Open Access Library Journal
2023, Volume 10, e9732
ISSN Online: 2333-9721
ISSN Print: 2333-9705

What Is the Relationship between the Faraday's Constant Numbers and Silk Worms as Regards to Quantum Perspective Model?

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How to cite this paper: Ölmez, T. (2023) What Is the Relationship between the Faraday's Constant Numbers and Silk Worms as Regards to Quantum Perspective Model? *Open Access Library Journal*, **10**: e9732.
https://doi.org/10.4236/oalib.1109732

Received: January 5, 2023
Accepted: February 19, 2023
Published: February 22, 2023

Abstract

This paper attempts to express the Faraday's constant numbers with chemical nucleotide bases **(A T, G, C and U)** as regards to Quantum Perspective Model. At first, the exact value of the Faraday's constant numbers after the comma is lined up in doublets (0, **96 48 53 32 12 33 10 01 84** × 10^5 C·mol^{-1}). Secondly, convert this twin decimal base numbers to binary number base system. Thirdly, after converting process of these numbers, convert this binary numbers as decimal number base system again. Fourthly, sum this decimal base numbers respectively. Fifthly, total sum of the adding processes corresponds to genetic codes [**Adenine (A), Thymine (T), Guanine (G), Cytosine (C) and Uracil (U)**]. Sixthly, approximately the consequence of this conversion corresponds to **Uracil (U) and Guanine (G)** nucleotide bases. Namely, the number "64" equals to **Uracil (U)** nucleotide base and proximate the number "79" equals to **Guanine (G)** nucleotide base. Seventhly, after converting [**Uracil (U) and Guanine (G)]** nucleotide bases to ["***AG***" **Adenine (A) and Guanine (G)**], this result is significant not only with the link between the Faraday's constant numbers in Electrochemistry, but also the link between dual positions of Superposition in Quantum Physics. Eighthly, after searching ["***AG***" **Adenine (A) and Guanine (G)**] sequences in the **NCBI** (**The National Center for Biotechnology Information**) database, the NCBI search result was similar to silk worm (***Bombyx Mori***) gene sequence "AGAAAAAGGA". They are very interesting specific model organisms for the genetics of silkworms with this sequence and the possibility of genetic engineering for the Silk Cocoon Membrane (SCM). Ninthly, this complex natural protein fibrous membrane is of great interest in the research community due to its possibility of having good electrical conductivity properties. Finally, this article revealed not only the relationship between Faraday's constant numbers and nucleotide bases, but also electricity, the common relationship between NCBI database search "Bombyx Mori" and Faraday's constant numbers. As a result, the expression of Faraday constants with genetic codes reaches meaningful results that will shed light on the Quantum Perspective Model, which is a new research method among Quantum Physics, Biology and Electrochemistry and Mathematics.

Subject Areas

Electrochemistry, Mathematics, Quantum Physics

Keywords

Biology, Mathematics, Electrochemistry, Nucleotide Bases, Quantum Physics, Binary Number Base System, Electricity, Quantum Perspective Model, Faraday's Constant Numbers, Silk Cocoon Membrane (SCM), NCBI and Silk Worm (Bombyx Mori)

