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New experimental data revealing an unexpected dimension to materials science and engineering

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Abstract The experimental portion of this paper deals with the use of Intention Imprinted Electrical Devices (IIED's) to significantly alter the measured properties of both inanimate and animate materials. The target materials selected for this study were (1) water, (2) the liver enzyme, alkaline phosphatase (ALP), (3) the main cell energy storage molecule, ATP, and (4) living fruit fly larvae. By comparing the separate influence of two physically identical devices, one unimprinted and the other imprinted via a unique meditative process, a robust influence of human consciousness on these four materials has been demonstrated. Furthermore, the IIED's are shown to produce a "conditioned" space where oscillations in material properties occur. The theoretical portion provides a speculative, but internally self-consistent, quantitative model for explaining this anomalous data. The model requires an expansion of our conventional thermodynamic perspective to embrace the consequences of physics gauge symmetry changes in nature associated with significant inputs from human consciousness.

Keywords Consciousness · Intention · Water · pH · Liver enzyme · ATP · Material properties · Vacuum structure · Oscillations · Gauge symmetry

Introduction

In a recent book, Radin [1] has provided clear and incontrovertible evidence to support the existence of ESP capabilities in humans. Likewise, Benson [2], Wolf [3] and Enserink [4] have clearly demonstrated the reality and power of the "placebo" effects in medicine and pharmaceuticals. Further, Puthoff and Targ [5], Jahn and Dunne [6], Targ and Katra [7] and Dossey [8] have clearly shown that humans are capable of highly accurate long range (~800–8000 km) cognition of location details plus events and of eliciting human health transitions at such distant locations.

From the foregoing, one might certainly ask the question "Can these partially developed human capacities have meaningful relevance for materials science?" The answer is a definite "yes" from the interesting results reported both in this journal [9] and elsewhere [10]. This data clearly indicates that both Qigong masters and adepts can significantly influence materials and processes both locally and non-locally located. Surely it is well past time for scientists to begin looking seriously at the structure of our present physics paradigm wherein there is no place for the human qualities of spirit, mind, emotion, intention and consciousness to influence the forces of nature. However, based on the foregoing experimental data [1–10], they clearly do! This paper is a beginning attempt to rectify the situation.

In this paper, the authors lay out the results of four target experiments showing even more objectively that human intention, under special conditions, can robustly influence the thermodynamic potentials of nature. This appears to occur via raising the "condition of symmetry" or "physics gauge" of the locale. In turn, this allows one to formulate an expansion of our current physics framework in such a way as to naturally introduce an intention-augmented component to *any* material property measurement.

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Experimental protocols and results

For the past several years we, with Michael Kohane, have been conducting specific target experiments on the use of IIED's (Intention Imprinted Electrical Devices) to influence both inanimate and animate materials with respect to some of their properties [11–15]. For each target

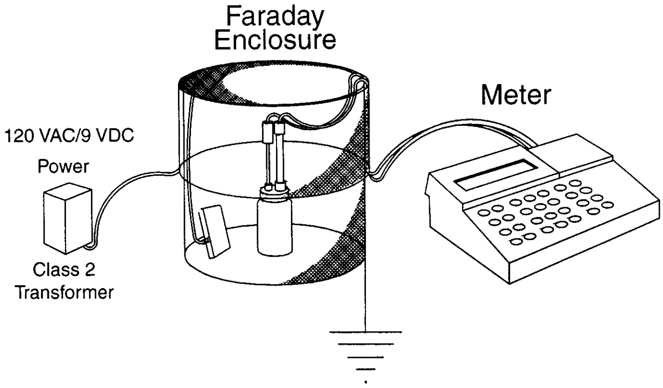


Fig. 1 Schematic drawing of experimental set-up used in simultaneous exposure to a device and pH plus temperature measurements

experiment, one starts with two identical simple electronic devices housed in 17.8 cm × 7.6 cm × 2.5 cm black plastic boxes. One isolates them from each other by first wrapping them in aluminum foil and then storing them in separate electrically grounded Faraday cages (FC's). One is left as is and is designated as the "control." The other is taken out of its FC, unwrapped, and "charged" with the specific intention for the particular target experiment under consideration. It is then rewrapped in Al-foil and returned to its FC.

This charging process involved the services of four highly qualified meditators to "imprint" the device with the specific intention following a specific protocol (see the Appendix of [11]). Then, on separate days, the control device and the imprinted device were shipped via Federal Express about 3000 km to a laboratory where the actual target experiments were conducted by others.

Fig. 2 pH vs. time for 50/50 dilution of Castle Rock Water with purified H_2O. (**a**) Measurements were made on a solution that had been exposed to an *unimprinted* three-oscillator device on 7/7/97. Note irregular pH behavior and oscillation of pH in the days following exposure. (**b**) Measurements were made on a solution that had been exposed to the *imprinted* three-oscillator device on 8/5/97. Note monotonically increasing pH behavior and steady increase in pH in the days following exposure

