Water – Nanoscale to Microscale to Macroscale

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Abstract

This paper deals with frequency and fractal related aspects of coherence in water which link the nanoscale through the microscale to the macroscale with particular reference to possible evidence for nilpotency events. It is based on the concept of domains of coherence in water. It develops work reported in CASYS'01 which showed that the basic arithmetic operations could be performed on frequency imprinted aliquots of water and in CASYS'05 where this was extended to implementation of the basic reversible logic gates. Memory in living systems, DNA and water are considered in respect of possible computer system applications and a nilpotency rule.

Keywords: Water, Frequencies, Coherence, Fractals, Nilpotency.

1. Introduction

Fröhlich investigated the properties of coherence in living biological systems as described in his Fest-Schrift. (Smith, 2006). Domains of coherence in condensed matter including water were predicted by Preparata and Del Giudice (Arani et al. 1995). Their theory gives the experimentally determined values for many of the physical properties of water including: critical volume; boiling temperature; latent heat of vaporisation; specific heat; the specific heat and compressibility anomaly at 230K; density anomaly at freezing point and the low frequency dielectric constant for water. Smith (2001, 2005) showed that arithmetic and logic operations could be performed on frequencies imprinted into water.

An emerging view is that memory in living systems, DNA and water is *quantum holographic* and *syntactic* with the information encoded in *phase* (possibly the phase of a macroscopic wave function) and operations modelled on computer *'re-write'* systems with a 'nil-potency' rule. A quantum holographic system is the only system which places its image in the actual location of the object in space and time (Marcer and Schempp, 1998). Recent work on computer *'re-write'* systems looks towards a universal system with only a 'create' and a 'conserve' function which must be iterative and recursive from a 'start-object' to a 'stop-criterion' with a 'nil-potency' or 'empty-set' rule (Diaz and Rowlands, 2004).

Rowlands (2007) has described a form of expression for the 'Dirac Equation' which contains purely physical information so that mathematics becomes an intrinsic part of physical structure. Furthermore, the equation contains three terms which separately express the "energy", "momentum" and "mass" in the physical system. He postulates that the most general form of the wave function is nilpotent (the square root

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of zero) and the operator $(\pm \boldsymbol{k}E \pm \boldsymbol{ii}\mathbf{p} + \boldsymbol{ij}\mathrm{m})$ which contains the physical information about the system is also a nilpotent in which $\boldsymbol{k}$ represents energy, $\boldsymbol{i}$ represents momentum and $\boldsymbol{j}$ represents mass.

He points out that nilpotent quantum mechanics includes quantum coherence and that living systems acting as hierarchies of quantum Carnot engines could show a boundary between fractal and wave structures and evidence of chaotic working. He does not specifically write the nilpotent Dirac equation in terms of frequencies. This can be done using the relationships $\mathrm{E} = \mathrm{h}\nu$ and $\mathrm{E} = \mathrm{mc}^2$. The momentum term could be represented by a wavelength λ for the coherence length in a coherent system, or by a third frequency = ν_3/c. The term then becomes:

$(\pm \boldsymbol{k}\mathrm{h}\nu_1 \pm \boldsymbol{ii}\mathrm{h}/\lambda + \boldsymbol{ij}\mathrm{h}\nu_2/\mathrm{c}^2)$ or $(\pm \boldsymbol{k}\mathrm{h}\nu_1 \pm \boldsymbol{ii}\mathrm{h}\nu_3/\mathrm{c} + \boldsymbol{ij}\mathrm{h}\nu_2/\mathrm{c}^2)$

Cancelling out Planck's constant gives:

$(\pm \boldsymbol{ik}\nu_1 \pm \boldsymbol{ii}/\lambda + \boldsymbol{j}\nu_2/\mathrm{c}^2)\ (\pm \boldsymbol{ik}\nu_1 \pm \boldsymbol{ii}/\lambda + \mathbf{j}\nu_2/\mathrm{c}^2) = 0$

If the constant parameter becomes the coherence length, then frequency becomes proportional to the velocity with which the coherence propagates and frequency is now a fractal quantity.

