Quantum Model for Remote Replication

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Abstract

A model for remote replication of DNA is proposed. The motivating experimental discoveries are phantom DNA, the evidence for remote gene activation by scattered laser light from similar genome, and the recent findings of Montagnier's and Gariaev's groups suggesting remote DNA replication.

Phantom DNA is identified as dark nucleon sequences predicted by quantum TGD with dark nucleons defining naturally the analogs of DNA, RNA, tRNA, and amino-acids and realization of vertebrate genetic code. The notion of magnetic body defining a hierarchy of flux quanta realize as flux tubes connecting DNA nucleotides contained inside flux tubes connecting DNA codons and a condensed at flux sheets connecting DNA strands is an essential element of the model. Dark photons with large value of Planck constant coming as integer multiple of ordinary Planck constant propagate along flux quanta connecting biomolecules: this realizes the idea about wave DNA. Biomolecules act as quantum antennas and those with common antenna frequencies interact resonantly.

Biomolecules interacting strongly - in particular DNA nucleotides- would be characterized by same frequency. An additional coding is needed to distinguish between nucleotides: in the model for DNA as topological quantum computer quarks (u,d) and their antiquarks would code for the nucleotides A,T,C, and G would take care of this. The proposed role of quarks in biophysics of course makes sense only if one accepts the new physics predicted by quantum TGD. DNA codons (nucleotide triplets) would be coded by different frequencies which correspond to different values of Planck constant for photons with same photon energy propagating along corresponding flux tubes. This allows to interpret the previously proposed TGD based realization of so called divisor code proposed by Khrennikov and Nilsson in terms of quantum antenna mechanism. Years later from this proposal a much more detailed mode emerged leading to a formula for $h_{eff} = n \times h$ making h_{eff} proportional to the mass (number) of the charged particle involved. This predicts universal energy spectrum for dark photons in the range of visible and UV photons. Dark photons can transform to ordinary ones in energy conserving manner and the outcome is identified as biophotons.

In this framework the remote replication of DNA could be understood. DNA nucleotides interact resonantly with DNA strand and attach to the ends of the flux tubes emerging from DNA strand and organized on 2-D flux sheets. In Montagnier's experiment the interaction between test tubes A and B would be mediated by dark photons between DNA and dark nucleon sequences and amplify the dark photon beam, which in turn would induce remote replication. In the experiment of Gariaev scattered laser light would help to achieve the same purpose. Dark nucleon sequences would be generated in Montagnier's experiment by the homeopathic treatment of the test tube B.

Dark nucleon sequences could characterize the magnetic body of any polar molecule in water and give it a "name" written in terms of genetic codons so that genetic code would be much more general than usually thought. The dark nucleon sequence would be most naturally assigned with the hydrogen bonds between the molecule and the surrounding ordered water being perhaps generated when this layer of ordered water melts as the molecule becomes biologically active. Water memory and the basic mechanism of homeopathy would be due to the "dropping" of the magnetic bodies of polar molecules as the water is treated homeopathically and the dark nucleon sequences could define an independent life form evolving during the sequence of repeated dilutions and mechanical agitations taking the role environmental catastrophes as driving force of evolution. The association of DNA, RNA and amino-acid sequences associated with the corresponding dark nucleon sequences would be automatic since also also they are polar molecules surrounded by ordered water layers.

The transcription of the dark nucleon sequences associated the with the polar invader molecule to ordinary DNA sequences in turn coding of proteins attaching to the invader molecules by the quantum antenna mechanism could define the basic mechanism for functioning and evolution of the immune system.

1 Introduction

The idea about remote replication, transcription and translation of genes in terms of electromagnetic field patterns is very attractive and would be in accordance with the wave DNA vision. This requires a coding of DNA nucleotides. I have proposed several codings of this kind.

1. In DNA as topological quantum computer model [K2] quark and anti-quark at the ends of a flux tube connecting DNA nucleotide to a lipid of the nuclear or cell membrane takes care

of the coding. Also sequences of dark nucleons giving rise to dark nuclei realize the analogs of DNA, RNA, tRNA, and amino-acids as well as vertebrate genetic code [K8], [K4]. Dark nucleons sequences could correspond to the phantom DNA discovered by Gariaev's group [I3].

