Article

Darwinian or Neutral Theory of Evolution or Something Else?

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Abstract

Darwinian and neutral theories of evolution represent too competing views about evolution - Darwinian theory seems to be the winner in the competition. TGD view about evolution represents that the third view in which the random changes correspond to quantum jumps according to zero energy ontology (ZEO). The number theoretical vision about TGD predicts that state function reductions tend to increase in statistical sense the number theoretical complexity of the system characterized by the dimension n for an extension of rationals coded by the value of effective Planck constant $h_{eff}/h_0 = n$ serving also as a kind of IQ. Magnetic body (MB) is the carrier of dark matter in TGD sense and the controlling agent - master - using biological body as slave. In particular, genome has dark analog realized as dark proton sequences - dark nuclei. Ordinary genome is its secondary representation and its dynamics is induced from that of dark genome: this view is inspired by the TGD based model for Pollack effect. In the sequel I will explain briefly these three views about evolution, and propose a concrete model for how evolution at the gene level could be induced from the reconnections of the flux tubes at the level of dark MB. Species preserving mutations would correspond to recombinations of maternal and paternal genomes occurring in meiosis, and evolutionary leaps to addition of new portions to genome realized at the level of dark genome as reconnections and inducing corresponding change at the level of ordinary genome.

1 Introduction

I learned recently that the so called neutral theory of evolution has been challenged by evidence for DNA selection (see `http://tinyurl.com/ybhyh6rc`). I must admit that I had no idea what neutral theory of evolution means. I had thought that Darwinian view based on random mutations and selection of the most adaptive ones is the dominating view. The debate has been about whether Darwinian or neutral theory of evolution is correct or is some new vision needed.

1.1 Darwinian and neutral theories of evolution

Darwinian and neutral theories of evolution and their variants represent two different views about evolution.

1. Adaptive evolution is the Darwinian view. Random mutations are generated and organisms with the most adaptive genome survive. One can of course argue that also recombination occurring during mitosis creating germ cells creates new genetic combinations and must be important for the evolution. Selection can be either negative (purifying) and eliminate the non-adaptive ones or positive favoring the reproduction of the adaptive ones.

   One can argue that notions like "fight for survival" and selection do not fit with the idea about organisms as basically inanimate matter having no goals. Also second law poses problems: no evolution should take place, just the opposite. Metabolic energy feed induces self-organization but by second law all gradients about which metabolic energy feed is an example, disappear.

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2. Neutral evolution theory was proposed by Morita 50 years ago and gained a lot of support because of its simplicity. Point mutations for the codons of DNA would create alleles. Already in Darwinian evolution one knows that large fraction of mutations are neutral having not positive or negative effect of survival. Morita claims that all mutations are of this kind. There would be no "fight for survival" or selection.

   The so called genetic drift, which is completely random process is possible in small populations and can lead to counterpart of selection: it can happen that only single allele remains and is counterpart for the winner in selection. This is purely random and combinatorial effect and in physics one would not call it drift.

   The first objection is that if one has several isolated small populations, the outcomes are completely random so that in this sense there is no genetic drift. Furthermore, there is no reason why further mutations would not bring the disappeared alleles back. Second objection is that there would not be no genuine evolution - how one can speak about theory of evolution?

   Now the feed of experimental and empirical data is huge as compared to what it was 5 decades ago and it is now known that the neutral theory fails: for instance, varying patterns of evolution among species with different population sizes cannot be understood. It is also clear that selection and adaptions really occur so that Darwin was right.

3. The shortcomings of the neutral theory led Ohta to propose nearly neutral theory of evolution. Mutations can be slightly deleterious. For large populations this leads to a purging of slightly deleterious mutations. For small populations deleterious mutations are effectively neutral and lead to the genetic drift.

   There is however a further problem: why the rate of evolution varies as observed between different lineages of organisms.