Evidence for mass having properties of coherent frequency is seen in the spiral representation of the periodic table of the chemical elements by Stewart, cited by Rowlands (2007) in Chapter 20 and attributed to the phase of quantum coherence. Mass also appears in the work of Partheil (1861-1909) (Partheil, 1903). He studied the relationship between musical notes and the atomic weights in the Periodic Table and found that the acoustic frequency of a resonance he detected was 16-times (in Hertz) the atomic weight. Some 24 different chemical elements happened to be readily available to the present writer. Each was placed between headphone earpieces connected to an oscillator and the resonance frequency detected by dowsing. All elements gave a dowsable resonance at the audio frequency predicted by Partheil.

The physics which relates atomic weight (actually isotope mass) to frequency is the Rydberg Constant in spectroscopy but this gives frequencies in the optical part of the spectrum. If there is coherence and fractality, these should be coupling to lower frequencies. To investigate this possibility, light from a quartz-window mercury discharge lamp was imprinted into water. The frequencies were measured and the fractal ratios determined. The optical to microwave fractal ratio was 1.1893 (± 0.0016) $\times 10^6$ and the microwave to low frequency (ELF) fractal ratio was 23.921 (± 0.033) $\times 10^6$. From the Rydberg Constant and these ratios, the corresponding ELF frequency for atomic hydrogen was found to be 16.061, in close agreement with Partheil's 16 Hz. From the writer's measurements on 24 elements, the ratio of frequency/atomic weight (C=12) gave 16.007 (± 0.021). Measurements on water, deuterium oxide and single crystal NaCl gave resonances at frequencies corresponding to the molecular weights. This means that living systems have the potential for determining atomic, and molecular weights which must be an anticipatory feature for bio-chemical computing systems. It is yet to be determined whether there is sufficient coherence in a living system for it to be able to distinguish between isotopes throughout the Periodic Table.

2. Frequencies in Water

For frequencies imprinted in water, experiments showed that both proton and electron spin precessions are involved whereas, for frequency imprints in metals only electron spin precession states are involved since the ions are immobilised in a crystal lattice.

A water imprint is erased if the geomagnetic field is reduced below the critical value of 375 nT. If erasure occurs when thermal energy exceeds the magnetic energy, this would occur for a spherical domain of phase coherence 52.92μm diameter at ambient temperature. Imprinting a frequency into water affects the natural water resonances so if this model is correct, these must also resonate with coherence domains. We showed in 1983 (Jafary-Asl et al., 1983) that living systems can respond to magnetic resonance (NMR) conditions, even at geomagnetic field strengths. Therefore, a frequency might be retained in water if proton precession becomes coherently synchronised to an applied frequency and the coherent protons generate their own internal magnetic field such as to satisfy proton NMR conditions. Such a process should be stable unless the domain is thermally broken up by removing the stabilising geomagnetic field.

The proton NMR condition gives the precession frequency $\nu = \gamma B/2\pi$ where γ is the gyromagnetic ratio 2.675×10^8 rad T^{-1} s^{-1}, B is the magnetic field and ν is in Hz. The magnetic field B at the centre of a magnetic dipole from a rotating charge is:

$$B = \mu_0 \, n \, e \, \nu / 2a$$

where μ_0 is the permeability of free space, n is the number of charges e involved, ν is frequency (Hz) and a is the radius of the orbit. Whence, the number of charges n required is independent of frequency and only depends on the size of the coherence domain:

$$n = 4\pi \, a \; / \; \mu_0 \, e \; \gamma$$

The number of proton charges required to generate a magnetic field to satisfy NMR conditions is $n = 6.29 \times 10^{12}$. With two protons available for coherent synchronisation from each water molecule, 5.52×10^{15} protons should be available for taking up frequency imprints and enough protons to imprint 982 distinct frequencies. It was found that water at pH 5 would accept 935 frequency imprints, whereas an aliquot at pH 9 it would only accept 77. The pH of water expresses the availability of protons and as more frequencies are imprinted, the pH increases (Smith, 2007).