2. Quantum antenna hypothesis represents one of the oldest ideas of TGD inspired quantum biology [K6]: molecules would act like quantum antennas. Frequency coding would be very natural for groups of molecules participating in the same reaction: the flux tubes connecting the molecules would carry the radiation inducing resonant antenna interaction and phase transitions reducing Planck constant would bring the reacting molecules near to each other. Magnetic flux tubes connecting the molecules would be essential element of the mechanism. Remote replication would represent an example about a situation in which $\hbar$ changing phase transition does not take place. If one wants coding of individual molecules -such as DNA nucleotides- by frequency in turned coded by the value of $\hbar$ for given photon energy ($E = hf$), one is forced to make ad hoc assumptions and it is difficult to find any plausible scenario. Quantum antenna mechanism could make possible remote replication for which the findings of Montagnier's group as well as remote transcription for which the work of Gariaev's group gives some evidence.

3. One can consider also a coding by field patterns. In fact, the quark and antiquark at the ends of the flux tube generate a color magnetic field coding for the quark pair since the classical color field depends on the color of the quark and its antiquark. Gariaev's group has proposed that the change of polarization direction could provide a possible mechanism of coding of DNA sequences to radiation patterns [I2]. The proposal is discussed from TGD point of view in [K7]. The mechanism changing the polarization direction should reduce to different propagation velocities for the two circular polarizations. The other polarization should act more strongly with the DNA related structures and this should cause the slowing down of propagation since it would correspond to sequence of absorptions and emissions. The constraint that this occurs coherently for DNAs and codes the DNA sequence is very powerful condition. It is however difficult to imagine how this mechanism alone could give rise to remote replication of DNA or similar processes: the coding from radiation pattern to DNA sequences is the bottle neck. Therefore this mechanism will not be discussed in the following.

In the sequel a model for the coding of DNA in terms of radiation patterns is discussed. There are three experimental guidelines: the phantom DNA [I3] identified as dark nucleon sequences in TGD framework and the evidence for remote activation of DNA transcription [I2] - both discovered by Gariaev's group - are assumed as the first two key elements of the model. The remote replication of DNA suggested by the experimental findings of Montagnier's group serves as a further guideline in the development of the model. Also the results of the latest experiment of Gariaev's group in many respects similar to that of Montagnier's experiment but differing in certain crucial aspects from it are used as input.

Polymerase chain reaction (PCR) (see `http://tinyurl.com/ybv6mn5l`) is the technique used in the experiments of Montagnier's group [I1] and later in somewhat modified experiment by Gariaev's group involving irradiation of the second test tube by laser light. DNA polymerase catalyzes the formation of DNA from existing DNA sequences serving as a template. Since the catalytic interaction of DNA polymerase takes place with already existing DNA sequence, the only possibility is that first some conjugate DNA sequences are generated by remote replication after which DNA polymerase uses these sequences as templates to amplify them to original DNA sequences. Whether the product consists of original DNA or its conjugate can be tested.

The model inspires the proposal that the magnetic body of a polar molecule codes for it using dark nucleon sequences assignable to the hydrogen bonds between the molecule and surrounding ordered water layer. Quantum antenna mechanism would allow the immune system to modify itself by developing ordinary DNA coding for amino-acids attaching to and thus "catching" the polar molecule. The mechanism could be behind water memory and homeopathic healing. Every polar molecule in living matter would have dark nucleon sequence or several of them (as in the case of amino-acids) serving as its name. This would also associate unique dark nucleon sequence also with the magnetic body of DNA so that DNA-dark DNA association would be automatic. Same applies to mRNA and tRNA and amino-acids.

The appendix of the book gives a summary about basic concepts of TGD with illustrations. Pdf representation of same files serving as a kind of glossary can be found at `http://tgdtheory.fi/tgdglossary.pdf` [L1].

2 The Findings That One Should Understand

It is good to start by summarizing the experimental findings that the model should explain.

1. One should be able to identify phantom DNA [I3]. This identification explains the findings about phantom DNA if ordinary and dark DNA have common resonance frequencies and therefore behave like resonantly interacting quantum antennae.

2. The earlier findings of Gariaev's group suggesting remote gene expression [I2], which becomes also possible if the DNAs of the sender can activate the DNA of the receiver by radiation. Direct activation could be based on electromagnetic signal between DNA of the sender and ordinary conjugate DNA of the receiver. Scattering from ordinary and possibly also phantom DNA and would generate this kind of signal. The challenge is to explain why the activation obeys genetic code in the sense that a given DNA sequence activates only similar DNA sequence.

