


# Quantum Biology 12: Do We Need DNA To Tell Time?

## Readers Summary

1. How important is time?
2. Do we need RNA or DNA to tell time?
3. Is light and water where QED and Circadian biology collide?
4. Is the leptin receptor a giant photoelectric accountant for the brain?
5. What does Einstein's fourth paper from his miracle year of 1905 have to say about the laws of nature?

## How important is time really to life?

Imagine there is a bank account that credits your account each morning with \$86,400. It carries over no balance from day to day. Every evening the bank deletes whatever part of the balance you failed to use during the day. What would you do? Draw out every cent, of course? Each of us has such a bank. Its name is time.

An alarm clock is shown floating in a turbulent, stormy ocean. The clock is dark and appears to be struggling against the waves. The sky is dark and filled with rain, creating a sense of chaos and confusion. The overall mood is one of being overwhelmed by time and circumstances.

Time floats in an ocean of confusion

Your mind is built to organize this chaos  
Jack Kruse

Every morning, it credits you with 86,400 seconds. Every night it writes off as lost, whatever of this you have failed to invest to a good purpose. It carries over no balance. It allows no over draft. Each day it opens a new account for you. Each night it burns the remains of the day. If you fail to use the day's deposits, the loss is yours. There is no drawing against "tomorrow." You must live in the present on today's deposits. Invest it so as to get from it the utmost in health, happiness and success! The clock is running! Make the most of today.

To realize the value of **one year**, ask a student who failed a

grade. To realize the value of **one month**, ask a mother who has given birth to a premature baby. To realize the value of **one week**, ask the editor of a weekly newspaper. To realize the value of **one hour**, ask the lovers who are waiting to meet. To realize the value of **one minute**, ask a person who just missed a train. To realize the value of **one second**, ask someone who just avoided an accident. To realize the value of **one millisecond**, ask the person who won a silver medal at the Olympics.

Time is our most valuable asset. Now we are going to examine quantum time. This is time on the smallest of scales in life...

- When quantum timing is off by a nanosecond or a 'fermisecond' you lose current on your semiconductors
- When current is lost so is energy
- When energy falls diseases ensue
- When diseases ensue leptin resistance is a usual suspect in the process,
- When timing is off so is leptin physiology
- When timing is off there is a big problem in the timekeeping tracks of the pineal, hypothalamus, and every organ clock in your body.

## **Do we need RNA or DNA to tell time in any life form?**

The short answer is no, we don't. And because we don't this should give you a huge insight into something more exciting. It means that **something other** than a biologic pathway or chemical has to control all circadian signaling. And guess what, that is also true. Today, you will begin to understand how life accounts for time using quantum electrodynamic particles and waves. It also will help you understand why all neolithic disease is tied to an inability to tell time. This is the source of the problem of metabolic syndrome (protons) that is confusing the heck out of modern medicine and

frustrating billions of humans and costing governments trillions of dollars worldwide. Two recent studies done in the Journal of Nature showed this to be definitively true. In fact, both studies go even further, yet I do not think the authors realize it yet. **They have definitively shown how life was organized at its genesis.** This is an observation they wrote about but missed the implications because of how entrenched they are using reductive science.

They showed that in the presence of no DNA transcription or protein transcription the cells still retained the ability to tell time. They used red blood cells, which have no nucleus, so there can be no gene activation in the cells, and they used an organism called *Ostreococcus tauri* to prove their points.

*Ostreococcus tauri* has an interesting chronobiologic property. It is a protist organism that uses a **photo-electric effect to tell time!** For example, when the organism is kept in constant state of darkness, there is no DNA transcription or RNA translation that can be detected. (O'Neill et al. 2011). Yet, when the organism senses light, it is able to maintain a perfect circadian rhythm *without the help of any nuclear control.* **This is a place where the microcosm of QED meets the macrocosm of how life really works.** Epigenetic signals control how the genome is expressed. The genome is just a piece of hardware that the software runs. The software is what adapts to the environmental signals and this, in turn, is what drives gene transcription. Here, we see definitive control of a molecular clock by the particle waveform of light alone independent of any biologic pathway or network. It is just an event coded by light, a naturally occurring part of the Electromagnetic spectrum of radiation. The photon's quantum effect in the cytoplasm affects a chemical bound to water that transduces the photon energy to a chemical message encoded for in a

single protein. The light controls electrons with the photoelectric effect and uses red light to control proton motions. This directly ties to the photoelectric effect to a vibrational oscillation change in the molecular bonds of a protein suspended in water. What is the transducer of the light? Coherent water in the cytoplasm is the short answer.