The fractional bandwidth of the resonance of a frequency ν imprinted into water is 4.6×10^{-6} from at least 10 MHz to 1 Hz. If the Heisenberg Uncertainty Principle is applied to such a system having a lifetime t and there is a sufficient average number of particles $< n >$ for the classical concept of phase to be meaningful, then:

$\Delta n . (h\nu) . \Delta t \geq h/2\pi$ or $\Delta n . \nu . \Delta t \geq 1/2\pi$

If the system involves random events in a continuum of time, a Poisson Distribution is applicable and then:

$\Delta n = \sqrt{(< n >)}$.

The spectral line width $\Delta\nu$ will be the reciprocal of the coherence time Δt so, for random particle fluctuations:

$\Delta\nu / \nu \leq 2\pi / \sqrt{n}$

Taking $\Delta\nu / \nu = 4.6\times10^{-6}$, the number of particles involved $n = 1.9\times10^{12}$. The protons involved in water memory are attached to water molecules so assuming that the fluctuation of one water molecule effectively involves three protons (two bonded protons and two H-bonded ones) $n = \frac{1}{3} (6.29\times10^{12}) = 2.1\times10^{12}$ which is well within the present degree of experimental accuracy.

The present paper deals with the problem of the experimental aspects of water related phenomena from the nanoscale through the microscale to the macroscale with particular reference to fractal effects involving coherent frequencies and instances which may be nilpotency situations where the product of frequencies results in a **zero**.

3. Scales of Magnitude

At the nanoscale, enzymes are structures which show anomalous diamagnetic and Meissner type effects when in an active state and this implies long-range order equivalent to a superconducting current loop. The *lac operon* system in *E. coli* is related to effects at the DNA level and is sensitive to applied magnetic fields at the magnetic flux quantum level. Highly coherent oscillations are emitted from yeast cells at the time of cytokinesis, these are microscale structures. The macroscale structure *par excellence* is the human body. Macroscopic quantum effects occur widely in living systems and water (Smith, 2004). The imprinting and erasure of frequencies in water together with effects of frequencies on living systems are events in the macroscale region.

4. Chemicals' Frequency Signatures

Chemicals possessing a trace of water have a characteristic frequency pattern or signature. The ELF resonances in the n-alkanes have frequencies proportional to the chain length, but only when a trace of water was present. In n-hexane, these resonances disappear below about 14 ppm of trace water.

In general, all chemicals which can H-bond to water have characteristic frequency signatures. They are not present in 100% halogen saturated molecules such as octachloronapthalene. These chemical signature frequencies can be copied into water and can interact with endogenous frequencies in living systems but, with no chemical content to back up the information. However, this frequency information can alter the isomeric structure of a molecule (Lubec et al., 1989).

If there are interactions involving the spectra of water and the characteristic molecular spectra of n-alkanes, these must be in the far-infra-red (FIR) rotational spectrum because this is the only place where n-hexane has any spectrum, which is the reason why it is widely used as a solvent in spectroscopy.

In considering possible water interactions with applied frequencies, it was necessary to place some arbitrary restriction on the otherwise hundreds of rotational water lines which might otherwise have had to be considered. The rotational water lines at 28 μm (357 cm^{-1}), 47 μm (213 cm^{-1}) and 78 μm (128 cm^{-1}) can become coherent enough for use in a water vapour laser and it was concluded that these should also provide the necessary coherence for water "memory". The wave numbers of the above three spectral lines for water and the tabulated FIR spectra for the n-alkanes were used. It was postulated that the energy gap for the water resonances might be related to the differences between the water lines.