3. The claim of Montagnier's team [I4, I5] is that the radiation generated by DNA affects water in such a manner that it behaves as if it contained the actual DNA. A brief summary of experiment of Montagnier and collaborators is in order.

   (a) Two test tubes containing 100 bases long DNA fragments were studied. Both tubes were subjected to 7 Hz electromagnetic radiation. Earth's magnetic field was eliminated to prevent its possible interference (the cyclotron frequencies of Earth's magnetic field are in EEG range and one of the family secrets of biology and neuroscience since seventies is that cyclotron frequencies in magnetic fields have biological effects on vertebrate brain). The frequencies around 7 Hz correspond to cyclotron frequencies of some biologically important ions in the endogenous magnetic field of.2 Tesla explaining the findings. This field is 2/5 of the nominal value of the Earth's magnetic field.

   (b) What makes the situation so irritating for skeptics who have been laughing for decades for homeopathy and water memory is that the repeated dilution process used for the homeopathic remedies was applied to DNA in the recent case. The solution containing no detectable amounts DNA (dilution factor was 10^{-12}) was placed in second test tube whereas the first test tube contained 100 bases long DNA in the original concentration.

   (c) After 16 to 18 hours both tubes were subjected to polymerase chain reaction (PCR), which builds DNA from its basic building bricks using DNA polymerase enzyme. What is so irritating from the point of view of skeptic was that DNA was generated also in the test tube containing the highly diluted water. Water in presence of second test tube seems to be able to cheat the polymerase by mimicking the presence of the actual DNA serving in the usual situation as a template for builing copies of DNA. One could also speak about the analog quantum teleportation. Note that the presence of both test tubes - and therefore some kind of communication between the samples - is absolutely esential for the process to take place: repeated dilution is not enough.

4. Peter Gariaev's team has carried out an analogous experiment recently in which one has two test tubes containing water. Tube A contained DNA fragments and tube B contained only water and DNA nucleotides plus DNA polymerase - just as as in Montagnier's experiment. The analog of the homeopathic procedure was not however applied to tube B. The experiments use a drop of DNA in water in gamma concentration in tube A. This DNA (with length of 600 base pairs) was scanned by laser radiation from helium-neon laser. The scattered radiation having a wide spectrum of frequencies down to kHz frequencies was applied on tube B at distance of 3 m in refrigerator (+4 Celsius) containing distilled water solution of DNA nucleotides and DNA polymerase inducing polymer chain reaction PCR amplifying DNA template if present. The generation of DNA sequences in tube B with the same mass

distribution as in tube A by polymer chain reaction (PCR) is observed suggesting that the necessary DNA template is generated as a direct copy or conjugate of the original in test tube A by some unknown mechanism. Nucleotide sequences have not been analyzed to see whether they are identical or conjugates of those in tube A.

3 The Model Of Remote Replication Consistent With DNA As Topological Quantum Computer Model

The basic assumptions are that the scattered radiation, the flux tubes of the magnetic body of DNA along which the radiation propagates, and quarks and antiquarks at the ends of the flux tubes from system able to serve as a template for the formation of conjugate of ordinary DNA. To understand how remote remote replication could take place, some further assumptions are necessary.

1. The flux tubes emanating from DNA are parallel and condensed at 2-D flux sheet having DNA at is first boundary so that DNA nucleotides can attach to the flux tubes at the second boundary. The attached nucleotides would be along the same line and would form DNA sequence in remote replication process.

2. Quantum antenna interaction takes place between group of molecules participating a given reaction so that they have common antenna frequency as resonance frequency. The frequencies characterize the radiation propagating along magnetic flux tubes connecting the molecules, and could come as sub-harmonics of the frequency of (in the case considered) visible light from the formula

$$E = h_n f, \;\; h_n = nh \;\; , \;\; n = 1, 2, 3, ... \;\; .$$

Here E is the fixed energy of photon. h_n denotes value of Planck constant which in TGD Universe can have infinite number of values coming as multiplies of the ordinary Planck constant h.