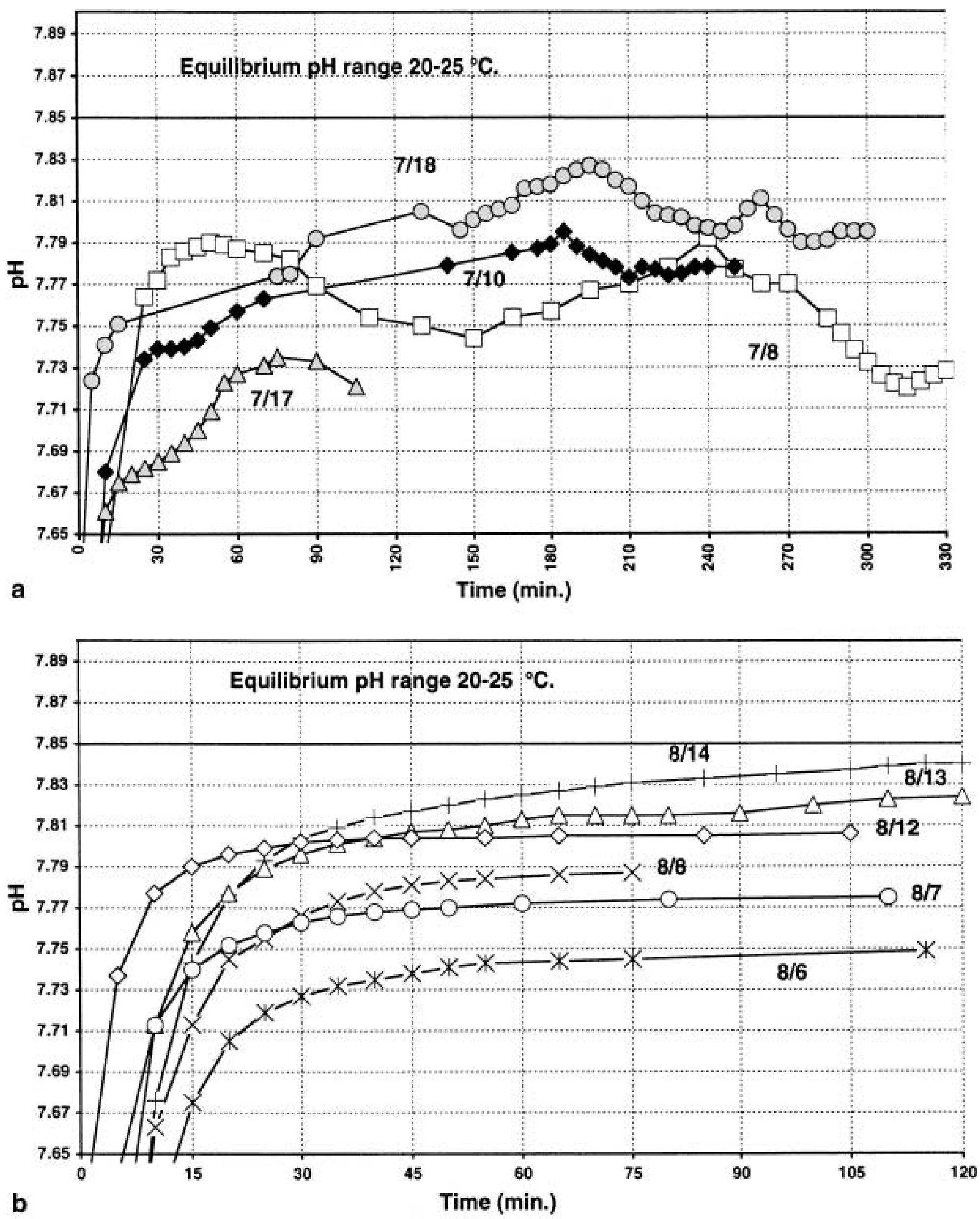
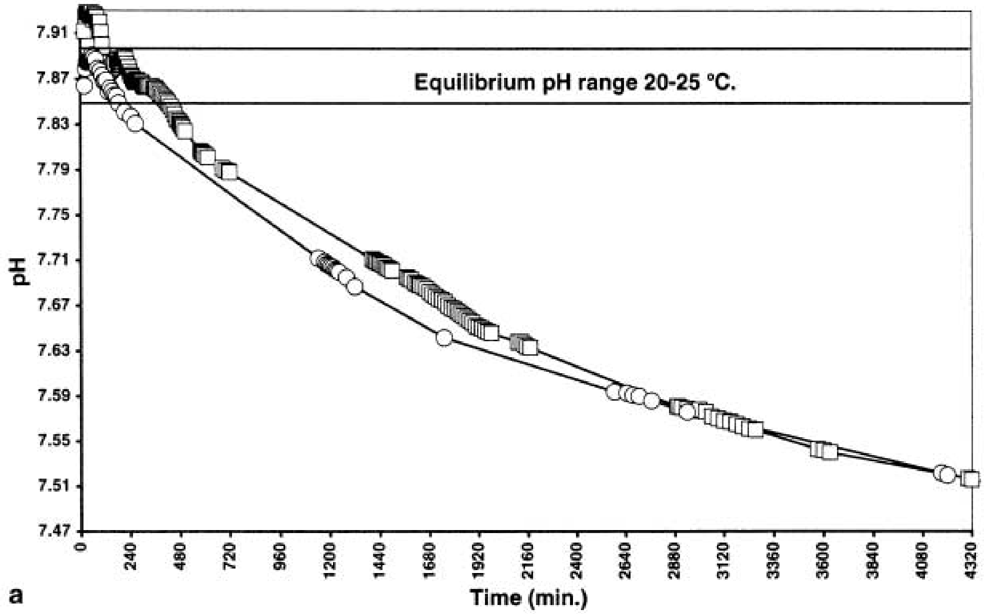
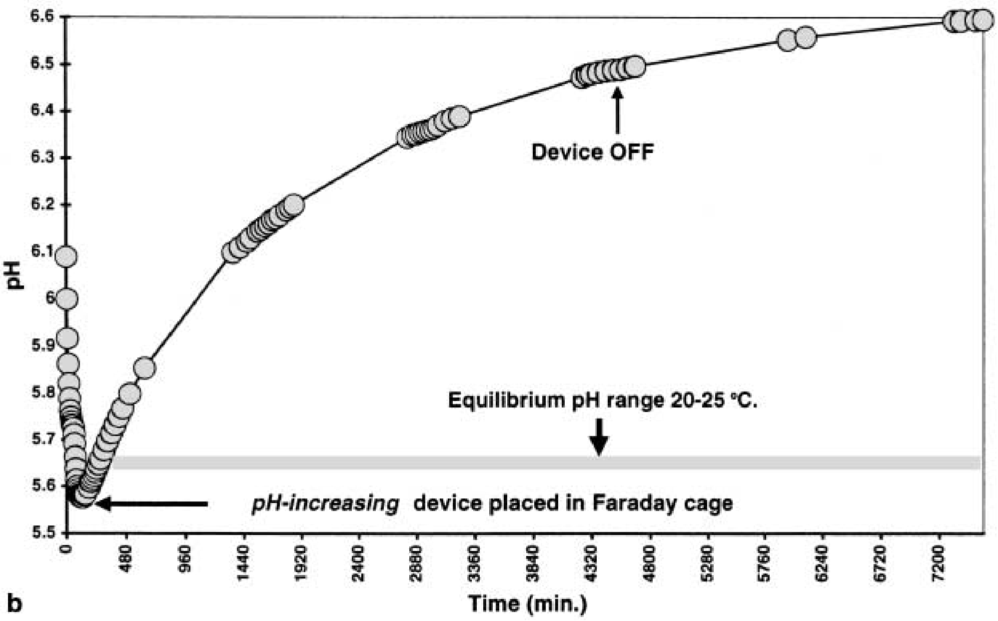


Fig. 3 (**a**) pH vs. time for 50/50 dilution of Castle Rock Water with purified H_2O. Measurement of pH was done simultaneously with exposure to the imprinted *pH-lowering* device for the data points depicted by squares but only after exposure for the data points depicted by circles. (**b**) pH vs. time of pure water in equilibrium with laboratory air during exposure to *pH-increasing* IIED





When not in use, the devices were always wrapped in Al-foil and stored in individual FC's. This was found to be necessary because, without it, even if the devices were separated by 100 meters and in the "off" state, the control device gradually became imprinted with that specific intention and we eventually lost our "control." Following this isolation procedure, we could maintain the imprint charge in the active device for ~4 months before reimprinting was felt to be needed.