5. Fractality

Within a coherent system, the coherence length becomes the constant and velocity becomes proportional to frequency which makes frequency a *fractal* quantity with no absolute scale. Any velocity that the system can support will have a corresponding proportionate frequency and the frequency bands interact. It is this which links chemical spectra to technological and biological frequencies. External radiation will interact with an entire coherence domain but, because of its mass the velocity decreases to something of the order of metres per second. Thus, one finds at least two frequencies, one corresponding to the velocity of light where there is no interaction, the other to the velocity with interaction.

Measurements were made of velocities with which coherence propagates in different materials by measuring the time taken to cover a known distance using an FET transistor at each end of the specimen to interrupt the coherence propagation. Additional measurements of the critical angle at an air interface gave velocities in agreement. The measured velocity for coherence in water was 2.6 m/s and the velocity measured along a human leg was 6 m/s.

Coherence can propagate at superluminal velocity. Energy is only involved in setting up the coherence domains initially. It is detected and measured from the critical angle for total internal reflection; for superluminal velocities this appears on the air side of an air/water interface. Living systems (e.g. tadpoles and earthworms) and water imprinted at a frequency higher than a natural resonance corresponding to the velocity of light show this effect.

6. Fractality and Modelling n-Hexane

Because fractality of frequency in coherent systems works both ways, it is possible to model water H-bonded to a molecule and compare to the measured resonance frequencies of the chemical. Molecular models were assembled from the plastic straws of a molecular model building kit. These had a scaling of length 3cm/Å. To scale the velocities by the same factor of 10^8 the molecular models were immersed in saline at a concentration to give the velocity ratio: 3 m/s relative to 3×10^8 m/s. Table 6.1 compares the frequencies for molecular models of n-hexane in saline with those for the actual chemical. The first column lists the ELF signature frequencies measured for the chemical n-hexane. The second and third columns give the frequencies measured for molecular models of n-hexane in saline. In column 3, the H-bonded water molecules are joined to carbon atoms 1 and 6, this frequency pattern matches that measured for n-hexane with trace water. It corresponds to a H-bonded water chain extending the whole length of the molecule.

Table 6.1: Frequencies for Molecular Models of n-Hexane in Saline

n-Hexane with trace water	Molecular Model C_6H_{14}	Molecular Model C_6H_{14} 4 water molecules bridging $C_1 - C_6$
Hz	Hz	Hz
4.2	4.113	4.204
6.8	7.132	6.824
13	20.31	13.10
19.4	38.11	19.32
26	80.32	25.32
42		41.63

7. Nucleotides

Rowlands (2007) in Chapter 19 compares the fundamental processes involved in biological systems with the mathematical and physical structures essential to the 're-write' procedure with special reference to DNA, RNA and the genetic code.

7.1. Frequency Pattern Synthesis

Nucleotides are the monomers from which DNA and RNA are constructed. The molecules consist of a nitrogenous base, a pentose sugar and a phosphate residue. They form the 'letters' of the genetic alphabet. Each has its own specific chemical frequency signature. The frequency pattern resulting from three nucleotides can be imprinted into 'erased-water'; the water acquires the frequency pattern of the corresponding DNA-codon according to the order of imprinting. Although nucleotide sequences are encoded in the chemistry and structured into the vicinal water, it is possible to operate on the frequency signatures without any chemicals being present. This implies that the physics and mathematics of frequencies in water can be used to produce frequency signatures to match chemical structures without any chemical being present.

7.2. Forward Transcription

Table 7.1 lists the frequency patterns measured from samples of single nucleotides. Table 7.2 compares the frequency pattern of a tri-nucleotide chemical with that from component nucleotides imprinted into water in the same order.