1. Introduction

Prior to this article the relations between some constant numbers and genetic codes were researched by K. Köklü [1] and T. Ölmez [2]. At first, the velocity of light numbers was published by K. Köklü [1]. Secondly, the relations between Planck's numbers and genetic codes were revealed by T. Ölmez [3]. Thirdly, relations between basic atomic weight of particles (proton, neutron and electron) and nucleotide bases were put forth by T. Ölmez [4]. Fourthly, the relations between Bohr Magneton and Boltzmann constants and nucleotide bases were researched by T. Ölmez again [5]. Lastly, the relations between the Faraday's constant and nucleotide bases and silkworm will be explained in this article on next pages. **Silkworm** metamorphosis is governed by intrinsic and extrinsic factors. One of the internal factors is transient electrical firing of neurosecretory cells of the dormant pupa living in the **Silk Cocoon Membrane (SCM).** External factors are environmental factors such as temperature, humidity and light. The conversion from light to electricity is more pronounced with **ultraviolet (UV).** An UV-sensitive fluorescent quercetin derivative was discovered on SCM. The SCM and pupal body surface may be responsible for generating the observed photocurrent. The firing pattern of cells is a function of environmental factors that ultimately control the pupa. Based on these results, an equivalent circuit model of a SCM with a general electrical output is proposed. More research on electrical energy conversion and its use for consumable electricity may be needed to make sense of this result [6] Silk cocoon membrane (SCM) is an insect-engineered structure. Electrical properties were examined in two Ways: mulberry (Bombyx mori) [7] and non-mulberry (Tussar, Antheraea mylitta) SCM. When dry, the SCM acts as an insulator. When absorbing moisture, it produces electric current, which is modulated by temperature. The current flowing through the SCM is probably ionic and protonic in nature. The features of SCM have been leveraged to develop simple energy-harvesting devices that can operate electronically with low power from electricity. Based on these findings, depending on the temperature and humidity, the electrical properties can be used in battery technology, bio-sensor, humidity sensor, steam applications and waste heat management [8]. Silk Cocoon Membrane (SCM), a complex natural protein fibrous membrane, is gaining significant attention in the textile industry, biomedical industry and research community due to its outstanding properties and ecological friendliness and the possibility of good electrical conductivity properties. However, few toxicological studies have shown that they are potentially revealed that it has some harmful effects on human health and the environment. Analysis of the thermal electrical properties of SCM fed with different silver nanoparticles under different temperature and humidity conditions revealed that the incorporation of silver nanoparticles into silkworm larvae with a traditional functionalization approach can result in an increase in ***electricity production*** by the silk cocoon. Therefore, successful generation of silver nanoparticle cocoons via in vivo feeding is expected to open up possibilities for large-scale production of ***electric iron*** with silk cocoon membrane [9]. As a result, this article attempts to elucidate the relationships between Faraday's constant numbers and chemical nucleotide bases and silkworms.

2. Methods

The representation of nucleotide bases (AT, G, C, and U) according to the Quantum Perspective Model is explained by chemical formulas. Regarding these chemical formulas, it was calculated according to the atomic masses of the elements. However, this article aims to investigate the relationship between Faraday constant numbers and nucleotide bases. In summary, the purpose of this research article is to explore the relationships between atomic weights, number base systems, and chemical formulas of nucleotide bases of elementary atomic particles.

The chemical structures of nucleotide bases consist of **Carbon(C), Nitrogen (N), Oxygen (O) and Hydrogen (H)** [10]. For the representation of **nucleotide bases (A, T, C, G and U)** in chemical atoms (**Table 1**).

Table 1. The 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	58
GUANINE: $C_5H_5N_5O_1$	5	5	1	5	78
URACIL : $C_5H_4N_2O_2$	5	4	2	2	64

The Calculation of the Faraday's Constant Numbers as Nucleotide Bases

The Faraday constant has the exactly defined value given by the product of the elementary charge e and Avogadro constant N_A:

The value of the Faraday's constant numbers is

$$\begin{aligned} F &= e \times N_A \\ &= 1.602176634 \times 10^{-19}\ \text{C} \times 6.02214076 \times 10^{23}\ \text{mol}^{-1} \\ &= 9.64853321233100184 \times 10^{4}\ \text{C} \cdot \text{mol}^{-1} \\ &= 0.\mathbf{964853321233100184} \times 10^{5}\ \text{C} \cdot \text{mol}^{-1} \end{aligned} . [11].$$

