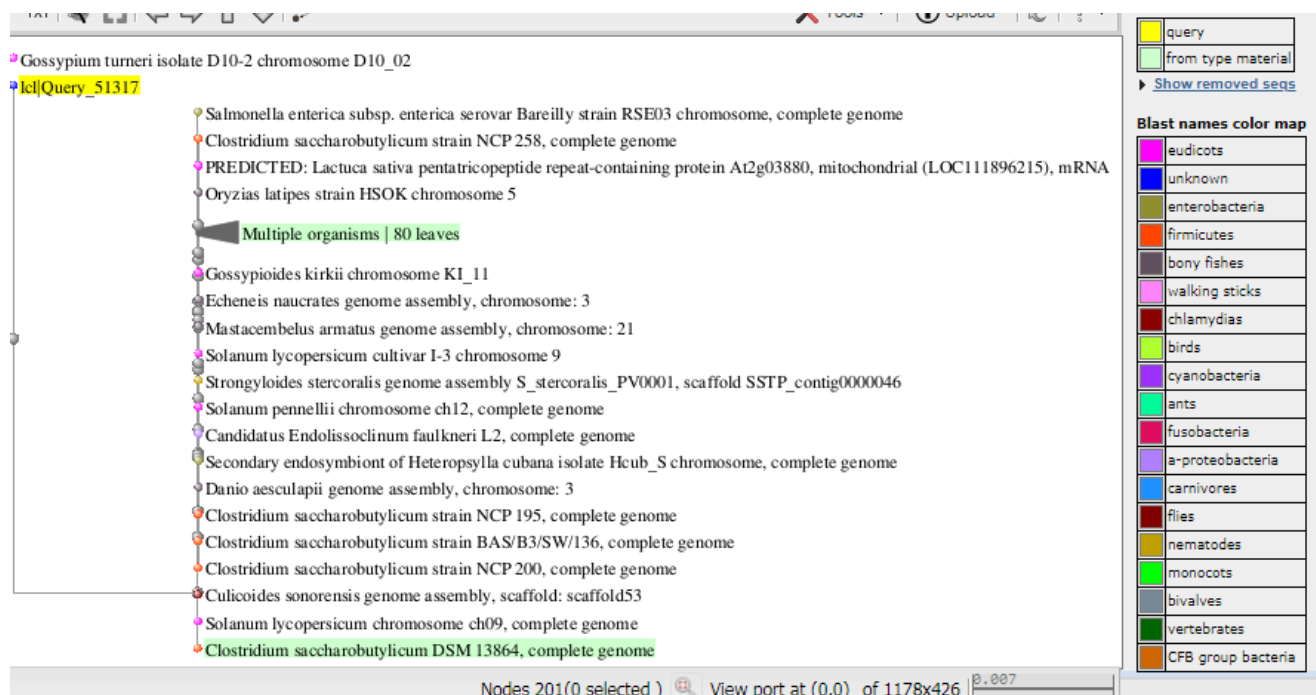


Figure 3: The NCBI (National Biotechnology Information Center) Result Blast Tree View Widget for
“AAAGGUCCGUUAAUAAGUAAAUUUAGGU” Nucleotide Sequence [13].