Herbert Frolich, the dominant biophysicist predicted in the late 1960's that hydrated proteins and light is all that is needed.

Why is this exciting for biology? Because these two studies are showing us where the genesis of life is. It is where QED and chronobiology collide primordially, and where a new paradigm can be born if we are perceiving what the observation means. Sadly, very few in this field even realize what these two papers really mean. I think I might, and that is what this blog is about. Paying attention to observations and then placing them into a reductive cavity of knowledge to examine.

The results of both papers demonstrated that transcription of DNA and translation of RNA is not necessary for the generation of circadian rhythms in two different types of eukaryotic cells belonging to **evolutionarily very distant relatives – protists and mammals. This suggests a primordial controller is at work using a quantum effect on protons and electrons to get the message to the biologic system to work well.**

**Biology Geeks:** Both studies began looking at the protein/enzymes called peroxiredoxins in the cytoplasm. Peroxiredoxins are ubiquitous molecules in almost all of life forms found on this planet. Peroxiredoxins are protein enzymes that protect the cells from damage by powerful chemical oxidizers we call “free radicals”. We spoke about them in detail in Quantum Metabolic Syndrome blog. The process of neutralizing these ROS/oxidants temporarily changes the chemical structure of the peroxiredoxin, which then reverts to its native state again – thus the molecule is constantly switching between the two states. **This change in**

**vibration is done by the photoelectric effect being transduced in water.** The peroxiredoxins are bound to our water crystalline gels in the cytoplasm. When energy substrates like protons, bind to the water it exposes the dipolar molecular network of water to the -CH<sub>3</sub> groups of the peroxiredoxins to unfold them to allow them to do their quantum magic inside a cell. When energy levels from protonicity and the photoelectric effect begin to diminish it is the signal to activate these proteins. I just spoke about this in a recent podcast with Ben Greenfield.

**Biophysics Geeks:** The energy of the proton and/or photon is transferred by resonance transfer and this changes the molecular structure of the peroxiredoxins in the cytoplasm. This QED oscillation between the two molecular states follows a 24-hour cycle synchronized to the day-night cycle found on Earth. Here we see clearly photoelectric change seen in our environment directly alters the oscillations found in these biologic proteins. They basically have described how light actually is the EMF signal that allows us to tell time, and they don't even seem to know it yet. This is the manner in which all things use light from photosynthetic reactions to tell accurate molecular time. Life then evolved a complex molecular clock mechanism around the action of photosynthesis using the SCN and pineal circuits in most brains of life. This is why molecular clocks are ubiquitous in all species as you heard from Jessa Gamble in the Cold Thermogenesis 2 blog post video.

☒ **Geeks Unite:** In both Nature studies, peroxiredoxins were detected using antibodies ("immunoblotting"). One of the chemical states of the molecule can be detected with this method, while the other state is indirectly detected by the comparative lack of signal. Thus a circadian rhythm would be seen as an alternating series of rises and falls of the detected signal with a period close to 24 hours.

And this is exactly what they discovered in both cases – there was a clear circadian rhythm of peroxiredoxins state-switching both in cultured red blood cells (above right) and in the cultured *Ostreococcus tauri* (below).

☒ Furthermore, in the protist study, they used the measurement of light emitted by luciferase added to the seawater solution as a marker of DNA transcription and translation. While the cells were kept in constant darkness no light emitted due to the presence of luciferase could be detected.

But at the onset of environmental light, luciferase-induced light measurements indicated that the transcription started at the phase predicted from the state of the clock **before** the cells were placed in the dark. This means that the circadian rhythm of DNA transcription did not start at some “Phase Zero,” triggered by switching on the light, but that it was driven by a clock that was operating all along while the organism was kept in the dark – a clock that does.

Thus a circadian rhythm would be seen as an alternating series of rises and falls of the detected signal with a period close to 24 hours. this helps us understand why shining a small amount of light on our skin during sleep can radically alter our own melatonin levels in the brain with direct skin exposure.

