

# Progress in understanding the notion of magnetic body and metabolism in TGD framework

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## Abstract

The notion of magnetic body, Pollack's mechanism modelled in TGD as transfer of protons to dark protons at magnetic flux tubes, and remote metabolism predicted by Zero Energy Ontology are key elements of TGD inspired quantum theory of consciousness and biology. The recent finding that brain hemispheres of persons having no corpus callosum are in synchrony supports the notion of magnetic body as intentional agent. The assumption that a modification of Pollack's mechanism is involved with cellular metabolism leads to the proposal that the energy of solar photons fed into electron transport chain is used to pump dark protons at magnetic flux tubes through thylakoid membrane. The finding that visible and UV light can provide metabolic energy for animal cells leads to a proposal how animal cells can perform the analog of photosynthesis using essentially same basic mechanism. The finding that GUT cells without any mitochondria can survive leads to a concrete cell level model for remote metabolism based on sending of negative energy photons to a energy storage.

## 1 Evidence for the notion of magnetic body from brain synchrony without corpus callosum

The notion of magnetic body is central for the entire TGD based approach to living matter and it would be important to find experimental support for it. Quite recently I received a link to a rather baffling finding about brain [J1] (see <http://tinyurl.com/3gjhtgb>). Neuroscientists have believed that the two hemispheres communicate via the neural pathways associated with corpus callosum: kind of communication cables would be in question. Many areas of brain behave synchronously, which has led to the notion of resting state network.

The team led by Michael Tyszka, associate director of Caltech Brain Imaging Center, has however discovered that the resting state network seems to work normally in people born without corpus callosum! As if brain hemispheres were communicating by some other means than neural signalling! This finding challenges not only the views about the origin of brain synchrony as being created by neural circuits but also the models of autism and schizophrenia explaining them in terms of impaired communications between hemispheres.

One can for instance speculate with the possibility that there is electromagnetic communication between brain hemispheres. This does not look a bad idea at all: nowadays it is possible to extract information about EEG so that pilots are able to control the flight of tiny flying object by imagining what the object should do. Technological applications will probably appear in the market soon so that anyone can have robots controllable by thoughts.

This mechanism is consistent with the TGD inspired view about brain. This view however encourages to consider also a more imaginative explanation. In TGD Universe living system involves besides organism and environment also magnetic body (MB) acting as an intentional agent receiving sensory input from organism and controlling it. MB has hierarchical onion-like structure. For instance, brain hemispheres have their own MBs, and entire brain its own MB serving as a "boss" for the MBs of hemispheres.

Communications between magnetic body and part of organism take place using dark photons having non-standard value  $h_{eff} = n \times h$  of Planck constant and thus energy  $E = h_{eff}f$ , which

should correspond to ordinary photons with energies above thermal energy: otherwise quantal effects are masked by thermal fluctuations. Bio-photons in the visible and UV range could result in the transformation of dark photons to ordinary photons. The frequency range of dark photons depends on the level of the layer of MB characterized by  $h_{eff}$  and wavelength corresponds to the size scale of the layer.

In the case of brain the transfer of sensory information to MB would be realized as EEG - wavelength of 7.8 Hz radiation is order of the circumference of Earth so that MBs for brain would be really large. In Zero Energy Ontology (ZEO) control signals would be realized as negative energy signals propagating backwards in geometric time and having phase conjugate laser light as a counterpart in ordinary physics. This explains Libet's finding that neural activity precedes conscious decision. Coordination by using EEG rhythms would be part of control analogous to work songs.

The MB of entire brain controls it and could naturally do this via the intermediate control of brain hemispheres forcing them to operate in the same rhythm. Brain synchrony and resting network would not be produced by resonant neuro-circuits as usually believed but by the spatiotemporal coherence of the EEG radiation from the MB of entire brain forcing brain hemisphere MBs to oscillate in the same rhythm and in turning synchronizing the brain hemispheres. This would be like forcing soldiers to march in the same pace and brain hemispheres could co-operate without any neural communication between hemispheres. The communication between hemispheres would be needed for more refined collaboration involving "discussion" between hemispheres: hemispheres of a person without corpus callosum would be like soldiers obeying blindly the orders. This might be also an essential element of autism and schizophrenia.