Target Experiment 1

Here, the specific intention was to either increase or decrease the pH of aqueous solutions and purified water (ASTM type 1) by one full pH-unit [11]. Separate IIED's were needed for $\Delta pH = +1$ and $\Delta pH = -1$. Thus, considering both, a swing of hydrogen ion concentration by a factor of 10^2 was attempted without any intentional chemical additions except those entering via contact with the local air atmosphere. The experimental set-up used is shown in Fig. 1 where a modern, high quality pH-meter (accuracy of ± 0.01 pH-unit, resolution of 0.001 pH-unit) and a high quality temperature probe (accuracy of ±0.012°C, resolution of 0.001°C) were utilized. The device was merely placed ~15.25 cm (6″) from the water and turned on (total radiated electromagnetic energy $<10^{-6}$ watt).

Figure 2 demonstrates an obvious difference in the coherence state for one of the aqueous solutions, ex-

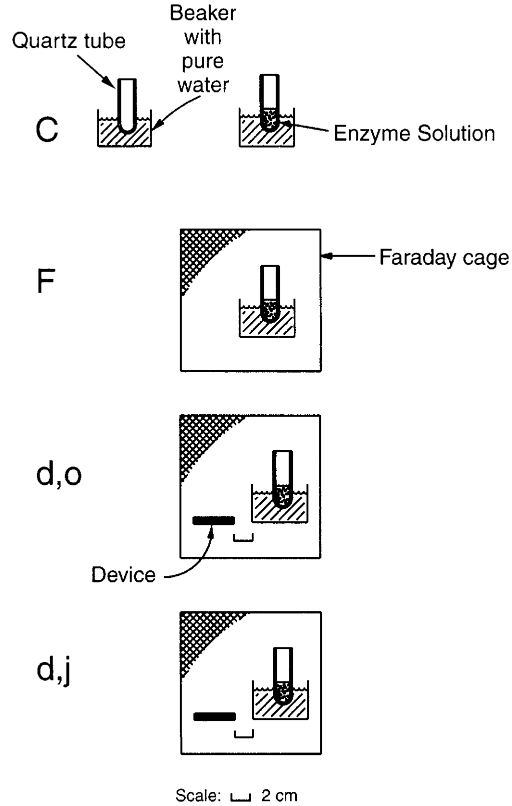


Fig. 4 Schematic drawing of the side-by-side experimental configuration for the four simultaneous ALP treatments

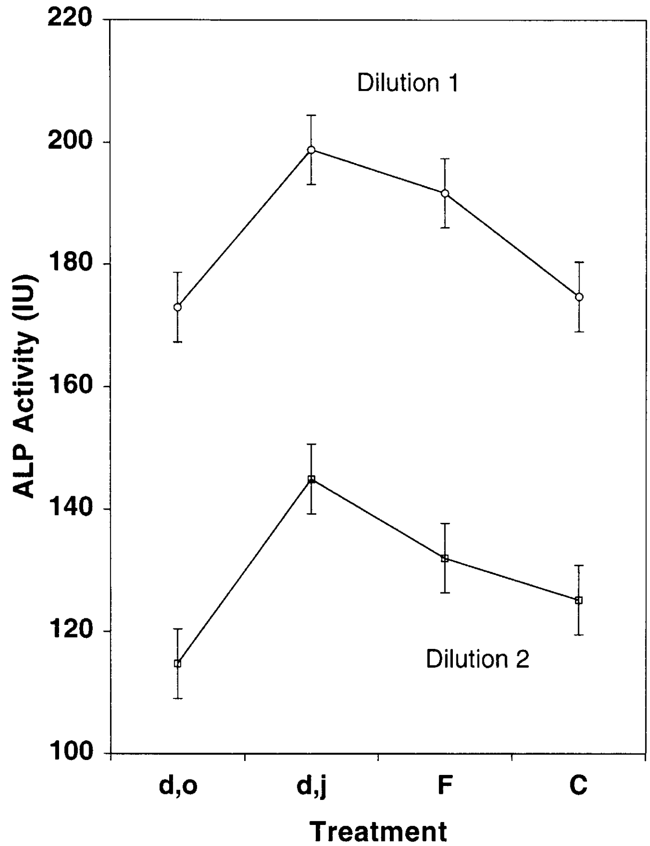


Fig. 5 Statistical means data on ALP activity for the four simultaneous treatments (dilution 1 is 100 ml ALP solution plus 150 ml purified water; dilution 2 is 100 ml ALP solution plus 200 ml purified water)

posed for 2 h. to either an unimprinted device (2a) or to an imprinted device (2b) and then monitored for several subsequent days [11]. For the unimprinted device the subsequent pH-readings are erratic while, for the imprinted device, the pH-readings monotonically vary over time and step in an orderly fashion from day to day. The readings were taken from ~9 AM to 11 AM every day and start each day with the buffer calibration. The pH-electrode was then placed in the test solution which initially drives the pH downward (initial transient deleted).

Figure 3 demonstrates results with two different IIED's, one with the intention to *decrease* the pH by one full unit (3a) and the other with the intention to *increase* the pH by one full pH unit (3b). The tests were made using different solutions so the equilibrium pH ranges were quite different. The purified water was ASTM type 1 (resistivity = 18.2 megohm-cm, TOC<5 ppb) water while the Castle Rock water is a naturally occurring spring water with total dissolved solids (TDS) of about 95 mg/l and $[Ca^{++}]/[Mg^{++}] = 2.0$. In these particular experiments, the pH change over ~5 days (7200 min) was ~ –0.5 pH units for the pH-decreasing IIED and ~ +1 pH units for the pH-increasing IIED, relative to the equilibrium pH range at 20–25°C for each experiment. When one uses a control device (unimprinted) instead of an IIED, the pH tends to stay in the equilibrium range or very close to it.

Target Experiments 2 and 3

Although experiments on biological materials (inert and living) are generally of less interest to materials scientists than those on inorganic materials, to show the scope of this new potential technology, we briefly demonstrate its application in this area as well. Details, only of interest to biologists, are provided elsewhere [12–14].