**It also underscores why any ambient blue light from artificial light sources is very damaging to our own internal timing mechanisms.**

**The big implication for life: This ability pre-dates the formation or the physiological requirements of DNA or RNA.**

These findings again support my assertion from the cold thermogenesis series, that sleep and darkness are the primordial conditions of all life. I believe we evolved

wakefulness. In fact, I believe circadian signaling predates the formation of DNA on this planet. Moreover, it implies that the ability to tell Quantum time is foundational in the electromagnetic spectrum of light.

**Quantum Leptin Bomb for the Geeks:** On this blog over the last 3 years, we have focused on the SCN to make many points about how circadian cycles are controlled and linked to biochemical and neural pathways. What is most important, and something I have yet to address is **how the SCN yokes all the peripheral molecular clocks in organs**. The work in the two Nature papers shows you how it is done, foundationally. It is done using quantum effects due to the electrodynamics of lights' spectrum. **Light EMF and temperature are massive influencers and controllers of the organ clocks.**

## **The genesis of Biologic rhythm: total geekdom**

The capacity to undergo rhythmic oscillations is a characteristic intrinsic to living matter. A fundamental statement of chronobiology states 'many rhythms persists even in complete isolation from the major known environmental cycles. This affirmation clarifies that the natural rhythms can be considered to lay outside of the period of the geophysical cycles. This means that living matter has its own time, i.e., the 'biological time'.

Assuming time as the fourth dimension of biology, one can conceptually and syllogistically argue that a Chronome exists in the genome. Besides the physical (physemes) and chemical (chememes) signals, one can assume that the genes provide information also in the form of 'chronemes', i.e., signals of periodic type. In such a way the process of clonation is timed by determined periods and results in a combination of quantal and temporal messages which cause the biological functions to quantitatively change according to a programmed spectrum of

periodicities. Speculatively, one could presume that the temporal signals find their periodic genesis within the helicoidal spirals of DNA where the chronome should reside. The DNA double helix could act as a metronome generating a vibration whose length is the period of clonation. Not only is DNA the alphabet for mankind's proteins, but it also acts as a language for the timing of musical dance that biochemistry must follow to work.

It has been suggested that the gene inherits not only the capacity to clone (Ergon) but also the capacity to endure (Chronon). The concept of Chronon refers to the expression of genes as a function of the chronological time which is linear, irreversible and progressive. The concept of Chronome relates to the expression of genes according to the chronobiological time which is cyclical, irreversible but recursive. Accordingly, the chronological time could be seen as the summation of the iterated periods which constitute the time base of biological rhythms.

## **So in humans, where do we tell time?**

The clock in the SCN is the major controller overall for timing, but when we face environmental mismatches that specifically involve the use of any particle/waveform tied to QED, it increases the likelihood that we can have desynchronization of the SCN from the peripheral clocks. It appears the brain has a dual timing mechanism. It has the older analog clock that responds in a graded fashion to one photon of light of many. The SCN and Pineal gland seem to be big players in the analog system. The retina and visual apparatus are the newer part of the clock called the digital system. They use a binary code of off and on with light. The action potential of the optic nerve is all or none. When light is present at the human eye ROS and ELF-UV light is

released from cells. (van Wijk)

When we have desynchronization of the SCN from the peripheral organ clocks, we call this a phase shift in chronobiology.

This is how we lose track of Quantum time (small time) that I mentioned in EMF 6. Moreover, this gets translated directly to leptin receptor signaling in the hypothalamus and downstream it directly affects all the hormones of life. It also is sensed in the pineal gland. The more blue light it gets the more calcium it leaches and the less melatonin is released. This ruins autophagy efficiency in humans and regeneration potential drops. Many modern humans now suffer from calcified pineal glands early in life-based upon CT scanning data. The leptin receptor is part of the ancient timing mechanism that life built to tell time. It gets signals from the analog and the digital system in the brain.