At first, Please take the Faraday's constant numbers numbers after comma (0, **96 48 53 32 12 33 10 01 84**). Secondly, convert this decimal numbers to binary number base. Please, See Table 2. Thirdly, after writing this binary numbers one by one, convert this binary numbers to decimal numbers again partially. For instance [(96: 1 100000; 48: 1 10000; 53: 1101 01; 32: 100000; 12: 1 100; 33: 10000 1; 10: 1010; 01: 1 and 84: 1010 100)]. Fourthly, sum the partial numbers respectively. For instance [(96 = **1** + 32 **= 33**); (48 = 1 + 16 = **17**); (53 = 13 + 1 = **14**) and (32 = **32**); (12 = 1 + 4 = **5**); (33 = 16 + 1 **= 17**); (10 = **10**); (01 = **1**) and (84 = 10 + 4 = **14**)]. Fifthly, add the total partial decimal numbers, respectively (33 + 17 + 14 = **64 Uracil** "**U**" and 32 + 5 + 17 + 10 + 1 + 14 = **79 Guanine (G)**. Lastly, see Table 2 for the equivalents of this numbers. Finally, the consequence of this numbers is "**UG**" (**Uracil and Guanine**).

In sum, as regards to Quantum Perspective Model, after the expression of Faraday's constant numbers as nucleotide bases, some important consequences were reached by this article. This result will be put forth in next pages.

3. Results and Discussion

3.1. Results

According to Quantum Perspective Model, prior to this article, the relationship between the square of the speed of light (c^2) [2] by K. Köklü and Planck's constant numbers [3], Avogardo's Number [4], the atomic weight of proton [4], the atomic weight of electron [4], the atomic weight of neutron [4], the Boltzmann constant [5] The Bohr magneton constant [5] genetic codes were studied by T. Ölmez (Please, See Table 3). At first, the calculation of the Faraday's constant numbers as nucleotide bases also can be expressed with **Uracil (U) and Guanine (G)** nucleotide bases. Secondly, the conversion of RNA nucleotide bases to DNA nucleotide bases enables the conversion of [Uracil (**U**) and Guanine (G)] nucleotide bases ["AG" Adenine (**A**) and Guanine (G)] to nucleotide

Table 2. Representation of decimal numbers in binary base for the value of Faraday's constant numbers numbers after comma.

DECIMAL NUMBERS	1	4	10	12	13	16	32	33	48	53	84	96
BINARY NUMBERS	***1***	***100***	***1010***	***1100***	***1101***	***10,000***	***100,000***	***100,001***	***110,000***	***110,101***	***1,010,100***	***1,100,000***

Table 3. The summary of some constant numbers and nucleotide bases.

SOME CONSTANT NUMBERS	NUCLEOTIDE BASES
The square of the speed of light (c^2) [2]	AUC or CCATAUUTU/CCACAUUTU
Planck's constant numbers [3]	Adenine (A) or Thymine (T)
Avogardo's Number [4]	**Uracil (U)**
The atomic weight of proton [4]	Guanine (G)
The atomic weight of electron [4]	Uracil (U)
The atomic weight of neutron [4]	Adenine (A) or Thymine (T)
The Boltzmann constant [5]	Guanine (G)
The Bohr magneton constant [5]	Thymine (T)
The Faraday's constant numbers	**Uracil (U) and Guanine (G) "UG"** OR **Adenine (A) and Guanine (G) "AG"**

bases. Thirdly, after searching this sequence at **NCBI** (**The National Center for Biotechnology Information)** database, the consequences are many living organisms. Fourthly, these are eukaryota. bilateria, obtectomera, galleria mellonella, murinae, mus musculus, rattus norvegicus, vigna angularis and in particularly ***bombyx mori*** [7] (**Figures 1-5**). Finally, could this relationship be a sign of relationships between Biology, Quantum Physics and some constant numbers?