For a given photon energy E one obtains harmonics of the basic wavelength

$$\lambda = \frac{c}{f(n)} = n\lambda_0 \;\; .$$

Wave length would correspond to the length of the flux tube proportional to n. DNAs with flux tubes characterized by different values of n would correspond to different levels in the evolutionary hierarchy. In TGD inspired theory of consciousness the value of h_n serves as the measure for the time scale of planned action and memory span and neurons of frontal lobe would represent the highest level in the hierarchy,

3. If resonance frequency is same for all nucleotides, frequency cannot distinguish between DNA nucleotides. In the model of DNA as topological quantum computer the quark (u or d) and antiquark ($\overline{u}$ or $\overline{d}$) at the ends of the flux tube code for A, T, C, G. This model is the simplest one and does not require any additional assumptions about frequency coding. It also allows resonant interaction at several frequencies: the scattering of visible light from DNA indeed produces a wide spectrum of frequencies interpreted in terms of dark variants of visible photons.

One can criticize the assumption that particular quark or antiquark is associated with the flux tube ending at particular nucleotide. At this moment this assumption does not have a convincing dynamical explanation. Presumably this explanation would rely on the minimization of the interaction energy.

4. What is needed is a model explaining why the resonant antenna frequency does not depend on nucleotide: obviously the frequency should relate to something shared by all nucleotides. An energy level associated with sugar-phosphate backbone of DNA is what comes first in mind. A more exotic option is transition involved with quark-antiquark pair. Since electromagnetic field for non-vacuum extremals is accompanied by classical color field, the exchange

of gluons between quark and antiquark suggests itself as the quantum antenna interaction distinguishing between nucleotides.

Quantum antenna mechanism is extremely general and flexible and might be a fundamental mechanism of bio-catalysis allowing also communication between visible and dark matter sectors. Antenna mechanism is of course central also in ordinary communications. If the biologically most relevant interactions of biomolecules via quantum antenna mechanism then also water memory and the claimed effects of homeopathically treated water might be understood [K4]. The testing of the dark photon aspect of the hypothesis would require the detection of the dark photons somehow: the decay to a bunch of n ordinary photons with same wavelength is the obvious manner to achieve this.

3.1 Identification Of Phantom DNA

The observed residual coherent scattering from a chamber from which ordinary DNA is removed inspired the notion of phantom DNA [I3]. The questions are what phantom DNA is and is it relevant to remote replication of the ordinary DNA.

Phantom DNA observed in the scattering experiments could correspond to dark nucleon sequences realizing vertebrate genetic code with dark nucleons consisting of three quarks representing both DNA, RNA, tRNA, and amino-acids as particular nucleon states [K5, K4]. The resonant interaction between ordinary and dark DNA would explain why light at same frequencies scatters also from dark DNA in phantom DNA experiments. In Montagnier's experiments it could give rise to a positive feedback amplifying the radiation from second sample containing DNA. Water would be living in the sense that it contains "dark DNA" and dark DNA might allow remote transcription to ordinary DNA sequences in presence of ordinary DNA codons (triplets) and vice versa.

Skeptic can of course ask whether one could explain the experimental findings without assuming phantom DNA.

1. In Gariaev's experiments [I3], which inspired the notion of phantom DNA part of DNA could "drop" to parallel space-time sheets and have the same effect on the scattered radiation as the ordinary DNA. This explanation would however require the many-sheeted space-time of TGD - probably equally abominable to skeptic as phantom DNA.

2. In Montagnier's experiment and also in the recent experiment of Gariaev the ordinary DNA contained by water droplet could diffuse to dark space-time sheets and enter from flux tube A to flux tube B along the same magnetic flux tubes as radiation propagates. DNA polymerase would allow to amplify this leaking DNA and produce conjugate DNA. The irradiation of the original DNA would generate the flux sheets serving as a route for the transfer. The killer test is to check whether it is indeed conjugate of the original DNA which is produced. Again many-sheeted space-time is required.

3. For the option based on DNA as topological quantum computer hypothesis discussed above the remote replication would take place via the direct formation of conjugate DNA template and DNA polymerase produces from this copies of the *original* DNA whereas for "trivial" option conjugate DNA is produced. Phantom DNA would not be absolutely necessary. It is however questionable whether the intensity of the radiation is high enough and the resonant interaction with phantom DNA which could give rise to a positive feedback might be needed to amplify the radiation.