4. One reason for fashionability was that the model was very simple and allowed to compute and predict. Only the size of the population and rate for the mutations is enough to predict the future in small populations. The predictions have been poor but this has not bothered the proponents of the neutral evolution theory.

   As an outsider I see this as a typical example of a fashionable idea: these have plagued theoretical particle physics for four decades now and led to a practically complete stagnation of the field via hegemony formation. Simple arguments show that the idea cannot be correct but have no effect.

Article explains several related notions.

1. It has been possible to determine the mutation rates at the level of individual sites of genome since 2005. Only subset of mutations of say cancer cells are functionally important to cancer and they can be identified. This leads to a selection intensity as basic notion. This notion is expected to be very valuable for the attempts to find targeted cure of cancer.

2. Neutral theory of evolution assumes that only point mutations matter. Theory was therefore completely local at the level of genome - and certainly simple! Innocent outsider knowing a little bit about biology wonders why the recombination of maternal and paternal chromosomes in meiosis creating the chromosomes associated with germ cells are not regarded as important. This mechanism is non-local at the level of genome and would naturally lead to a selection at the level of individuals of the species. It has been indeed learned that the genetic variation and the rate of recombination in meiosis correlate in given region of genome. This sounds almost obvious to the innocent novice but had to be discovered experimentally.

   One can however still try to keep the neutral theory of evolution by assuming that recombination is completely random process and there is no selection and adaption - contrary to the experimental facts and the basic idea behind the notion of evolution. Recombination would bring only an additional complication.

Besides the direct purifying selection and neutral drift there would be recombination creating differences in the levels of variation across the genomic landscape. This leads to the notion of genetic hitchiking. When beneficial alleles are closely linked to neighboring neutral mutations, selection acts as a unit on them. One speaks about linked selection. Frequencies of neutral alleles are determined by more than genetic drift but one can speak of neutrality still. Linkage of hitchiker to allele - beneficial or not - is however random. Does genuine evolution takes place at all?

3. Most of the DNA is not expressed as proteins. It would not be surprising if this part of DNA could have important indirect role in gene expression or perhaps be expressed in some other manner - say electromagnetically. How important role this part of DNA has in evolution? There are also transposons inducing non-point like mutations of this part of DNA: what is their role. There also proposals that viruses, usually though to be a mere nuisance, could play decisive role in evolution by modifying the DNA of host cells.

4. It is now known that up to 80-85 per cent of human genome is probably affected by background selection. Moreover, height, skin color blood pressure are polygenic properties in the sense that hundreds or thousands of genes are acting in concert to determine these properties. This strongly suggests that point-like mutations cannot be responsible for evolution and not even recombinations are enough if random. A control of evolution in longer scales seems to be required. This of course relates to the basic problem of molecular biology: what gives rise to the coherence of living matter. Mere bio-chemistry cannot explain this. Something else perhaps controlling the bio-chemistry is needed.

1.2 Criticism of the standard view

One can start by criticizing the standard view.

1. Is the standard view (to the existent that such exists) about evolution consistent with second law? One can even ask whether standard view about thermodynamics assuming a fixed arrow of time is correct.

2. If mutations and more general changes of genome occur by pure change, can they really lead to a genuine evolution. The notions of selection and survival of fittest are notion, which do not conform with the view about evolution as mere standard physics. A probable motivation for neutral evolution theory has been the attempt to get rid of these notions: physicalism taken to extreme.

3. The reduction of life to bio-chemistry does not allow to understand the coherence of organisms.

4. One can also criticize the reduction of life to mere genetics.

   (a) Genetic dogma does not tell much about morphogenesis.

   (b) Is genetic determinism a realistic assumption? Clones of bacterium are know know to have personalities behaving differently under given conditions (see `http://tinyurl.com/us7fxlh`).

   (c) Most of the genome of the higher organisms consists of DNA not transcribed to RNA still interpreted as junk by some biologists. What about introns? Could there exists other forms of gene expression - say electromagnetic.