For target experiment 2, the specific IIED intention was to increase the in vitro thermodynamic activity of a specific liver enzyme, alkaline phosphatase (ALP). Four simultaneous, side-by-side variants were conducted on the same shelf in an incubator (held at 4°C) as shown in Fig. 4. Comparisons could then be readily made between the control ALP solution (C) and (1) ALP solution placed in a small but otherwise empty grounded FC (F), (2) the same as (1) but with an activated *imprinted* device (d,j) present and (3) the same as (1) but with an activated *unimprinted* device (d,o) present. The first comparison, (C) with (F), allows one to assess the effect of the broad band ambient EMF's in the incubator on the ALP activity. The second comparison, (F) with (d,o), allows one to assess the effect of low power (less than 1 microwatt) and specific frequency (three frequencies in the 1–10 MHz range) EMF's on ALP activity. The third

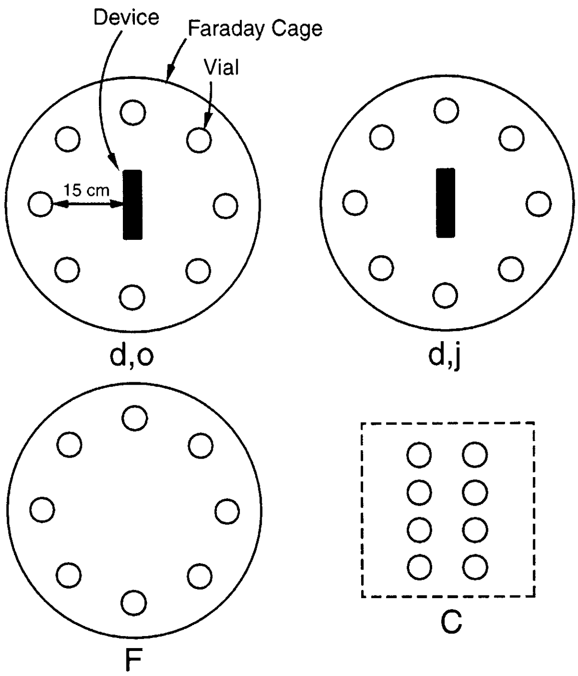


Fig. 6 Experimental configuration for the simultaneous, four treatment, side-by-side, in-vivo larval development study

comparison, (d,j) with (d,o), allows one to assess the effect of imprinted human intention, at constant EMF output, on ALP activity. In addition, simultaneous correlations between any and all of these different experimental states are available.

The results of this experiment, in terms of means with their standard deviations, are provided in Fig. 5. The data were assessed via the ANOVA statistical procedure and, based on this, pairwise comparison with Tukey post hoc tests were examined. Visual inspection of Fig. 5 and the ANOVA indicated that both the treatment and the dilution significantly modified ALP activity. The treatment rankings for both dilutions were (d,j)>(F)>(C)>(d,o) and the Tukey post hoc comparisons between treatments indicated (1) that (d,j) was significantly ($p<0.001$) greater than (d,o) and also significantly ($p<0.005$) greater than (C) and (2) that (F) was significantly ($p<0.011$) greater than (C).

For target experiment 3, the specific IIED intention was to increase the in vivo ratio of ATP to ADP in developing fruit fly (Drosophila Melanogaster) larvae so as to significantly reduce their development time to the adult fly stage. Once again, we incorporated four simultaneous experimental variants in a side-by-side positioning on a laboratory bench-top (at 18°C and 55% relative humidity) as indicated in Fig. 6. The four treatments investigated were as follows: (1) (C)–the control culture of 30 larvae (0–4 h. old) transferred to a single vial containing non-stressful food, (2) (F)–a similar culture inside an otherwise empty Faraday cage, (3) (d,o)–culture as in (2) but containing an *unimprinted* device in the "on" state and (4) (d,j)–culture as in (2) but containing an *imprinted* device in the "on" state.

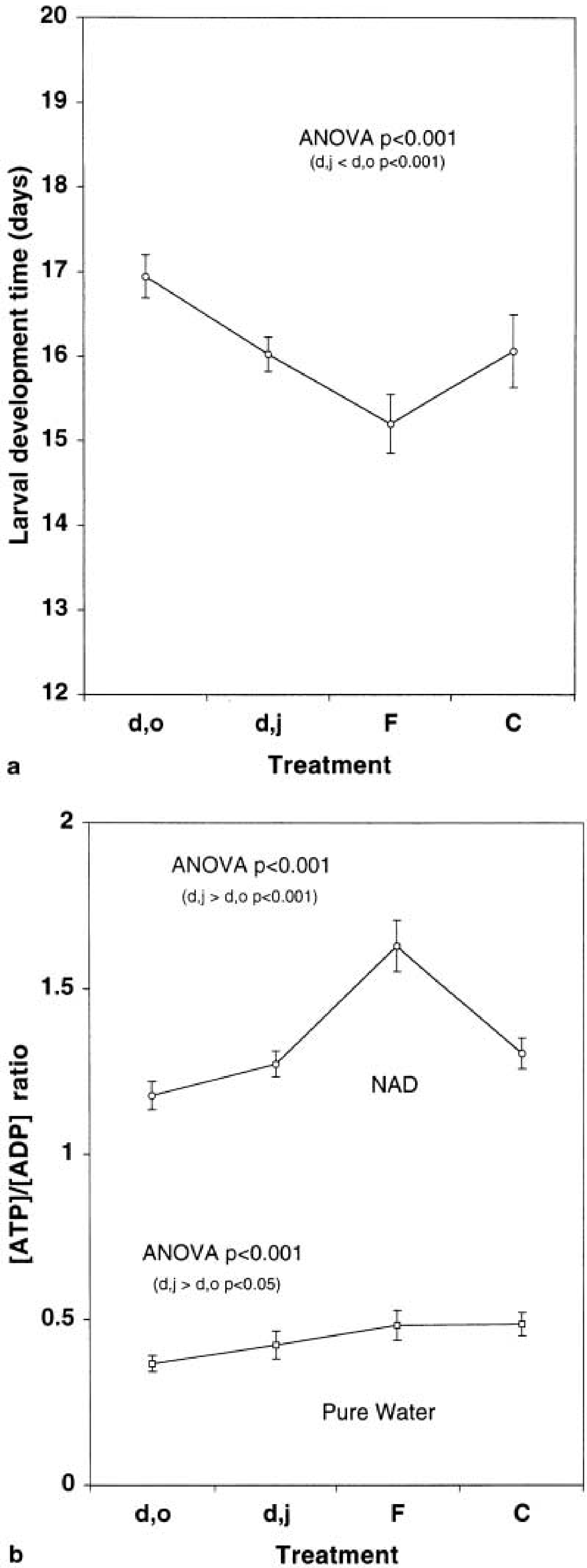


Fig. 7 (**a**) Means for larval development time vs. treatment and (**b**) [ATP]/[ADP] ratio for the larvae vs. treatment (means)