3.2. Discussion

According to Quantum Perspective Model, prior to this article, the relationship between Planck's constant numbers [3] and genetic codes were studied by T. Ölmez. The consequence of this article can be expression of Planck's constant numbers as both **Adenine (A) and Thymine (T)** nucleotide bases. Previously, this twin result may be explained by ***Quantum Superposition***. But also the link between some irrational numbers and genetic codes were researched by Tahir Ölmez, too (**Table 4**). Not only the NCBI database results of some irrational numbers (√2, √3, √5, √7, √10, Pi, Euler's and golden ratio numbers) are bony fishes, but also the NCBI database result of the Faraday's constant numbers are ***silk worms***. While calculating Faraday's constant numbers as nucleotide sequences, Guanine (G) has calculated as "**79**" though it is "78" (Please, See **Table 1**). The deviance of one "**1**" number can be stemmed from hydrogen bonds (Remember, **Guanine (G) and Cytosine (C)** pairs with ***three*** (***3***) hydrogen bonds). Calculation of Faraday constants as nucleotide bases can be expressed in terms of nucleotide bases **Uracil (U) and Guanine (G)** or nucleotide bases **Adenine (A) and Guanine (G)** [12]. In addition, the common feature of Faraday constants and nucleotide sequences is electricity**.** Because, as Faraday constant numbers are related to electricity, "Bombyx mori", one of the silkworm species, can also generate electricity [6].

Table 4. The summary of some irrational numbers and nucleotide bases.

Irrational Numbers	Nucleotide Bases
√2 [13]	GGATGTUTATTGAGTGAUAA
√3 [14]	GGATGAUTAUGGGTTTAGAAA
√5 [15]	ATTTATTUAATAUATAAUUUUATTGA
√7 [16]	GATTCUUUACTAGAGTTACTAGTTTGATT
√10 [17]	ATAAGTCATAAGTGTATTAGTTTAAAACTG
Pi Numbers (as a 22/7) [2]	CTA [Cytosine (C), Thymine (T), Adenine (A)]
Pi Numbers (as an extended form) [18]	TUGATTATAUTGGTTGGTTGTTAAUGGTAU
Euler's Identity [19]	AAAGGCUUGCCCAACAAGCCAAACCCAGGC
Euler's Numbers [20]	ACGCCGACACTAACUATU
Golden Ratio Numbers (only "618") [21]	CAAT Box "GGCCAATCT"; TATA Box "TATAAAA"
Golden Ratio Numbers (Extended form) [22]	ACATCC

