

BIOLOGICAL TIME KEEPING RESULTS FROM OSCILLATIONS IN THE RATIOS OF ORTHO TO PARA NUCLEAR SPINS OF THE PAIRED HYDROGENS OF WATER

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A homodimeric, growth-related and time-keeping hydroquinone oxidase (ENOX1) of the eukaryotic cell surface capable of oxidizing intracellular NADH exhibits properties of the ultradian driver of the biological 24 h circadian clock by exhibiting a complex 2 + 3 set of oscillations with a period length of 24 min. The oscillations require bound copper, are recapitulated by aqueous solutions of copper salts and appear to derive from 30 to 40 sec periodic variations in the ratio of ortho and para nuclear spins of the paired hydrogen atoms of the elongated octahedral structure of the ENOX1 protein- bound copper II hexahydrates (Morré et al., 2008). Raman spectral evidence for ortho-para spin isomer disequilibrium in liquid water has been provided by Pershin (2006) and Tikhonov and Volkov (2002). Harmonic oscillations of the OH centroid band determined from Raman scattering (Pershin, 2006) provides a measure of exchange between two water states related to ortho/para ratios. The period length was determined to be 35 plus or minus 13 sec. A corollary of these observations is that the ortho/para oscillations must occur in a highly synchronized matter. Our findings suggest that water molecules communicate with each other via very low frequency electromagnetic fields and that these field appear to be generated by the energetics of synchronous ortho to para interconversions of the nuclear spin pairs of water hydrogens. An alternative source of energy absorbed and emitted by water and correlated with ortho/para oscillations of ortho/para spin pairs of water hydrogens is indicated from the auto-oscillations in water luminescence observed by Gudkov et al. (2011) following infrared radiation. The emissions oscillate with period lengths that agree with our previously found period of oscillation for pure water of 18 min reflective of ortho to para spin isomers based on measurements of redox potential.

References:

1. Morré et al. 2008. Inorganic Biochem. 102:260-267. www.biophys.ru/archive/h2o-00004.pdf
2. Pershin, S. M. 2006. Laser Phys. 16:114-119.
3. V.I. Tikhonov and A.A. Volkov. 2002. Science 296:2363. www.biophys.ru/archive/h2o-00011.pdf
4. Gudkov et al. 2011. J. Phys. Chem. 115:7693-7697. www.biophys.ru/archive/h2o-00022.pdf