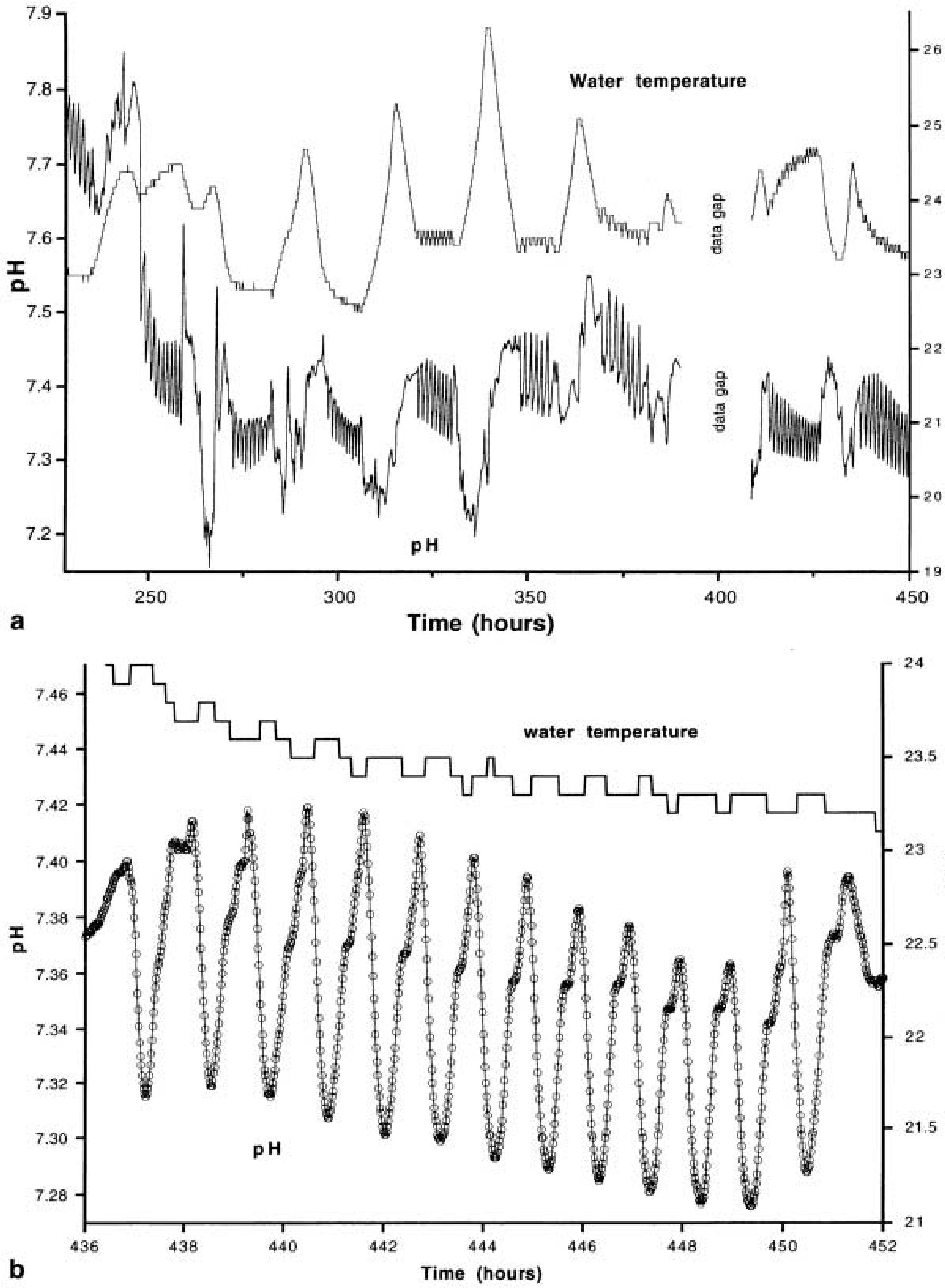
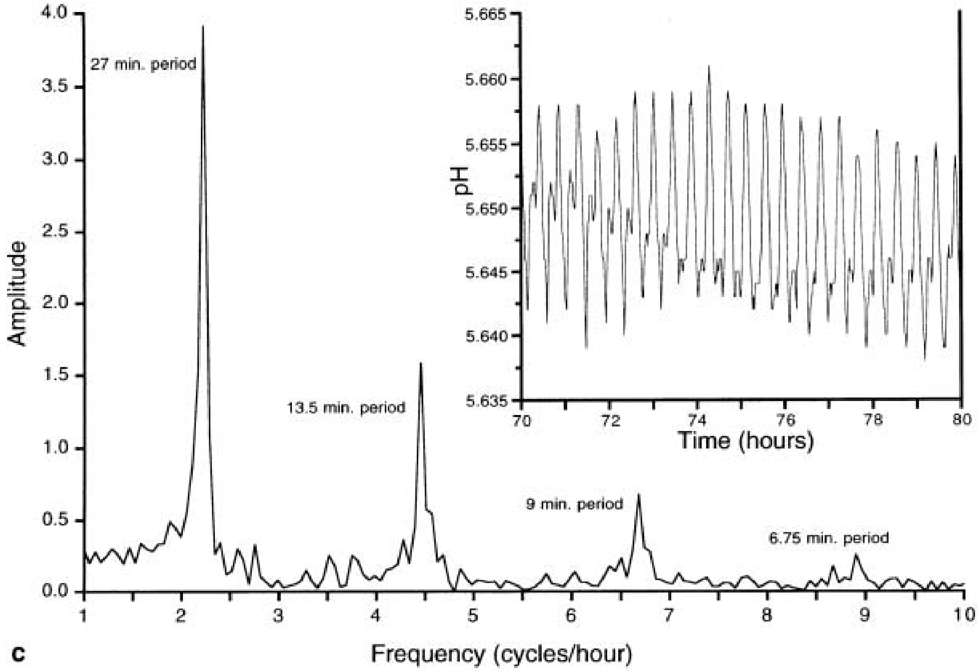


Fig. 8 (**a**) pH and temperature changes with time for pure water containing fine-grained $ZnCO_3$ particulates. The plots reveal both long, τ_L, and short, τ_S, periods of undulations. (**b**) An expanded short interval from (a) illustrating the regularity of the τ_S-oscillations. Note the inverse correlation between pH-oscillations and temperature fluctuations. (**c**) Amplitude spectra data via Fourier transform for part of the real-time data set (shown in inset) depicted in the lowest plot in Fig. 10

Our larval assay used high performance liquid chromatography (HPLC) to measure changes in levels of ATP, ADP and AMP present in larval homogenate samples. From this, the [ATP]/[ADP] ratio was readily determined. Larval development time, LDT, is defined as the time taken for half of the surviving adults to emerge. We assessed LDT and [ATP]/[ADP] ratio in a total study involving approximately 10,000 larvae and 7000 adult flies over an 8 month period [13]. For the [ATP]/[ADP] ratio assessment, we utilized a specific added amount of either NAD (Nicotinamide Adenine Dinucleotide) or purified water to the larval homogenate samples for a set time period.