Table 7.1: Frequency Patterns of the Single Nucleotides

Nucleotide	↑	↓	↑
Adenine	2.043×10^{-1}	5.610×10^{0}	$1.511\times10^{+2}$
Cytosine	2.082×10^{-1}	$5.054\times10^{+1}$	$5.652\times10^{+3}$
Guanine	3.212×10^{-1}	6.365×10^{0}	$9.662\times10^{+3}$
Thymine	2.203×10^{-1}	6.906×10^{0}	$2.067\times10^{+2.}$
Uracil	5.872×10^{-1}	$9.211\times10^{+2}$	$2.926\times10^{+4}$

Table 7.2: DNA Frequency Patterns Relating to Forward Transcription

DNA Tri-nucleotide 3' – 5' CTA	4.402×10^{-3}	3.904×10^{-2}	3.215×10^{-1}	3.304×10^{0}	$4.313\times10^{+1}$
Nucleotides C+T+A *imprinted into water*	4.402×10^{-3}	3.904×10^{-2}	3.215×10^{-1}	3.304×10^{-1}	$4.313\times10^{+1}$

The frequency signatures from the DNA and the combination of separate nucleotides are not completely identical. If the tri-nucleotide and the three nucleotides as chemicals are measured together a frequency of 7.801×10^{0} Hz is detected. This frequency is also obtained if the tri-nucleotide or the three separate nucleotides (but not both together) are measured in a Caduceus coil[1]. The next stage for following forward transcription through water imprinting is to make a copy of the frequency signature of the DNA tri-nucleotide into water to remove the chemical component. This copy is then succussed once in the frequency of 7.801×10^{0} Hz; a second succussion brings it to the pattern of GAC as shown in Table 7.3.

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[1] A Caduceus coil is wound as a solenoid but with a second layer of wire over-wound in the opposite sense. The magnetic **B**-fields from the two layers cancel. The vector potential **A**-fields are in the direction of the currents and are respectively clockwise and anti-clockwise giving a resultant a plane wave of vector potential which can interact with the phase of the wave function.

Table 7.3: Successions in 7.801×10^{0} Hz

Once successed DNA	3.052×10^{-3}	5.648×10^{-2}	$3.052\times10^{+1}$
Second succession = G+A+C pattern	2.017×10^{-2}	6.742×10^{-1}	4.106×10^{-1}

This imprint is equivalent to the corresponding m-RNA codon. This is then measured together with G+A+C or separately in a Caduceus coil; a single resonance at 7.414×10^{0} Hz is found. Table 7.4 shows the results from successions in this frequency.

Table 7.4: Successions in 7.414×10^{0} Hz

Once successed m-RNA	3.051×10^{-2}	5.915×10^{-1}	4.119×10^{0}
Second succession = C+G+U = t-RNA	4.603×10^{-2}	5.018×10^{-1}	5.716×10^{0}
Third Succession = aspartic acid	2.501×10^{-3}	2.007×10^{-2}	2.007×10^{0}

Note that several frequencies around 7.8 Hz appear in the above Tables. This frequency seems to be a general promoter for changes to water imprints. It is also the endogenous frequency of the heart meridian and chakra and it appears in Schumann Radiation from the ionosphere under which evolution has taken place.

7.3. Reverse Transcription

Successions using different frequencies will take the amino acid frequency pattern in water back to that of the DNA. Firstly, measure the amino acid chemical and the above water imprint together or separately in a Caduceus coil. This gives the promoter frequency for the reverse transcription as 3.151×10^{0} Hz. Table 7.5 lists the results of a series of single successions in this frequency.

It appears that the application of the physics and mathematics of frequencies in water will take patterns of coherent frequencies through the paths that would be followed if the actual chemicals had been present to H-bond to their vicinal water.

Table 7.5: Successions in 3.151×10^{0} Hz

First succession of amino acid imprint in water = C+G+U =t-RNA	4.603×10^{-2}	5.018×10^{-1}	5.716×10^{0}
Second succession	3.051×10^{-2}	5.915×10^{-1}	4.119×10^{0}
Third succession = G+A+C	2.017×10^{-2}	6.742×10^{-1}	4.106×10^{-1}

Finally, the result from the third succession is measured in a Caduceus coil (or with G+A+C) and this gives 7.810×10^{0} Hz again. Success once at this frequency and the amino acid water imprint is found to have returned and to be the same as the five frequencies listed in Table 7.2.