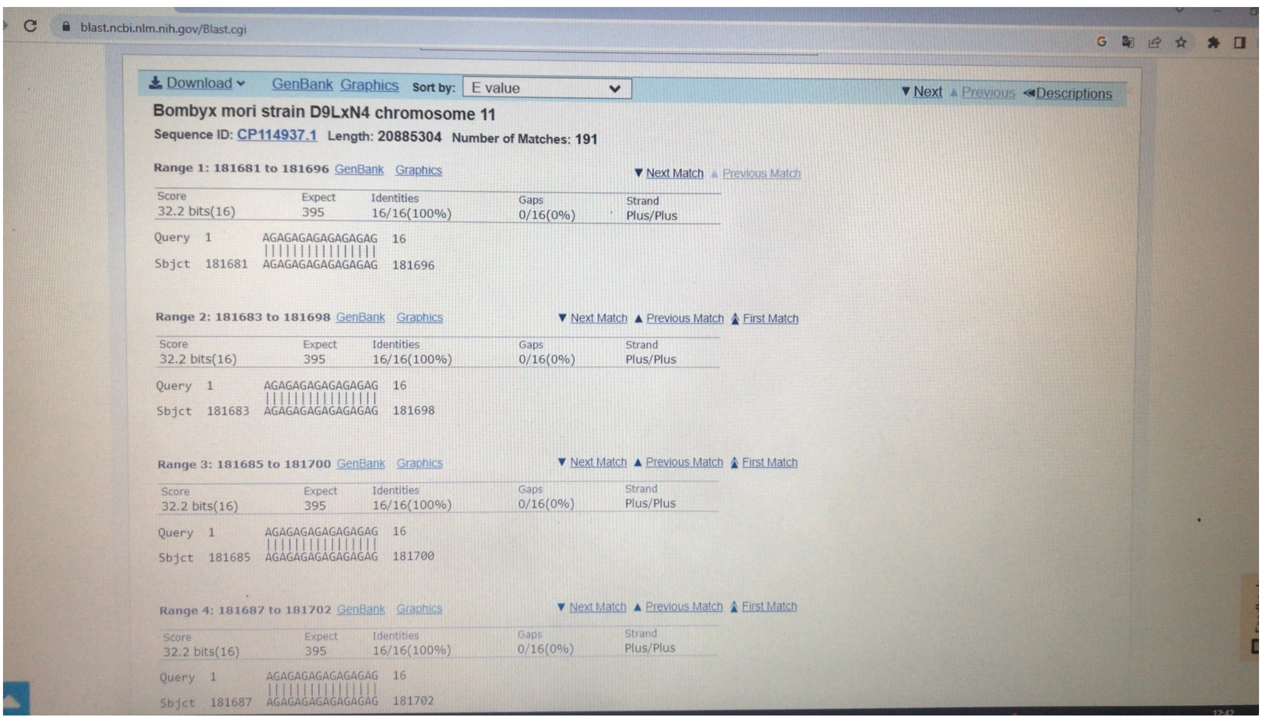

Figure 1. The NCBI blast result "AGAGAGAGAGAGAGAG" of nucleotide bases for Bombyx Mori [24].

Figure 2. The NCBI gene bank for "Bombyx Mori" [24].

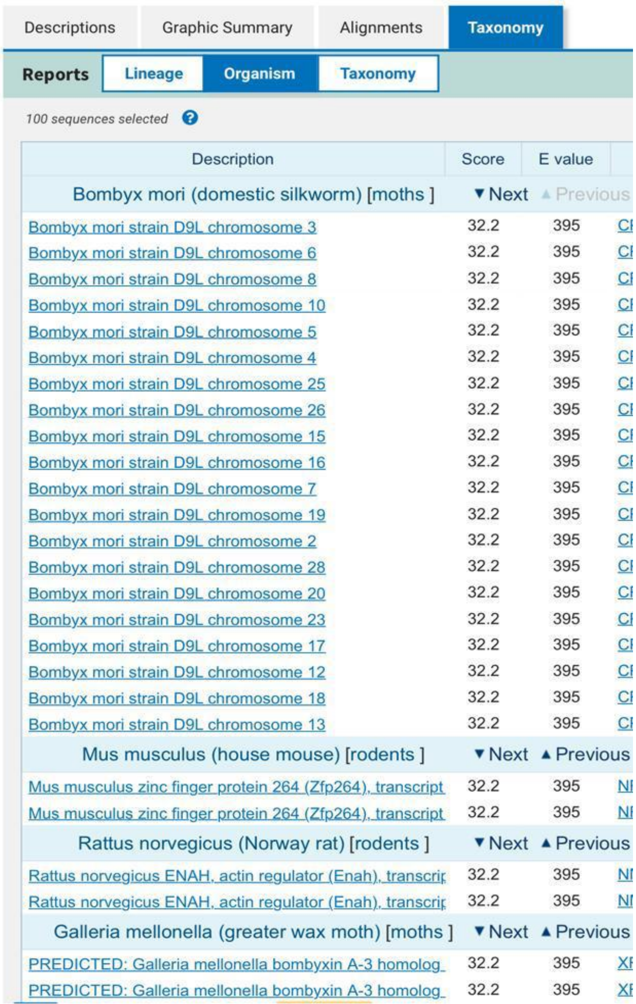

Figure 3. The NCBI taxonomy organism gene search result for "Bombyx Mori" [24].