TGD view about evolution represents that the third view in which the random changes correspond to quantum jumps according to zero energy ontology (ZEO). The number theoretical vision about TGD predicts that state function reductions tend to increase in statistical sense the number theoretical complexity of the system characterized by the dimension n for an extension of rationals coded by the value of effective Planck constant $h_{eff}/h_0 = n$ serving also as a kind of IQ. Magnetic body (MB) is the carrier of dark matter in TGD sense and the controlling agent - master - using biological body as slave. In

particular, genome has dark analog realized as dark proton sequences - dark nuclei. Ordinary genome is its secondary representation and its dynamics is induced from that of dark genome: this view is inspired by the TGD based model for Pollack effect.

In the sequel I will explain briefly the three views about evolution, and propose a concrete model for how evolution at the gene level could be induced from the reconnections of the flux tubes at the level of dark MB. Species preserving mutations would correspond to recombinations of maternal and paternal genomes occurring in meiosis, and evolutionary leaps to addition of new portions to genome realized at the level of dark genome as reconnections and inducing corresponding change at the level of ordinary genome.

2 TGD inspired vision about evolution

TGD based view about evolution can be seen as a response to these criticisms but actually developed from a proposal for a unification for fundamental interactions and from the generalization of quantum measurement theory leading to a theory of consciousness and generalization of quantum theory itself.

2.1 Basic conceptual building bricks

The basic assumptions of TGD based view about evolution are following.

1. TGD leads to a new view about space-time and classical fields. In particular, many-sheeted space-time and magnetic body bring in new element changing dramatically the views about biology.

   The notion of Maxwellian fields is modified. Unlike in Maxwellian theory any system has field identity, field body, in particular magnetic body (MB) carrying dark matter n TGD sense and in well-define sense at higher evolutionary level as compared to ordinary bio-matter. This expands the standard pairing organism-environment to a triple MB-organism-environment.

   MB can be seen as the controlling intentional agent and its evolution would induce also the evolution of the ordinary bio-matter. MB carries dark matter as $h_{eff}/h_0 = n$ phases giving rise to macroscopic quantum coherence at level of MB. MB forces the ordinary bio-matter to behave coherently (not quantum coherently).

   TGD leads also to a realization of genetic code at the level of dark analog of DNA represented as dark proton sequences [4] - dark nuclei, which are now essential element of TGD based view about nuclear physics [5]. Dark photons are essential for the communications between MB and ordinary bio-matter. Also dark photons would realize genetic code with codon represented as 3-chord consisting of 3 dark photons.

   Genetic modification would take place at the level of magnetic flux tubes containing dark analog of DNA and induce changes of the ordinary genome, which would do its best to mimic dark genome. In particular, the recombination occurring during the meiosis would be induced by the reconnection of the flux tubes of dark genome.

2. Number theoretical vision about evolution deriving from the proposal that p-adic physics for various primes combining to what I call adelic physics is second needed element [3]. Any system can be characterized by a extension of rationals defining its algebraic complexity. The dimension of extension identifiable in terms of the effective Planck constant $h_{eff}/h_0 = n$ defines evolutionary level as a kind of IQ. What is remarkable that n increases in statistical sense since the number extensions with n larger than that for given extension is infinitely larger than that of lower-dimensional extensions. Intelligent ones have larger scale of quantum coherence and thus coherence of bio-matter and survive. Evolution is directed process forced by number theory alone.

Quantum jumps in the sense of ZEO tending to increase n occurring naturally in mitosis generating germ cells lead also to a more intelligent genomes. Point mutations could be seen something occurring at the level of ordinary matter rather than being induced by dark matter.

3. Zero energy ontology (ZEO) is behind the generalization of quantum measurement theory solving the basic problem of standard quantum measurement theory. There are two kinds of state function reductions. "Small" state function reductions (SSFRs) as analogs of weak measurements give rise to the the life cycle of conscious entity self having so called causal diamond (CD) as a correlate. Under SSFRs the passive boundary of CD is unaffected as also members of state pairs at it: this gives rise to the "soul" as unchanging part of self.