8. Nil-potency

This section attempts to identify systems and measurements which might be used to investigate nil-potency. The criterion used is that the product of two operations shall result in a **zero**. Effects are found in the process of potentisation and in the 'Three Courses' of the acupuncture meridians.

8.1.Potentisation

Experiments on the imprinting of water by *succussion* (i.e. mechanical shock) using a free-fall ampoule of water showed that momentum change rather than energy change was involved (Smith, 2008). The nil-potent equation contains a momentum term.

When water is imprinted by succussion with 10 Hz the water resonance frequencies become **zero** and are replaced by two sidebands at ±10 Hz in the ELF. The GHz and THz fractals are replaced by proportionate sidebands.

When water is imprinted by succussion at 1 Hz and then serially diluted tenfold (1+9): the 1 Hz remains. When it is successed - the 1 Hz **disappears** to be replaced by 10 Hz. In general after succussion, the original frequency **disappears** to be replaced by that frequency multiplied by the dilution factor. However, a 7-fold dilution does not potentise and gives the pattern of the 6-fold dilution; the 11-, 13- and 19-fold dilutions do not imprint any frequency - **zero imprint**. These are all prime number dilutions. The same thing happens for these dilution ratios multiplied by 10, 100 and 1000.

8.2. Organs and Meridians in Chinese Acupuncture

Chinese acupuncture recognises 11 organs in the sense of them being general structural and functional entities. There are 6 Yang organs and 5 Yin organs which interact closely with the 'channels' or 'meridians' serving them. There are 12 meridians running parallel to each other in the limbs and these are paired into Yang which is characterised by exterior, excess, heat; and Yin which is characterised by interior, deficiency, cold (Stux and Pomeranz, 1991). With two median meridians these make up the 14 meridians on which the 361 'Classical Chinese Acupuncture Points' are located.

The 12 meridians are divided into 'Three Courses' through which 'Qi' or bio-information is supposed to flow. The frequency measured when pairs of Yang or Yin meridians are joined with a wire connected between a pair of acupuncture points is the geometric mean of the high and low frequency on each Yin or Yang branch.

If the frequencies of a Yin and a Yang branch are imprinted into separate vials of water, with the Yin and Yang imprinted in opposite phases and the vials are then placed close together so that the wave functions overlap, **no frequency can be measured**. This is a situation in which the products of frequencies give a **zero** resultant.

If three of the four frequencies of a Course are imprinted into a single vial of water, any attempt to imprint the fourth frequency **erases all the frequencies.** This is clearly an **anticipatory** system whereby in the normal or healthy state, the frequencies around a 'Course' are **nil-potent,** but if any organ within the 'Course' changes its frequency from its healthy endogenous nilpotent value, an alarm frequency will appear.

9. Conclusions

Fractality of frequency in coherent systems links the nanoscale through the microscale to the macroscale in water, DNA and living systems. Nilpotent effects may occur on the basis of the product of two operations giving a zero outcome and provide the system with an anticipatory feature through the appearance of an error signal when nilpotency ceases. A coherent frequency is the basic instruction. A physical mechanism for the memory of frequencies in water is presented. As shown in previous CASYS papers, frequencies imprinted into water can be processed arithmetically and operated on by the basic reversible logic gates. The operations are clocked by voltage pulses which can be as small as nerve impulses so these operations are available to living systems. Frequency erased water would be a suitable medium for a 'create function'. A 'start-object' might be a frequency imprinted into this water. Frequency "memory" would be the 'conserve' function. Erasure would be the 'stop-criterion' and nilpotency would provide both an anticipatory feature and remove redundant information.

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