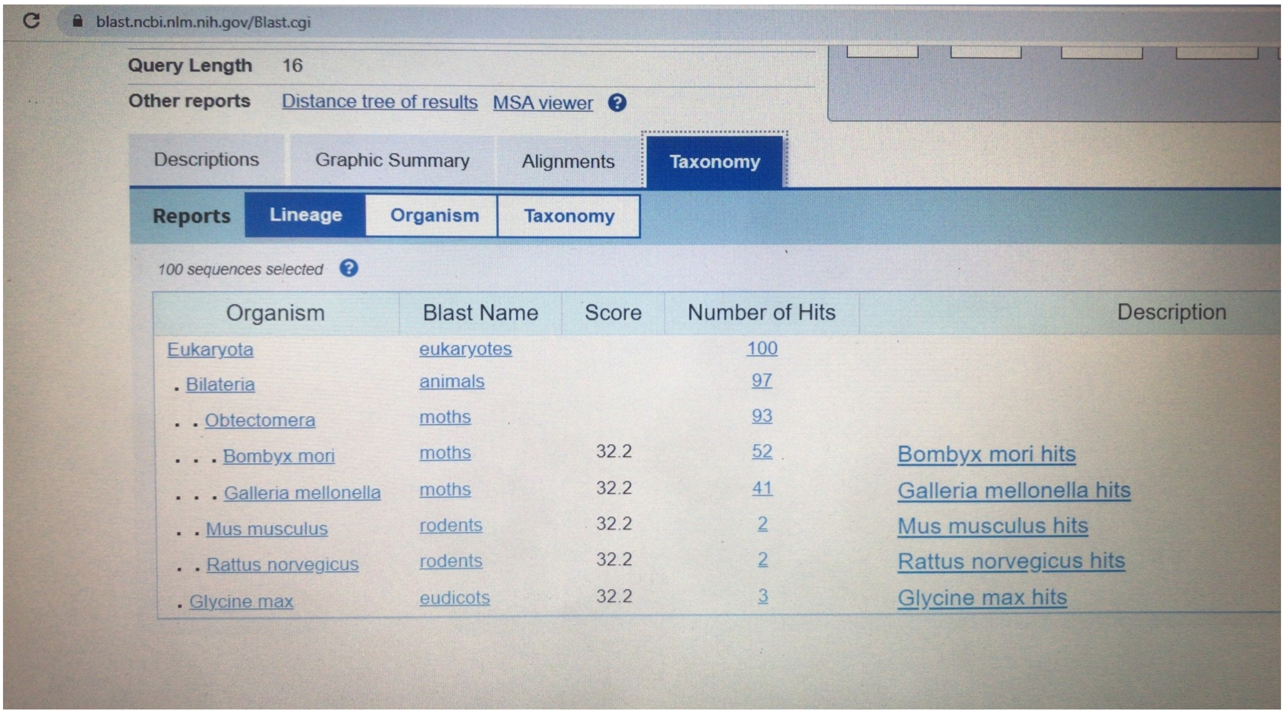

Figure 4. The NCBI gene search result for "Bombyx Mori" [24].

