Bose Einstein condensate - cold fusion, cellular membranes and neurons.

(original title: “Proton Pump - Mechanism of CF”)

Stan Bleszynski 30/06/2013
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http://www.ncbi.nlm.nih.gov/pubmed/20108228

http://www.nick-lane.net/LAM%20BioEssays.pdf

http://www.nature.com/scitable/topicpage/why-are-cells-powered-by-proton-gradients-14373960

[modified 8/07/2013]

The above paper by Nick Lane postulates the existence of a mechanism of proton membrane potential (of the order of 0.15V) that drives various biochemical reactions that require a much higher threshold potential to initiate, typically of the order of 1V (1eV per molecule).

The mechanism being a kind of collective coupling of multiple protons exerting their potential upon a target molecule thus effectively multiplying the available small potential of 0.15V/proton across a cellular membrane, by the number of protons taking place in a given reaction. This also leads to a non-stoichiometric behavior.

We are most likely dealing here with collective quantum processes where a number of particles (protons) act coherently as a single combined “particle” - a donor of the combined energy of all protons involved, to a target molecule.

There are lots of details to be clarified. For example how exactly are the protons involved synchronized or “collectivized”? Quantum processes generally rely on the involved particles having deBroglie wavelength comparable to the distance between the involved particles. If the wavelength is much smaller (as is in case of massive particles such as protons), then the particles are supposed to participate as individual particles, thus limiting the available quantum transition energy for the target molecule, to 0.15V or so. In order to act coherently, the wavelength ought to be much longer than the area surrounding the target molecule such that it would encompass multiple protons. There is a discrepancy here. On the other hand we do know that such collective behavior of protons does take place - because we exist! 8-:)

Perhaps the coherency may be achieved by the equality/homogeneity of the potential (0.15V) of a large number of protons involved, implying the uniformity of the cellular membrane as being

the critical factor. Also it ought to involve some kind of pairing of the protons (not necessary for deuterons) like the Cooper Pair phenomenon for electrons, to overcome Pauli's exclusion principle for fermions.

If the collectivistic behavior of protons plays the role in driving metabolism in cells providing a mechanism for multiplying the small membrane potential, thus a similar mechanism might allow for driving nuclear reactions, as long as the number of collectively engaged protons or deuterons is sufficiently large. The uniformity of the medium (i.e. the cellular membrane for life, and palladium crystal lattice, for CF) should be the critical key factor!

On the related topic of transmission of neural signals versus proton condensate collective quantum processes.

Added 2/06/2013

If proton-ion interaction and signal transmission taking place on the cellular membranes has a character of quantum Bose-Einstein (BE) condensate (of "Cooper" pairs of protons), it may have some very far reaching practical consequences, yielding some observable/measurable phenomena.

1) It will be highly temperature dependent, when too low temperature would slow down chemical processes that fuel the energy while too high a temperature would produce a phase transition destroying the coherency of the BE phase state.

2) Propagation of the signal along the neural cell membrane that involve the BE condensate would occur at effectively an infinite (or extremely high) speed and/or would demonstrate some non-local properties involving infinitely fast computational neural logic operations etc (note: this is referred to as "quantum action at distance", quantum entanglement, quantum computing etc, see also https://en.wikipedia.org/wiki/Quantum_entanglement, https://en.wikipedia.org/wiki/Action_at_a_distance_(physics) , https://en.wikipedia.org/wiki/Quantum_computer), **as long as the BE condensate wave function coherency is preserved and the wave function is not quantum-collapsed by an act of observation or measurement**.

3) Propagation of the neural signals that involve the non-BE phase of proton ions, or signals that involve collapsing of the condensate wave function, takes place at much slower speed, typically 3-30m/s (http://en.wikipedia.org/wiki/Nerve_conduction_velocity) characteristic of the ionic transport processes in electrolytes.

Proposed experimental evaluation of the effects (2):

Device an experiment involving living neural tissue in-vitro connected to electronic trigger circuit (A) and receiver circuit (B) separated by a certain distance of the order of 1m. Measure a difference in propagation speed between setup (I) the straight signal connection A-B, and the setup (II) where the neural link involves a complex logic circuit (the "processor") placed in between A and B such that the signal must pass through the network only after a certain computation burden is completed.

By comparison of the propagation times, it should be possible to estimate the computation burden of the processor and to estimate the computational speed of the processor without collapsing its quantum state (note - this needs to be thought out properly).

It is probably not possible to estimate the true propagation speed of the neural proton BE condensate directly because either a signal injection into point A or a signal reception at point B would collapse the wave function as would any other act of observation (http://en.wikipedia.org/wiki/Copenhagen_interpretation).

What is the exact mechanism of proton BE condensate
(added 5/07/2013)

In the previous sections I was hypothesizing about a mechanism similar to Cooper pairs formation with electrons in a solid crystal lattice, leading to BE (Bose-Einstein) condensate of electron pairs phenomena of superconductivity, confinement and expulsion of magnetic field,

It is probably not the case in cellular membrane since the electromagnetic properties of BE condensate are not observed in living cells. Instead, a collective phenomena associated with cellular membrane and neural propagation may involve BE condensate of charge-less quasiparticles rather than proton-pairs themselves. As such, dynamics of such condensate might not involve any movement of charge (thus no primary electromagnetic phenomena) but instead may involve propagation of other quantum attributes such as spin, orbital state or other.

Examples of such quasiparticle states are excitons, spinons, orbitons or similar. Such quasiparticles must also quantum-coherently with neuro-transmitters (in case of neurons) to preserve coherent propagation of neural signals, and must couple to ionic chemical processes taking place in the cells to allow catalysis of chemical reaction at the electron-volt scale. Incidentally similar BE-related quantum-collective mechanism should explain the nature of chemical surface catalysis.

Note: the above text is a "seed" of a draft and is not expected to be flawlessly correct. It does not represent a finished paper, but it may serve as a starting point of a discussion and of future papers. Comments are welcome.

Added 27/09/2013, posted as comment on Hyperlipid blog

http://www.blogger.com/comment.g?blogID=36840063&postID=8285274149691985 45&page=1&token=1380291067657

Sorry but I still think it is missing an "elephant-in-the-room".

I think that the protons on one side of the membrane pair with electrons on the other (or inside the double membrane) forming quasi-particle pairs which then form quantum condensate (Bose-Einstein condensate) acting like one global particle with a much higher energy at its disposal. By "global" I mean non-locality in the QM sense. That's why biochemical reactions are non-stoichiometric and are so temperature-sensitive, as well as are able to overcome high chemical potential thresholds. That's why mitochondria, neurons etc use membranes rather than conducting reactions in the bulk cellullar plasma, except for trivial cases.

This kind of follows the pattern - note that the BE condensate can easier form on the 2D or 1D structures such as in HT superconductors without requiring kryogenic temperatures, unlike in 3D volume.

Regards,
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