The experimental data is presented in Fig. 7 as means with standard deviations arising from ANOVA statistical procedures and Tukey post hoc tests. For both results, the ANOVA gives $p<0.001$ overall. In terms of our basic hypothesis concerning the influence of intention-augmented EMF’s on larval fitness, this data provides robust support from LDT with (d,j)<(d,o) at the $p<0.001$ level of statistical significance. The unexpected findings that (F)<(C) at $p<0.001$ and that (F)<<(d,o) at $p<0.0001$ illustrates that both random ambient EMF’s and specific high frequency EMF’s (even at quite low power levels) are significant stressors for D. Melanogaster. The finding that the [ATP]/[ADP] ratio practically mirrors the LDT data for the added NAD case, at a high Pearson correlation value, strongly supports the connection between energy availability to the cells and organism fitness as well

Fig. 8c



as the profound importance of NAD to overall metabolic activity. Finally, it is important to note that, even for the added pure water case, the different treatments gave an overall statistically significant effect ($p<0.001$).

Target Experiment 4

During the course of the preceding experiments, it began to be apparent that some type of "conditioning" process was going on in the particular locale associated with continued use of the IIED's in that locale. In the purified water experiments locale, after some incubation period, we began to observe oscillations [15] in air temperature, water temperature, water pH and water electrical conductivity whose amplitude often exceeded 10^2 times the sensitivity of our detection systems (see Fig. 8). In other nearby locales (~6–15 m away), where no previous IIED studies had taken place, no such oscillations were observed.

In Figure 8a, one sees the presence of both highly periodic short-period (<2 h.) and long-period (>2 h.) oscillations in both pH and temperature. Fig. 8b is an expanded scale view of one oscillation train from Fig. 8a (near the end) to illustrate the "lawful" nature of the pH waveform. These oscillations are among the largest amplitude pH-oscillations we recorded. Fig. 8c provides the amplitude spectrum for a pH-oscillation wavetrain from Fig. 10 (lowest plot) which demonstrates how periodic even the lowest amplitude pH-oscillations can be.

To probe the nature of this conditioning, we conducted a DC magnetic field polarity experiment using the experimental set-up shown in Fig. 9 [14]. With this configuration, one can readily measure any water pH changes associated with the North Pole vs. the South Pole pointing upwards without altering the basic cylindrical symmetry of the field. When one conducts this pH measurement experiment in a typical laboratory environment were no conditioning has occurred, one observes two things, (a) there is no measurable difference between the N-pole up case and the S-pole up case and (b) there is no measurable pH change in the water for either field polarity (for field strengths = 500 Gauss). On the other hand, when one makes such measurements in a conditioned locale, the results are remarkably different. There, one

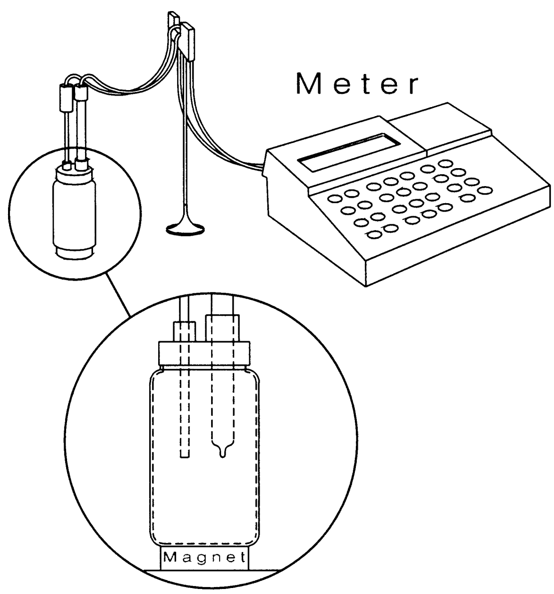


Fig. 9 Experimental set-up for testing changes due to a DC magnet placed under the water vessel with either the N-pole or the S-pole aligned upwards

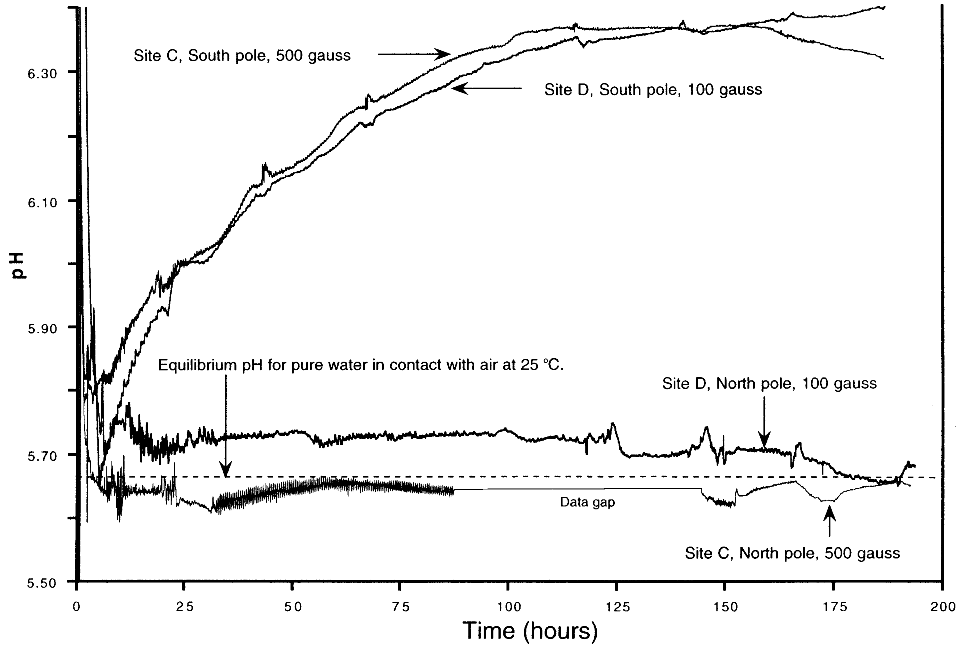


Fig. 10 Conditioned locale pH changes with time for purified water with either the North-pole or South-pole of a DC magnetic field aligned vertically upwards (at 100 and 500 Gauss)

may find a marked difference for $\Delta pH = pH(S) - pH(N)$. Fig. 10 demonstrates an example wherein ΔpH grows in magnitude with the passage of time to attain a maximum value of ~ 0.60 pH units.