This is why leptin is found in the biochemistry of animals that date back to the Cambrian explosion. **The leptin receptor does this by counting quanta of light, phonons, protons, and electrons from food. It is a quantum clock, not a calorie clock that most believe.**

It is intimately tied to energy balance and conservation and accurate timing of all biochemical reactions in the body. It works on the principle stated in Einstein's fourth paper from his miracle year in 1905. This paper is least well known of all four but the most cited for real life explanations of how the world really works. This paper was on the Brownian motion but it put forth a foundational principle in all of nature.

**Any fluctuation in timing leads to a massive loss of energy and information.** This theorem is called the fluctuation-dissipation theorem. As I mentioned in my recent podcast with Ben Greenfield this theorem uses stochastic calculus and not ordinary calculus. Most humans think change is linear. It is not. It works on stochastic math, which is non-linear. This is why the stock market and human behavior vary. The variance is locked into a strict mathematic relationship. **That**

**variance uses the square root relation.**

Unlike regular calculus, which is used to predict trajectories of ordinary motions like a ball, stochastic calculus inherently assumes this square root dependence on time. This is precisely why people do not get the changes they expect from measure to lose weight or reverse and illness. It is not a linear progression as they expect. I have said this numerous times on my forum, but few people have questioned me why. Now they know. It is based upon stochastic math and probability waves founded in Einstein's fourth paper. Most of life is lived in the tail of a bell curve and not under the curve. This offends common wisdom and that is why it invokes the Dunning Kruger effect. It is quite random on the very short time scales used in biology on the inner mitochondrial membrane where quantum tunneling acts. People think that time is linear. Neils Bohr wrote early in the 20th century that all life is complimentary. It can and must be thought of in two ways, one based upon a particle form and another based upon a waveform. It seems counter-intuitive, but that is precisely what Quantum mechanics requires of nature's laws.

In quantum mechanics, time can only move forward or into the future. There is no chance to go back in time. Einstein's fourth foundational paper shows this, as a foundational physical law of the universe. Obesity researchers do not realize this because they are caught in the "wrong scale" of understanding. Biochemical reactions are **5 levels below this quantum level of understanding**. To build a building would you begin on the 5th floor before you started in the basement?

Well, in my opinion not understanding QED is exactly why obesity researchers and modern man are clueless about obesity causation, variables controlling weight loss and the development of all neolithic diseases. We need to look at nature's laws to see how the foundation of how life works. **It is a quantum world and all life uses a quantum blueprint.** This means you need to know about electrons, protons, light,

sounds, and isotopes. A primal blueprint is about 50 stories away from the basement. This is the math of the leptin receptor. It is a quantum thermostat that uses stochastic calculus to accurately assess the Joules in a system to measure energy balance over a quantum time scale.

This is how we can get leptin resistance in the brain, liver and muscles levels and this is why each one of these situations was given its very own blog in the original leptin series. We had Leptin 1, Leptin Part Deux, and Why is Oprah still fat. These posts describe what happens when the quantum timing is off on the cytochrome proteins, but do not mention it specifically on purpose, because you had to know QED was involved a priori. That is way too complex for any beginner, especially an obesity researcher whose dogma blinds them to an inconvenient truth. When the cytochrome timing is off you can bet timing at Kreb's bicycle will be off and you'll be redox shifted back to older metabolic pathways not as dependent upon the movement of electrons and protons in the mitochondria.

Moreover, When you begin to understand the complexity of clock management and how they are all tied to environmental signals to tell time on a quantum level their control mechanism becomes paramount. Today's blog post is giving you a birdseye view of how the photoelectric effect actually works independently of RNA or DNA. Remember I told you in EMF 3 about the origin of life? At its outset, there was no DNA or RNA. What did I say was present? There were huge amounts of EMF and the "pieces of life" were suspended in ocean water at sea vents. Photosynthesis, either directly or indirectly, is the source of all life on this planet. The only exception to this rule is on the seafloor. The exceptions are chemoautotrophs that live in rocks under the seabed that turn the chemicals evacuated from the vents into energy by forming simple organic and inorganic chemicals that are suspended in water. I then explained to you how the primordial pieces and parts came together in that blog post.

Once they came together in a space-time continuum that matched, they began to construct a method to tell time using the photoelectric effect and water to form a complex nanomachine to tell quantum time. Today, you are seeing how that process actually works on a larger scale. Quantum mechanics is taking the subatomic world and making sense out of the reality of your life now. I understand it may be hard to fathom, but it is the general blueprint of how life works because these are nature's laws, not man's laws or beliefs found in an RCT.