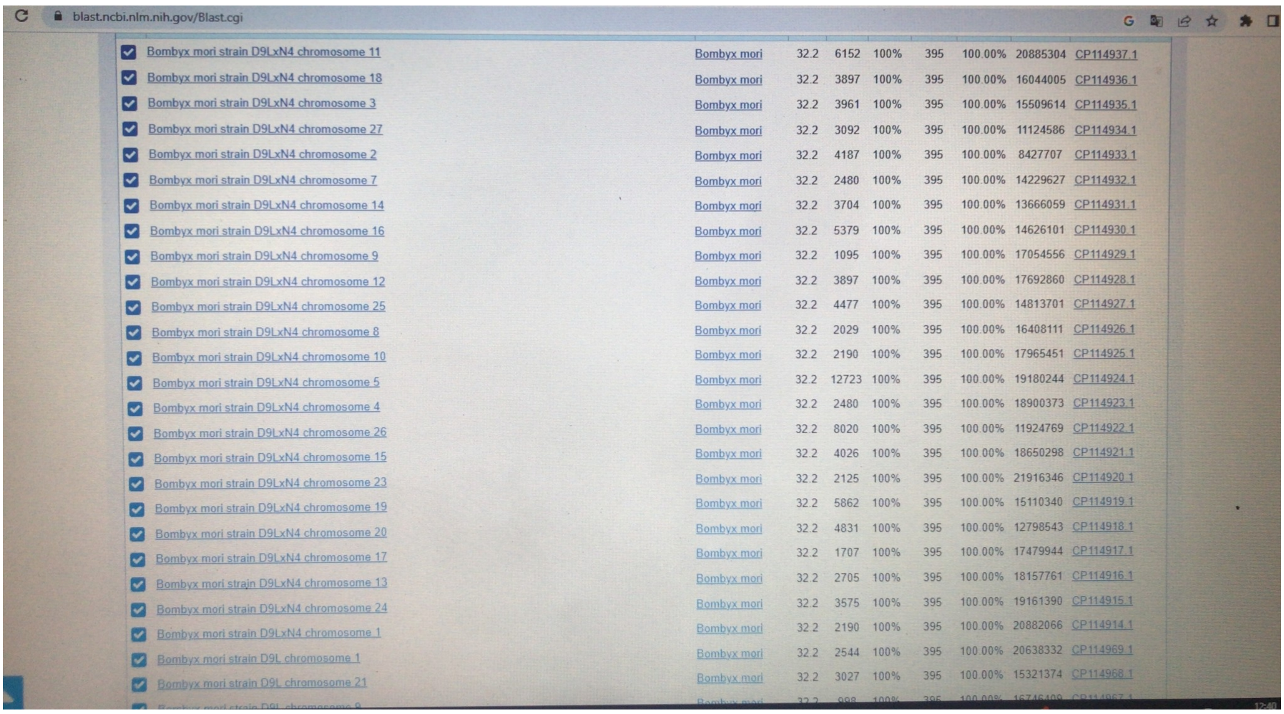

Figure 5. The NCBI gene search result for "Bombyx Mori" [24].

4. Conclusions

Before this article, reference can be made to classical and **Continuously Variable (CV)** quantum neural network hybrid multiple classifiers based on the binary classifier architecture proposed in "Continuously variable quantum neural networks" [23]. Contrary to the original assumption that quantum computers will replace the classics in computers, **Quantum Processing Units** (**QPU**s) are emerging as task-specific special-purpose processing units very similar to Graphics Processing Units. The currently available QPUs are called near-term quantum devices because they are not yet fully fault-tolerant and are characterized by shallow and short quantum circuits. However, the availability of these devices allows for active research especially about quantum algorithms peculiar to them in **Quantum Chemistry**, graph optimization and *quantum machine learning*. QPUs are based on ***two different theoretical models*** of quantum computing: the discrete variable (qubit-based) model and the continuous variable model. The discrete variable model is an extension of the computational space. From ***{0, 1}*** to a computationally complex two-dimensional space ***{0, 1}***. Implementing machine learning algorithms on quantum computers is an active area of research. **Quantum machine learning algorithms** can be implemented in variable quantum circuits with parameterized quantum gates. A quantum circuit is a collection of quantum gates, and the state change induced by the circuit of the initial quantum state is considered quantum computation. **Machine learning** is a way to extract hidden patterns by learning from a data. The best-fit set of parameters for most closely matched ***mathematical*** expression data. The mathematical expression used for pattern extraction is called ***machine learning algorithm***. With short-term devices available in the cloud, it is now possible to execute quantum machine learning (QML) algorithms on quantum computers or simulators. When applying classical to quantum machine learning algorithms, The CV model offers many advantages over the qubit-based quantum model. The computational state space of a qumode in the CV model is infinitely dimensional. In the qubit-based model, it is ***only 2-dimensional*** and it is ability to identify the size of the CV quantum computing space in approaching the original infinite space gives users additional freedom and flexibility in experiments and quantum algorithms. In sum, in this paper, classical and CV quantum hybrid classifiers using different numbers of qumodes and shear cutoff dimensions are researched. The contributions of this article, successfully implements a quantum neural network classifier with more than two classes. Currently available quantum neural network architectures can ***only be classified into up to two classes*** *[23]*. Furthermore, in our paper, it has been revealed that the binary result of the nucleotide bases of Faraday's constant numbers can be explained not only by the gene sequences "**AG**" [Adenine (A) and Guanine (G)], but also by the gene sequences "**UG**" [Uracil (U)] and Guanine (G)] [23].