3.2 Dark DNA And Frequency Coding By Quantum Antenna Mechanism

The remote transcription of dark DNA (phantom DNA) to ordinary DNA and vice versa would have quite far reaching implications for evolution since dark DNA/RNA/tRNA/amino-acids could define a virtual world serving as *R&D* lab where new DNAs could be developed and if needed translated to ordinary DNA. The dark DNA could be also transferred through cell membranes without difficulty, in particular to germ cells. Also the genetic transfer between different organisms would become possible. Second possibility is that the magnetic flux tubes mediating the dark

photons traverse the cell membranes so that even the transfer of dark nucleons through the cell membrane is un-necessary. The implications for genetic engineering would be obvious.

Could one generalize the quantum antenna mechanism to the interaction between dark nucleons representing DNA triplets as entangled states of three quarks and ordinary DNA codons consisting of three unentangled nucleotides? Could similar mechanism realize genetic code assigning to dark DNA dark variants of RNA, tRNA and amino-acids via the analogs of transcription and translation processes? It seems that frequency coding, which - somewhat disappointingly - did not look natural for remote replication of ordinary DNA, is ideal for these processes so that the original idea of wave DNA would be realized at the level of dark-visible and dark-dark interactions.

The flux tubes would be associated with entire codons -DNA triplets - rather than individual nucleotides. Different DNA triplets do not form interacting groups in the sense that they should be connected by flux tubes. Therefore the simplest possibility would be frequency coding with specific resonance frequency for each DNA triplet. No quarks at the ends of the flux tubes connecting codons are needed.

Remark: : A hierarchy of flux quanta is essential and must distinguish between its levels. Flux tubes associated with nucleotides at flux tubes associated with DNA codons at flux sheets traversing DNA strands.

If one assumes that octaves correspond to the same frequency this would require odd multiples

$$\lambda(n) = (2n+1)\lambda_0 \quad , \quad n = 0, ..., 63$$

of λ_0 so that the longest wavelength would be $127\lambda_0$. In the number theoretic model of the genetic code based on the notion of Combinatorial Hierarchy [K3] codons are indeed labeled by 64 integers in the range $0, ..., 127 = 2^7 - 1$. These integers are however not assumed to be odd. One can also consider the possibility that the frequencies are coded by the value of Planck constant and this option leads to an interpretation of the earlier proposed realization of divisor code [K8] to be discussed later on.

Support for this option comes from the phenomenon of phantom DNA demonstrating that resonant scattering of light from DNA and dark DNA occurs for the same frequencies.

Can one imagine remote transcription of dark DNA to ordinary DNA using *only nucleotides* as building bricks? This process would require coupling of DNA nucleotides to dark nucleons representing DNA triplets and it is not easy to imagine any simple mechanism making this possible. Already existing DNA triplets seem to be necessary.

3.3 Common Explanation For The Findings Of Montagnier And Gariaev

In the experiments of Montagnier's group [I5] the outcome is remote replication whereas the earlier experiments Gariaev's group [I3, I2] give evidence for phantom DNA and remote activation of DNA transcription by scattered laser light able to represented genetic code. There must be interaction between the test tubes in Montagnier's experiments and in the recent experiments of Gariaev's group observing remote replication there is explicit interaction between the test tubes due to the scattered laser radiation. Hence one expects a common underlying mechanism based on radiation between the tubes and phantom DNA.

1. The TGD based explanation [K4] of Montagnier's findings relies on the assumption that the homeopathic procedure generated a population of dark DNA nucleotides in the diluted system. The sequence of dilutions and shakings was like a series of environmental catastrophes driving the evolution of dark DNA and also feeding metabolic energy to the system. The outcome was dark DNA population mimicking the original DNA in the test tube B. In the presence of DNA polymerase in tube B and second test tube A containing ordinary DNA the dark DNA was somehow able to generate ordinary DNA in tube B. The detailed mechanism for this remained open.

2. Could the scattered laser light have the same effect as the homeopathic procedure? This would require a direct transcription of dark DNA to ordinary DNA in the presence of DNA polymerase and nucleotides (only them!). It is very difficult to understand how this could happen. DNA polymerase very probably does not have the same catalyzing effect on dark DNA sequences as on ordinary DNA sequences. It is also difficult to imagine the build-up

of ordinary DNA from nucleotides using dark nucleon sequences as templates: if frequency coded codons would serve as building bricks, situation would be simpler as already found.