## 2 Progress in TGD based model of metabolism

A considerable progress in the understanding of TGD based model of metabolism has taken place.

### 2.1 Generalization of Pollack's mechanism and photosynthesis

Pollack's mechanism involves charge separation [L1, I4, I3] (see <https://www.youtube.com/watch?v=i-T7tCMUDXU>). Pollack's mechanism creates in presence of radiation and water bounded by a gel at the boundary of water and gel an EZ, which is a layer negatively charged water with effective stoichiometry  $H_{1.5}O$  consisting of layers with hexagonal structure. The TGD inspired proposal is that hydrogen bonded pairs of  $H_2O$  molecules are formed and that each of them loses one proton as dark proton at magnetic flux tubes outside EZ [L1] [K1]. The notion of many-sheeted space-time and topological field quantization are essential elements of the proposal. Same phenomenon could be caused also by irradiation by sun light.

Charge separation occurs also in photosynthesis as water molecules split to give  $O_2$  plus protons and electrons. The obvious question is whether Pollack's mechanism could be precursor of photosynthesis. The electrons in photosynthesis are however free and transferred to electron transport chain so that recent photosynthesis should be a generalization of Pollack's process and produce besides dark protons also free (possibly dark) electrons. That dark protons would be transferred through thylakoid membrane via magnetic flux tubes conforms with the general model for channels and pumps in TGD inspired quantum biology. Electron transport chain appears also in cell respiration. This can be used to explain the reports that solar radiation and also IR radiation on skin can transfer metabolic energy to the cell so that animal cell would effectively perform photosynthesis. In the case of IR radiation the mechanism could be remote metabolism (quantum credit card mechanism) possible in Zero Energy Ontology.

The light dependent step  $2H_2O \rightarrow 4H^+ + 4e^- + O_2$  of photosynthesis pumps protons through thylakoid membranes (for an illustration see [https://en.wikipedia.org/wiki/Light-dependent\\_reactions](https://en.wikipedia.org/wiki/Light-dependent_reactions)). The electrons excited by photons of sunlight are transferred along electron transport chain and lose energy used to pump protons through the thylakoid membrane and being thus transferred from stroma to grana against electric gradient. ADP transforms to ATP as these protons return to back through ATP synthase. This step is repeated again and again.

Could dark protons created by the analog of Pollack's mechanism be involved with photosynthesis? In what step the protons are transformed to dark protons by this mechanism?

1. The model of cell membrane leads to a proposal that pumps and channels quite generally are dark magnetic flux tubes and protons (and also other ions) are transferred through them as dark protons (dark ions). This would imply almost dissipationless transfer.
2. The protons are pumped as dark protons through the thylakoid membrane along dark magnetic flux tubes serving as pumps using the energy provided by electrons flowing down in the electron chain. The dark protons return from grana through ATP synthase as dark protons as ATP is generated and transform with some rate back to ordinary protons in stroma. Otherwise the fraction of dark protons would steadily increase.
3. This leaves two options under consideration. Already the step  $2H_2O \rightarrow 4H^+ + 4e^- + O_2$  step  $2H_2O \rightarrow 4H^+ + 4e^- + O_2$  creates dark protons by a generalization of Pollack's mechanism or this step creates ordinary protons transformed by Pollack's mechanism to dark protons as they are transferred to dark magnetic flux tubes serving as pumps. The first option looks more plausible.

## 2.2 The analog of photosynthesis in animal cells?

What is interesting is the electron transport chain is involved also with the cellular respiration. There are various light therapies using red or IR light, and they seem to provide basically metabolic energy. Cells would act like plant cells and the analog of photosynthesis could be in question. This would explain the claims that the members of some religious cults can practically live utilizing only sunlight. I have actually proposed that analog of photosynthesis storing the energy by  $ADP + P_i \rightarrow ATP$  type process using standard machinery could be actually involved and transfer the energy of IR light to metabolic energy further distributed by ATP.