   "Big" state function reductions (BSFRs) correspond to ordinary state function reductions. They change the arrow of time and one can say that self dies and re-incarnates with a reversed arrow of time. This applies in all scales since consciousness and cognition predicted to be universal. In BSFRs the value of h_{eff} increases in statistical sense and this gives rise to evolution also at the level of genome. The reversal of the arrow of time allows to see self-organization and metabolism as dissipation in non-standard time direction so that generalization of thermodynamics to allow both arrows of time allows to understand both self-organization and evolution.

2.2 Evolution at DNA level

A possible application would be TGD based model for meiosis and fertilization. The starting point is that recombinations occurring in meiosis represent a fundamental step in evolution preserving the species and point mutations are mostly noise having also negative effects. There are also modification which produce a new species. Consider first recombinations.

1. In meiosis BSFR for the dark proton sequences defining dark DNA could induce reconnections of parallel maternal and paternal dark proton flux tubes inducing recombination at the level of the ordinary genome.

2. The resulting germ chromosomes - or rather their dark variants realized in terms of dark proton sequences would have arrow of time opposite that of chromosomes. They would be in a dormant state analogous to sleep.

3. Fertilization involves the pairing of paternal and maternal germ chromosomes and looks almost like time reversal of meiosis. In the proposed picture it would indeed change the arrow of time for the germ chromosomes - wake up them. The sequence meiosis replication-meiosisI-division - meiosisII would correspond to 4 BSFRs leading to germ cells having dark genome as as time reversal of ordinary genome.

   Remark: One can ask whether also the passive strand of ordinary DNA has arrow of time opposite to that of the active strand.

Recombinations do not change the genome dramatically and can be said to be species preserving. Big leaps in evolution change genome more drastically - say by adding new genes - to yield what might be regarded as a new species. They represent a challenge also for the TGD based view.

The big changes should occur at the level of the magnetic body inducing in turn modifications at the level of ordinary genome. The addition of a portion of DNA double strand of same length to the end of DNA double strand could be a species changing modification. This would not change the earlier genome and could add a new gene for instance. How this change could occur?

1. In TGD dark genome acts as master controlling the ordinary genome playing the role of slave. Dark genes correspond to dark proton sequences with possibly subset of protons behaving like neutrons due to the presence of negatively charged bonds between two neighboring protons of the sequence.

Large modification would add to this sequence new dark protons: dark counterpart of nuclear fusion would take place.

In water Pollack effect [1] [2] would correspond to this process this process and would give rise to charge separation creating negatively charged regions called exclusion zones (EZs) by Pollack. There is no reason why this process could not occur also inside cells containing pairs maternal and paternal chromosomes.

2. At the level of dark magnetic body the modification of dark double strand could be realized if it corresponds to a closed monopole flux loop having double helical structure: the conjugate strand would carry the return flux. The addition of a piece of DNA would be induced by a reconnection gluing shorter helical flux loop to the end of the helical loop. The chemical counterpart of dark DNA would be formed by the pairing of dark codons with the ordinary codons - kind of transcription process.

3. The modifications of paternal and maternal dark genomes are expected to occur independently and typically lead to different lengths of paternal and maternal DNAs. Hence the condition that the paternal and maternal modifications of germ cells are identical (same length) is too strong.

   Can the maternal and paternal DNA double strands have different lengths? This seems to be possible. The reconnection process in meiosis does not require same lengths for maternal and paternal genomes. In fertilization the chromosomes of paternal and maternal gametes form pairs and also this allows different lengths. Therefore the big leaps in the evolution could correspond to additions of new pieces to maternal an/or paternal dark genome.

This picture is of course over-simplified. Also addition of DNA portions in the middle of genome - say adding a new gene or par of gene - should be possible at the level of dark matter. Also this process should occur by reconnection process at the level of dark matter. Also now it seems that the process can occur independently for maternal and paternal chromosomes.

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