To demonstrate both simultaneous water and air temperature (T) oscillations plus the correlation between them, a Faraday cage with a central water vessel was set up in one conditioned space (purified water plus 1 gm of fine-grained $ZnCO_3$ powder, surface area = 21.4 m^2/gm, was added to 250 ml of ASTM-type 1 purified water in a polypropylene bottle). High resolution digital thermometers were located with the local geometry shown in Fig. 11. Fig. 12a shows the air T-oscillations at the 15.25 cm (6″) location outside the cage plus the water-T and water-pH in the vessel located inside the cage. Fig. 12b is an expanded view of the data collected just before that shown in Fig. 12a while Fig. 12c shows the amplitude spectrum for a portion of this data (from hour 9 to hour 17.5 in Fig. 12b). These air T-oscillations are huge (~230 times our best measurement accuracy and ~3500 times the resolution) and all have the same waveform. Fig. 12d illustrates the comparative amplitude spectra data for simultaneous T- and pH-oscillations taken in this vessel of water two days earlier (oscillation data shown in inset). Again, the same wave shape (revealed by the nesting of the amplitude spectra) is exhibited for these two very different material properties.

To illustrate that the Fig. 12 results were not generated by some type of natural convection phenomenon, a mechanical fan experiment was conducted in a strongly conditioned space. The focus of this experiment was to see if the air, T-oscillations would be strongly influenced by the forced convection from a mechanical fan. The furniture arrangement in the conditioned room, including both the location of the water vessel inside its Faraday cage (similar to Fig. 11 configuration) adjacent to a monitoring computer and the two fan locations, X (one on the floor) and Y (on a desktop) is shown in Fig. 13. Temperature measurements outside of the Faraday cage occurred at 15.25 cm (6″) intervals out to 3.35 m (11 feet). High resolution, digital thermometers (resolution =

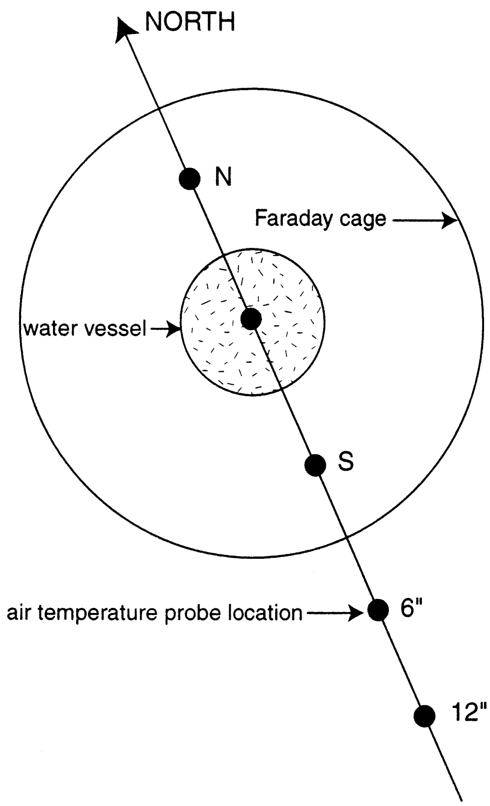


Fig. 11 Schematic illustration of air and water temperature probe locations relative to a centrally located water vessel in an electrically grounded Faraday cage