Experience directs our learning to instruct us, how one event or observation constantly follows another; without instructing us in the secret connection of the events or observations, which binds them together, and renders them inseparable. This is where wisdom is found. Today's post exemplifies this situation perfectly.

The clock in the pineal organ, the clock in the retina, the clock in the SCN (the suprachiasmatic nucleus of the hypothalamus), the peripheral clocks in all the other tissues all behave differently, but they use the exact same molecular machinery. Think back to quantum biology one for a minute. I taught you about how biology builds a zero entropy system for perfect energy/information transfers in water and carbon nanotubes. I have not given you all the goods yet, but I will when you slowly assimilate all you are learning in each blog.

It does this by using multiple pathways to do many things. Here we see the same thing in central and peripheral clocks controls. Even before these two studies in Nature, it was clear to me from the neural network level, that the properties must have been modified by something else in the environment that affected the cell directly or indirectly using the interactions between cells in the tissue to control the process. Dr. Montaigner work on water and EMF's were the missing link, in my humble opinion. Light is part of the EMF spectrum. It became clear to me at least that the path of

life and circadian cycle control is the domain of quantum controls that use particle and wave mathematics to be the thermostat to control the processes in cells. Life then built a complex set of biochemical and hormonal pathways to create micro nanomachines to transduce those environmental signals to control the processes of growth and metabolism in their zero entropy systems.

The key chemical to the entire equation is the use of water because it is the ultimate quantum canvas for life to paint her masterpiece on. It is the perfect dipole molecule to bind to proteins to make liquid crystals function as semiconductors. It does things to electrons and protons you won't expect. These effects are all non-linear. It just made fractal sense the more I dug into the science of 9 different scientific disciplines. The real problem blocking all nine from this reality is that none of them seem to know what the other is studying and finding out. They just keep doing their own thing without sharing what they have learned.

If you examine the requirements for a rhythm to be considered a circadian cycle, one of the axioms it must follow is that the rhythm must be independent of the temperature cycles. This alone, strongly suggested to me, that cold is the primordial condition prior to life. It also implies that life would have had to account for the rhythm of light internally utilizing biologic processes at the genesis of life. Long ago in the chronobiologic literature, Colin Pittendrigh made an educated guess for a single origin of the circadian clock, due to universally adaptive nature of the clock. I think he was close to correct in his speculation. I believe the origin is primordial and tied to light's EMF spectrum.

In the case of mammalian red blood cells, the result is clear – there is no DNA or RNA in these cells. *Thus, the circadian rhythms in these cells have to be generated in the cytoplasm.* In the case of *O.tauri*, the picture is a little bit more complex: the cells have a nucleus which has DNA. There is a

clock driven by transcription and translation of canonical “clock genes.” Yet, when this mechanism is suppressed – either by constant darkness or by chemicals – the cells still exhibit circadian rhythms generated by the sub-atomic molecules residing in the cytoplasm. The phase at which the DNA-centered clock starts its cycle is determined by the phase of the cytoplasmic clock, not the other way round.

## **What else did these two 2011 studies tell me?**

**They explained the deep biologic purpose of sleep.** If you remember in the Cold Thermogenesis series I said I believed sleep was also primordial to life, and we evolved wakefulness.

Many of the studies in chronobiology literature have pointed to a big sleep paradox. The genetic and non-genetic models of molecular clocks cannot explain the complexity of the observed reality that is sleep. What do I mean by that? Many physiologic phenomena we observe to occur cannot be explained by their theories, such as the purpose of sleep. The latest two articles also point to the same paradox. **Sleep is not a property of individual tissues or even individual cells, but it is found in the background of all the interactions between the organization of cells in all tissues.** Even more foundational, in my opinion, is that all the interactions between the organism and its environment involve sleep at a core level. Hence this is why I believe that sleep is the primordial condition of all life. **We had to evolve wakefulness.**

I think this explains the paradox in all these chronobiologic papers. We have seen through the human genome project data that “gene theory” alone can not explain the complexity of human life when we have fewer genes than our ancestors, and yet, we have extraordinary physiologic traits never seen before in our primate tree. Might there be another way to

transfer information other than DNA? There is no way the hardwired genome can be the ultimate controller of us. This is precisely why cancer researcher remains stumped about cancer in my opinion. They do not understand how the current of injury has homology to regeneration in animals like salamanders. Salamanders can regenerate huge parts of their missing body and they never get cancer. Moreover, if they do not get taken out by a predator they can live forever. This implies they are a perfect example of a zero entropy system that uses QED perfectly.