3. One must not forget that the presence of the test tube A was essential in the experiment of Montagnier: communications between the test tubes crucial for the outcome must have taken place. The consistency between the two experiments could be achieved if the DNA in test tube A generated the counterpart of the scattered laser signal in Gariaev's experiments but certainly as a much weaker signal.

4. This signal should have been amplified somehow by the presence the dark DNA sequences in tube B so that it would have been able to generate critical amounts of conjugate of the original DNA amplified by DNA polymerase to the copy of the original. What suggests itself is a positive feedback loop ordinary DNA sequences $\rightarrow$ dark DNA sequences $\rightarrow$ ordinary DNA sequences..... causing the amplification of the weak signal so that it is able to induce remote replication by the proposed mechanism. This kind of feedback of signals propagating between magnetic bodies was assumed also in the model for the strange images produced by the irradiation of DNA sample by ordinary light interpreted as photographs of magnetic flux tubes containing dark matter [K1].

This model explains also the findings of the recent experiment (unpublished) of Gariaev. In this case the amplification by feedback mechanism could be present but might not be needed since the scattered laser radiation could give strong enough signal to produce the needed amount of conjugate DNA serving as a template. What is nice from TGD point of view that the consistency between the two experiments gives support also for the notion of dark DNA and its identification as phantom DNA.

3.4 Summing Up The Basic Assumptions Of The Mechanism

The basic assumptions of the model of remote replication deserve a short summary.

1. Bio-molecules would serve as receiving and sending quantum antennas forming populations with communications between members just like higher organisms. The molecules participating the same reaction would naturally have same antenna frequencies. Quarks and antiquarks at the ends of the flux tubes would code for different nucleotides and the frequencies associated with the nucleotides would be identical. The character of classical electromagnetic field would code for a particular nucleotide.

2. Remote replication and other remote polymerization processes would differ from the ordinary one only in that the phase transition reducing the value of Planck constant for the flux tube would not take place and bring the molecules near each other. Note that the fractal hierarchy of flux quanta: nucleotide flux tubes, codon flux tubes and flux sheets associated with DNA strands is essential.

3. The immediate product of remote replication would be the conjugate of the original DNA sequence and DNA polymerase would amplify it to the copy of the original DNA sequence. This prediction could be tested by using very simple DNAs sequences- say sequences consisting two nucleotides which are not conjugates. For instance, one could check what happens if conjugate nucleotides are absent from the target (neither conjugate nor original DNA sequence should be produced). If the target contains conjugate nucleotides but no originals, only conjugate DNA sequences would be produced - one might hope in sufficiently large amounts to be detectable.

4. Frequency coding would be natural for quantum antenna interactions between ordinary DNA and its dark variant and also between dark variants of DNA, RNA, tRNA, and amino-acids. The reason is that dark nucleons represent the genetic code by entanglement and it is not possible to reduce the codon to a sequence of letters.

4 Possible Implications

The proposed realization of remote replication seems to have rather far reaching implications for the understanding of the mechanism of homeopathy and basic mechanisms of immune system as well as to the understanding of how DNA -dark nucleon sequence association. One can also interpret the proposed TGD based realization of the divisor code [K8] suggested by Khrennikov [K9] as frequency coding of DNA triplets by the value of Planck constant assignable to flux tubes emerging from DNA triplets.

4.1 Possible Relevance For Homeopathy And Immune System

TGD inspired vision about water memory assumes that the magnetic bodies of molecules dis-solved into water represent the molecules in terms of cyclotron frequencies characterizing its magnetic body. Molecules can lose their magnetic bodies as the hydrogen bonds connecting the molecule to the magnetic body are split. The population of these lost magnetic bodies would define a representation for the dissolved substance able to mimic it.

The hitherto unanswered questions concern the detailed structure of the magnetic body of the molecule and how it codes for the molecule. The hydrogen bonds connecting the molecule to the ordered water forming a kind of ice covering the molecule in the inactive state should be crucial aspect of the coding. If dark nucleon sequences are associated with the hydrogen bonds of this "ice layer" or generated in their splitting as I have proposed, one can ask whether dark nucleon sequences could characterize the molecular magnetic body. If so, cyclotron resonance frequencies or more general frequencies associated with the dark DNA sequences could code for the molecule. DNA sequences would define a universal language allowing for the system to name for polar molecules.