The metabolic machinery for cellular respiration contains so called oxidative phosphorylation (OP) as a basic step: OP adds to ADP a phosphate giving metabolic currency ATP. ATP in turn distributes the metabolic energy further. OP uses electron transport chain to transfer metabolic energy from NADH by  $NADH \rightarrow NAD^+ + H^+ + 2e^-$ . The electrons go through the electron transport chain as in photosynthesis and transfer protons outside the mitochondrial membrane very much like through thylakoid membrane in photosynthesis. The protons return through ATP-synthase and induce  $ADP + P_i \rightarrow ATP$ .

The metabolic energy must come from somewhere and OP indeed follows Krebs cycle in which the energy is extracted from nutrients and given to the NADP molecule. The photon energy could be feeded directly to OP electron transport chain just as photon energy is transferred to this chain in photosynthesis. The presence of electron transport chain is necessary and one must feed the electrons and protons to this chain somehow.

1. Could the analog of photosynthetic reaction  $2H_2O \rightarrow 4H^+ + 4e^- + O_2$  with visible photons replaced with IR photons produce dark protons? Whether this is energetically possible and whether the electrons have high enough energies to drive the dark protons through the membrane is far from clear. One can of course imagine, that the number of pumped protons per electron is lower than usually.
2. A mechanism that I have called quantum credit card or remote metabolism [K1] looks more plausible. The splitting  $2H_2O \rightarrow 4H^+ + 4e^- + O_2$  could occur - not by absorption of positive energy photon but by emission of negative dark IR photon with the energy of visible photon. Cell would actively suck metabolic energy from IR light source. The emitted dark negative energy IR photon would decay to ordinary IR photons in reverse time direction, which would look like fusion in standard time direction and is thermodynamically non-favoured. ZEO predicting kind of syntropic processes to occur in living matter would be an essential prerequisite.

At deeper level metabolic energy might correspond to negentropic entanglement and thus information. Information could be the basic metabolic currency.

## 2.3 Gut cells without mitochondria can survive: a proof for the notion of remote metabolism?

Gut cells can survive without mitochondria [I2] (see <http://tinyurl.com/j7p49cn> for the article in *Current Biology* and <http://tinyurl.com/hqq79th> for a popular representation). There are many other strange findings that I have discussed in earlier writing from TGD point of view. Visible and IR light energize human skin cells transferring energy for the cells- the analog of photosynthesis. Some spiritual groups and also traditionally the people called saints are reported to survive by using only sunlight as their source of metabolic energy. NASA has studied sleigh dogs able to run for days without eating and showing no signs of getting tired.

Could the analog of photosynthesis work also in animal mitochondrial cells? The basic mechanism could be essentially the same: electron transfer chain providing energy to pump protons through cell membrane against potential gradient. This is the key step of both photosynthesis and cellular respiration. After that protons flow spontaneously back through ATP synthase and liberate energy to build ATP from ADP. This is like power plant. In plants solar photons provide the energy for electrons. In the animal cells dark photons with large  $h_{eff} = n \times h$  (transforming now and then to biophotons) could do it. In the case of IR metabolism electrons could send to the energy source dark negative energy IR photons, which decay to ordinary IR photons. This would be an active variant of metabolism and time reversal of the usual mechanism: I have called it quantum credit card mechanism or remote metabolism [K1].

In the recent case even mitochondria are missing! Could remote metabolism work also without mitochondria?  $ADP \rightarrow ATP$  transformation should occur since ATP is the universal energy currency. Could it take place as remote metabolism by sending negative energy photons to the cells having the mitochondria. The electron transfer chain is preceded by Krebs cycle extracting the energy from nutrients: could the absorption of negative energy photons induce the decay of nutrient without transfer of energy to electron chain of the mitochondria. The hungry gut cell without mitochondria would be allowed to eat in the table of the luckier ones. Again one quantum objection against vulgar darwinism. This would be like kicking laser from population reversed state to ground state by phase conjugate negative energy irradiation.

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