Cancer researchers believe the genome is the key when the science says it is the epigenome, the software that really runs our computer (genome).

Scientists and lay public forget that comparative anatomy is what validated the genetic method, not the other way round. Moreover, I believe that this discipline will also validate how QED controls electrons and protons to give biophysical controls over biology, organic chemistry, and genetics. I think the brain is the key in making these linkages. My blog exists only to point out these things.

The simplistic “this gene is for clocks” model just could not explain the complexity of observed reality that is sleep.

## **Where does this paradox come from?**

Biologists and physicists scientific work has not yet had a ‘sexual relationship’ in experimental science. Let me explain: Fundamental misunderstandings have been occurring between molecular and organismal biologists for 50 years because geneticists come from an educational lineage that had its genesis with a physics book! The field of genetics began in Edwin Schroedinger’s book, What is Life in 1944. This group believes there is a genetic program that controls everything; Their latest champion is Richard Dawkins, who is brilliant, but quite brilliantly wrong about how biology

really works. Organismal biologists are strict biologists and bound to Darwinian theory. They believe in natural selection and the conditions of existence as the dominant factors that shape life. They are just collectively realizing that Darwin's original idea, that the conditions of existence (epigenetics), is by far, the more important factor for life, that is "natural selection". Darwin actually also said this in 1859 but it appears no modern scientist has read what he originally wrote. I did in 2003, and now they seem to be slowly awakening from their long haze of bewilderment. This change is recent and due to the 2003 Duke studies, I mentioned in the CPC blog here.

These two types of biologist do not share the same core principles, yet, they are working on the same problem. The missing link was Schroedinger's original lineage: physics.

He was intrigued by biology but he did not have an understanding of the science to see how the subatomic world of QED directly plugged into both versions of biology in the study of molecular clocks. This is the real source of the paradox. Honestly, there is no paradox in my view. It is a lack of scientific systems understanding that lack the ability to think across disciplines, because of how we structure and teach science in the world today. If Einstein thought like modern scientists we would have never gotten to the moon on Newton's math. It is time for biology to get the same message. They need Einstein's math to validate how biology really operates under the same laws of nature that govern the universe.

Darwinian biology describes phenomena that are a result of a myriad of interactions but have no particular dominant factor at play. Genetics is 180 degree opposite this paradigm today. They believe there is a reductive pathway from a gene to cell to tissue to physiologic function to explain everything we observe in life, and then we have QED who says we can have "spooky action at a great distance" because of nonlocality,

quantum tunneling, etc. The organic chemists believe that there is no such action possible at a distance in chemistry. No wonder modern medicine is a mess! We know energy and information about electrons and protons transfer and that input come from sunlight. It is based on the core beliefs of these fields as well. Your results are this way because of this thinking that science should be studied in special areas independent of a more global view. **It is like a giant game of telephone, except the message is seeing your health disappear as one person talks to another via a journal filled with RCT.**

Instead of a reductive view, we need a top-down approach, to include all principles to come up with a 30,000 foot understanding of how life works using biology, chemistry, and physics. The study of circadian biology is the best place for this to begin, in my humble view. Sadly, these two papers caused a stir in academia and the media, but no one has unified the concepts why they are huge for us. I hope today to engage some minds to see how they “marry” to one another. All biology is based in QED, in my humble opinion. That is what this current series is all about. It is trying to put the pieces of together of why modern medicine can't solve the biggest epidemic the world has ever seen in Metabolic Syndrome.

**It is hard to fix when you have no idea that the loss resonant energy transfer from the EMF to electrons and protons is changing the messages from the Sun and Earth. The mechanism is clearly found in QED theory to water is behind “the curtain” causing all neolithic disease.** If you scour the chronobiology literature every known disease has a link back to problems with the molecular clock at some level. Sadly, no one is making these connections yet. But they are getting what I have been saying for 8 years.