Quantum antenna mechanism would in turn associate ordinary DNA sequences with the dark nucleon sequences coding for the molecule. Hence one can imagine a development of a mechanism allowing the organism to modify its DNA by adding to it genes coding for proteins characterized by the same resonance frequencies as the magnetic bodies of the invader molecules. These proteins would couple strongly to the invader molecules via quantum antenna mechanism and the phase transition reducing Planck constant would allow them to catch the invader molecules by attaching to them. The fact that the DNA of immune system evolves very rapidly conforms with this vision.

4.2 Frequency Coding For DNA Sequences By The Value Of Planck Constant As A Realization Of Divisor Code

The realization of dark magnetic bodies of polar molecules in terms of dark nucleon sequences allows to understand the association of dark DNA with ordinary DNA, RNA, and tRNA making among other things possible the transcription of dark DNA to DNA and vice versa. Dark nucleon sequences would be associated with the magnetic bodies of DNA, mRNA, and tRNA. This would apply also to amino-acid sequences. Dark DNA would separate from ordinary DNA as it loses its magnetic body in the splitting of hydrogen bonds and suffers denaturation. Similar mechanism would cause denaturation of other biomolecules and would mean that they "lose their names" and thus information content and become mere organic molecules instead of living bio-molecules. This kind of association would make the emergence of the genetic code and its generalization to the naming of molecules by DNA sequences trivial.

Genetic code can be understood from the proposed natural correspondence between dark nucleon sequences and DNA, RNA, tRNA, and acmino-acids). I have however developed also another realizaton based on TGD based realization of so called divisor code first suggested by Khrennikov and Nilsson [K9] and the following argument allows to interpret in terms of frequency for fixed value of photon energy with frequencies coded by the value of Planck constant.

1. The observation of Khrennikov and Nilsson is following. Consider the integers n in the range 1, ..., 21 and obviously labeling amino-acids and let $k(n)$ the number of divisors of n. Define $B(k)$ as the number of integers n for which the number of divisors is k. It turns out that the numbers $B(k)$ are rather near to the numbers $A(k)$ of amino-acids coded by k codons. This suggests that given amino-acid A is coded by a product of prime $p(A)$,

which alone characterizes it, and integer $n(A)$ in the range $1, ..., 21$. The product of integers characterizing the codon coding for A would be characterized by the product of $p(A)$ and some factor $r(A)$ of $n(A)$. With these assumptions given codon would code for only single amino-acid and the number of DNAs coding for amino-acid A is the number of the factors $r(A)$ of $n(A)$. The codons coding for A would be coded by integers $p(A)r(A)$ such that $r(A)$ divides $n(A)$. The safest assumption would be that the primes $p(A)$ satisfy $p(A) > 19$ so that $p(A)$ does not divide $n(A)$ for any A. If $p(A)$ is as small as possible the value spectrum of $p(A)$ is

$$\{23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97, 101, 103, 107, 109\} \ .$$

If one assumes that the two additional amino-acids coded in some cases by non-vertebrate genetic code correspond to primes also the primes $113, 127$ are included.

What is interesting is that Mersenne prime $M_7 = 2^7 - 1 = 127$ appears in the model of genetic code based on the notion of Combinatorial Hierarchy [K3]. This model assumes that DNA codons correspond to 64 integers in the range $1, ..., 127$. This realization of the genetic code cannot however be consistent with the divisor code realized in the proposed manner since it would require that the integers $n(A)p(A)$ belong to the range $1, .., 127$. The prime factors of these integers can however belong to this range.

2. The TGD inspired proposal [K8] was that the flux tube assignable to amino-acid A corresponds to $\hbar = p(A) \times n(A)\hbar_0$ whereas the DNA triplet (for quark-antiquark coding nucleotide rather than triplet) coding for it is characterized by $\hbar = p(A) \times r(A)\hbar_0$ such that $r(A)$ divides $n(A)$.

3. This proposal could be interpreted in terms of frequency coding by quantum antenna mechanism. For a given photon energy E wave length would be coded by the value of $\hbar$ and one would have $\lambda_n = n\lambda_0$, $n = p(A)n(A)$ for amino-acids and $n = p(A)r(A)$ for codons. The condition that flux tube lengths are same for different DNA triplets would be satisfied if the common length of the flux tubes is an integer multiple of λ_0 proportional to the product of all integers appearing as factors in the integers coding for amino-acids. The common length of the flux tubes would be therefore proportional to the product $\prod_A p(A) \prod_A r_A$.

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