This paper tries to shed lights on the relationships between some constant numbers (Please, See **Table 3**) just like the Faraday's constant numbers and nucleotide bases [Adenine (A), Thymine (T) Guanine (G), Cytosine (C) and Uracil (U)]. According to Quantum Perspective Model, the chemical formulas of nucleotide bases [Adenine (A), Thymine (T) Guanine (G), Cytosine (C) and Uracil (U)] consist of Carbon(C), Nitrogen (N), Oxygen (O) and Hydrogen (H).

At first, the first six calculation of the Faraday's constant numbers value **"64"** are defined as **Uracil (U)** and the second twelve calculation of the Faraday's constant numbers value **"79"** are defined as **Guanine (G)** nucleotide base. Secondly, after the RNA nucleotide bases "Uracil (U) and Guanine (G)" are converted to DNA nucleotide bases "Adenine (A) and Guanine (G)", the result gains remarkable importance in the NCBI database [24] (National Center for Biotechnology Information). Thirdly, one of these NCBI key search results can be identified with the silkworm "Bombyx mori" (**Figures 1-5**).

Owing to its small size and ease of culture, the **silkworm** has become a model organism in the study of lepidopteran and arthropod biology. Basic findings about pheromones, hormones, brain structures and physiology were obtained with ***silkworm***. Many research studies have focused on the genetics of *silkworms* and the possibility of genetic engineering. Researchers at Tufts have developed scaffolds made of spongy silk that look and feel like human tissue. They are implanted during reconstructive surgery to support or reconstruct damaged ligaments, tendons, and other tissues. They also created implants made of silk and drug compounds that could be implanted under the skin for a steady and gradual release of the drug. Silkworms have been used in antibiotic discovery as they have many advantageous properties compared to other invertebrate models. Some important antibiotics were discovered by using **silkworms**. In addition, antibiotics with appropriate pharmacokinetic parameters that correlate with therapeutic activity in the silkworm infection model were selected. Silkworms have also been used to identify novel virulence factors of pathogenic microorganisms [7].

Fourthly, *Genetic engineering* has been utilised to produce a range of **silk** based biomaterials capable of promoting mineralisation to aid bone regeneration [25]. Besides, with this sequence and the possibility of genetic engineering for Silk Cocoon Membrane (SCM), silk worms are very important model organisms for the genetics. Fifthly, **Silk Cocoon Membrane (SCM)** may have good electrical conductivity potential [25]. Even, ***Spider silk*** inspired domain "(SGRGGLGGQG ***AGAAAAAGGA*** GQGGYGGGLGSQGT) 15" acted as an organic scaffold to control material stability. (Remember, while researching the Faraday's Constant, we will find repeated sequence "**UG**"! You can still see the "**AG**" gene sequence while converting the "UG" gene sequence to the **"AG" gene sequence**!) [25] [26]. Sixthly, as for the relationships between Avogardo Numbers [4] and Faraday constant numbers, it can also be determined with the same nucleotide base result as "**Uracil(U)**". Namely, the first result of "UG", which is Faraday's constant numbers, does not only consist of "**Uracil(U)**", but also the expression of Avogardo Numbers consists of "**Uracil(U)**". Let alone previous explanations, the only nucleotide base that makes the difference between DNA and RNA is "Uracil(U)". Seventhly, this paper revealed not only the relationship between Faraday's constant numbers and nucleotide bases, but also ***electricity***, the common relationship between "Bombyx Mori" and Faraday's constant numbers in the NCBI database search. Eighthly, not only are some constant numbers related to genetic codes, but also some irrational numbers and the Fibonacci sequence [27] are also related to genetic codes (**Table 3** and **Table 4**). As a result, the expression of Faraday constants with genetic codes reaches meaningful results that will shed light on the Quantum Perspective Model. In fact, whether there is a relationship between the Faraday cage and the silkworm cocoon may be a subject of further research. In sum, Can these results shed light on the inter-scientific relationships between Quantum Physics, Biology and Electrochemistry, and Mathematics?

Conflicts of Interest

The author declares no conflicts of interest.

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