Information transfer by quantum dragons in brain microtubules?

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The development of quantum annealing machines, also known as adiabatic quantum computers, with about 50 qubits would be a disruptive technology. Nowadays, Canadian D-Wave produces a quantum annealing machine with > 2000 qubits, where a qubit – by definition – is a quantum superposition of the 0 and 1 bit. In this perspective, usual questions addressed [1] include whether such technologies: Are adiabatic?, Are quantum? or even – Are a computer? However, similar questions can be posed concerning the function of our brain in the system of microtubules (MTs). Such nanodevices, like tubulin dimmer chains in MTs, have a quasi one-dimensional structure, as a long serpentine creatures of mythology and folklore – dragons. If a quantum dragon (QD) is present [2], it cannot be observed by electron transmission since the probability of transmission $T(E) = 1$, for all incoming electrons of energy E. Nonetheless, the problem of information transmission by QDs, in the context of the function of the human nervous system, can still be raised: a single-band tight-binding model for electron transmission by quantum dragons was proposed. The mapping was applied to a chain of tubulin dimmers present in the MTs of the human brain. We advocate that this complete transmission could have been achieved, as being the most efficient, in the course of evolution, even though alternative solutions – producing entangled states at finite temperatures, e.g., [3] – can also be imagined.

[1] M.A. Novotny (2017) "Adiabatic quantum computers in 2017: huge advance or all hype?". Lecture held on April 6th, Institute of Physics, University of Silesia, Katowice, Poland

[2] M.A. Novotny (2014) Energy-independent total quantum transmission of electrons through nanodevices with correlated disorder. Physical Review **B 90**, 165103

[3] D. Gruss, K. Velizhanin, M. Zwolak (2016) Landauer's formula with finite-time relaxation: Kramers' crossover in electronic transport Sci. Rep. **6**, 24514