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- CPC #4: Evolutionary Friend or Foe?
- CPC #7: Obesity Qualia
- The Cold Thermogenesis Protocol
- Leptin: Chapter One
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- Do Food Electrons Impart a Quantum Effect?

## Cites

- O'Neill JS, & Reddy AB (2011). Circadian clocks in human red blood cells. *Nature*, 469 (7331), 498-503 PMID: 21270888
- O'Neill JS., Gerben van Ooijen, Laura E. Dixon, Carl Troein, Florence Corellou, François-Yves Bouget, Akhilesh B. Reddy and Andrew J. Millar, (2011). Circadian rhythms persist without transcription in a eukaryote, *Nature*, 469 (554-558), doi:10.1038/nature09654
- Njus, David, Frank M. Sulzman & J. W. Hastings (1974) Membrane model for the circadian clock, *Nature*. Vol. 248, pp. 116-120, doi:10.1038/248116a0

- <http://www.euroestech.net/cpemuk/cpemuk.php>
- MERGENHAGEN, D. and H. G. SCHWEIGER, (1975a) CIRCADIAN RHYTHM OF OXYGEN EVOLUTION IN CELL FRAGMENTS OF ACETABULARIA MEDITERRANEA, Experimental Cell Research 92:127-130
- MERGENHAGEN, D. and H. G. SCHWEIGER, (1975b) THE EFFECT OF DIFFERENT INHIBITORS OF TRANSCRIPTION AND TRANSLATION ON THE EXPRESSION AND CONTROL OF CIRCADIAN RHYTHM IN INDIVIDUAL CELLS OF ACETABULARIA. Experimental Cell Research 94: 321-326
- Mori, T., Binder, B., and Johnson, C.H. (1996) Circadian gating of cell division in cyanobacteria growing with average doubling times of less than 24 hours. Proc. Natl. Acad. Sci. USA 93, 10183–10188.
- Mori T, Williams DR, Byrne MO, Qin X, Egli M, et al. (2007) Elucidating the Ticking of an In Vitro Circadian Clockwork. PLoS Biol 5(4): e93. doi:10.1371/journal.pbio.0050093
- Nelkin and Lindee (2004) The DNA Mystique, University of Michigan Press.
- Nijhout, H.F. (1990). Metaphors and the Role of Genes in Development. BioEssays 12:441-446.
- Nitabach, Michael N., Todd C. Holmes and Justin Blau (2005) Membranes, Ions, and Clocks: Testing the Njus–Sulzman–Hastings Model of the Circadian Oscillator, Methods in Enzymology, Volume 393, 2005, Pages 682-693, doi:10.1016/S0076-6879(05)93036-X
- Njus, David, Frank M. Sulzman & J. W. Hastings (1974) Membrane model for the circadian clock, Nature. Vol. 248, pp. 116-120, doi:10.1038/248116a0
- <http://blogs.scientificamerican.com/observations/2011/02/11/circadian-clock-without-dna-history-and-the-power-of-metaphor/>
- ADAMICH, MARINA, PHILIP C. LARIS & BEATRICE M. SWEENEY (1976) In vivo evidence for a circadian rhythm in membranes of Gonyaulax, Nature 261, 583 – 585, doi:10.1038/261583a0
- Barnett, Audrey (1966) A circadian rhythm of mating type

reversals in *Paramecium multimicronucleatum*, syngen 2, and its genetic control, *Journal of Cellular Physiology*, Volume 67, Issue 2, pages 239–270

- Bass, Joseph and Joseph S. Takahashi (2011) Circadian rhythms: Redox redux, *Nature* 469: 476–478, doi:10.1038/469476a
- Brandon, R.N. (1996) *Concepts and Methods in Evolutionary Biology*. Cambridge University Press, Cambridge, UK.
- Cornelius, Gerd and Ludger Rensing (1976) Daily rhythmic changes in Mg<sup>2+</sup>-dependent ATPase activity in human red blood cell membranes in vitro, *Biochemical and Biophysical Research Communications*. Volume 71, Issue 4, 23 August 1976, Pages 1269-1272
- Dawkins R (1976) *The selfish gene*. Oxford University Press.