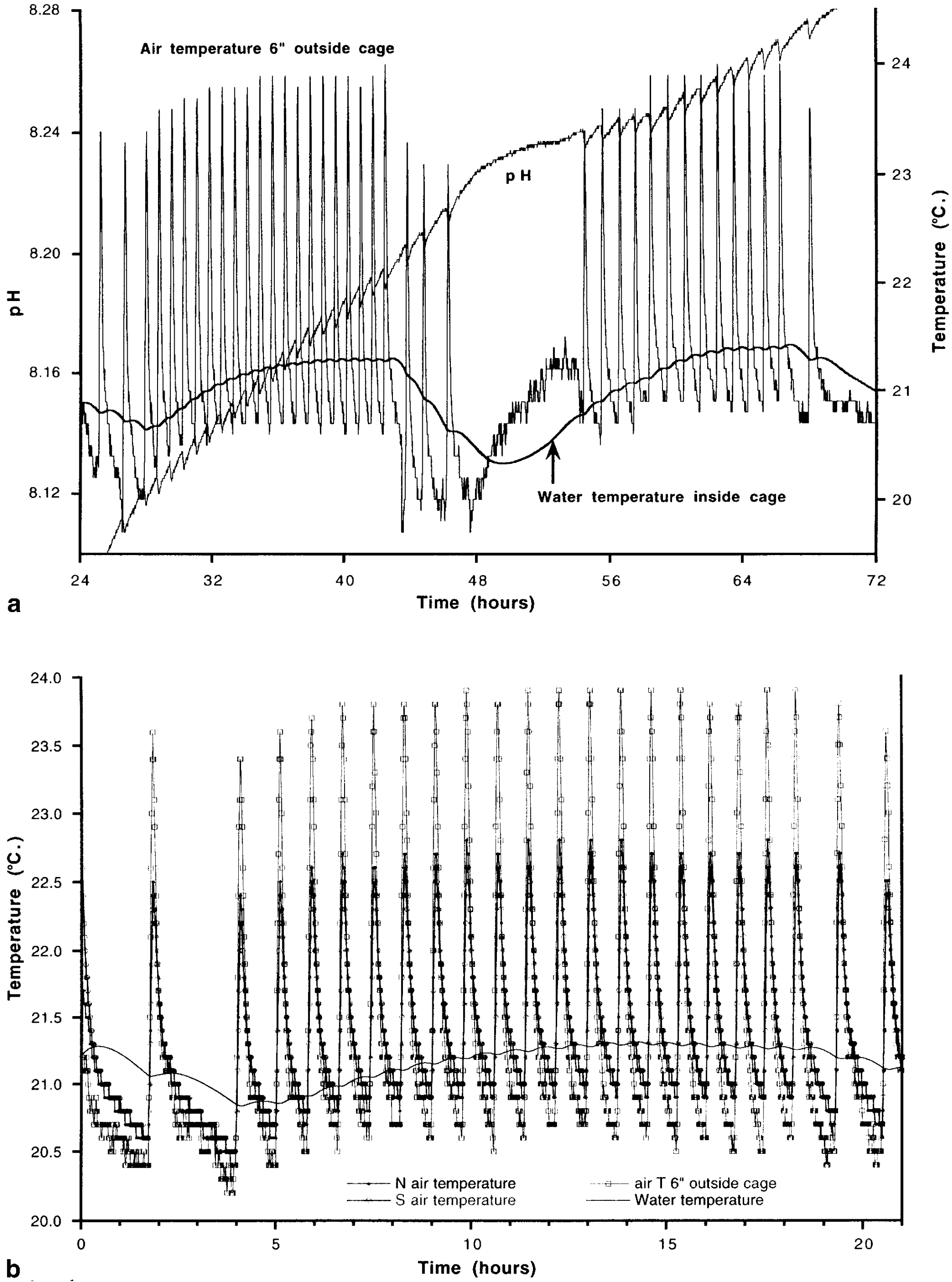


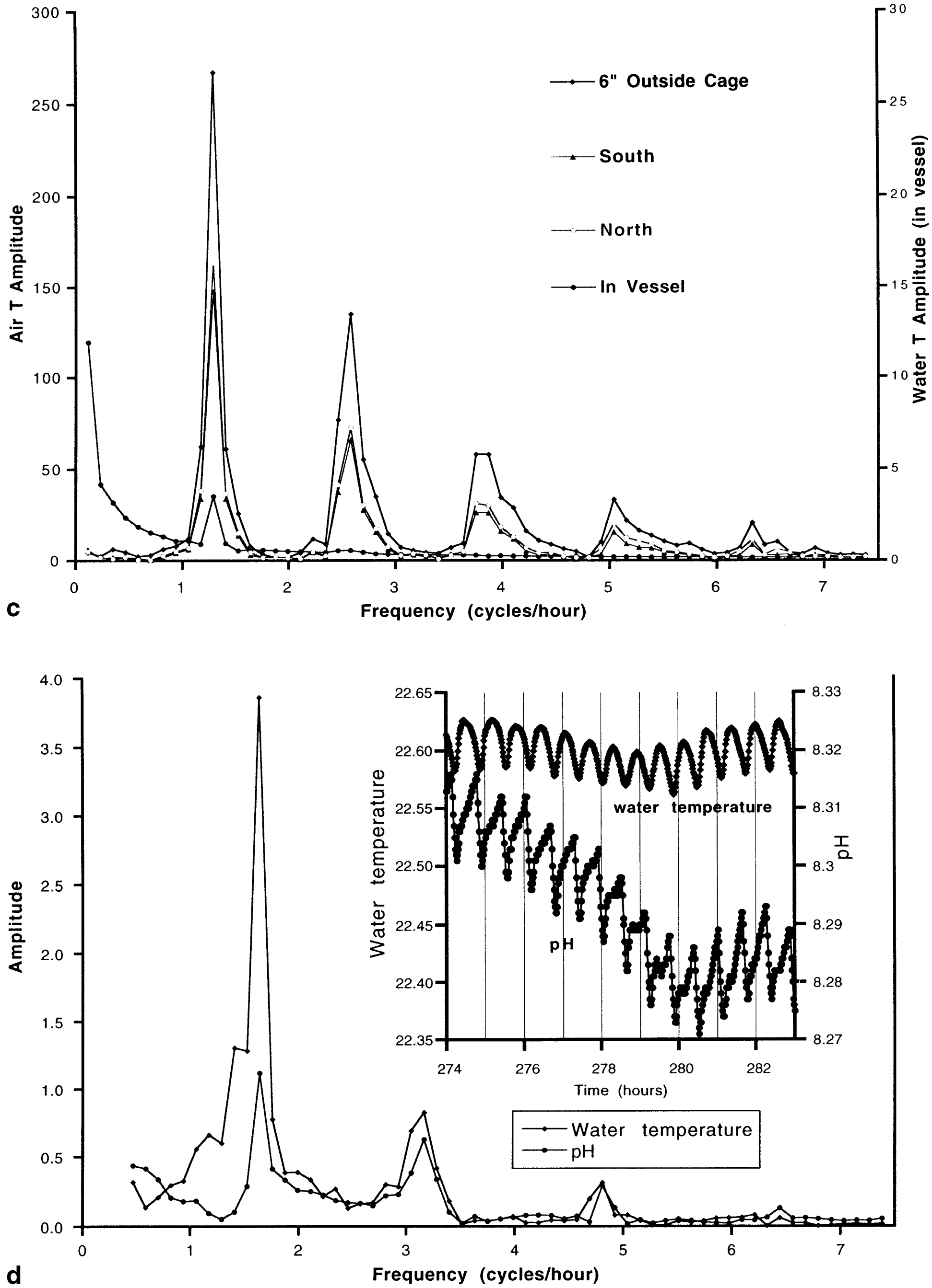
Fig. 12 (**a**) Pure water with Zinc carbonate particulates in vessel in Faraday cage. Simultaneous measurement of air and water temperature plus pH in the Fig. 11 configuration on 5/12/99 to 5/13/99. Note the precise frequency correlation for the three variables. (**b**) Four real-time temperature vs. time plots for simultaneous air temperature measurements made at the N, S, and 6″ positions of Fig. 11 plus the water temperature inside the vessel (5/11/99). (**c**) Fourier transformed amplitude spectra data for a 8.5 hour interval of (b) (between hour 9 and 17.5). The fundamental period is 46.5 minutes and five harmonics can be observed. (**d**) Fourier transform comparison of both water T-oscillation and pH-oscillation data in the water vessel of Fig. 11 on 5/10/99. Real-time oscillation data shown in inset. The fundamental period is 36.6 minutes and three harmonics can be discerned

0.001°C) were used in the water and at 30.5 cm (1 foot) outside the cage. Lower resolution, digital thermometers (resolution = 0.1°C) were used in the air inside the cage and at all other locations outside the cage. All measurements were computer monitored.

Earlier measurements had shown that the major floor-ceiling temperature gradients occurred between the floor and ~ 1 m (3–4 feet) above the floor; thus, we started with the fan at position X (on the floor) and operated it for 55 h. Later, the fan was moved to position Y and operated for 42 h. For comparison purposes, a 24-hr. period, real-time record of the T-oscillations for the three cases of (1) no fan, (2) fan at X and (3) fan at Y are given in Fig. 14. From Fig. 14, it seems clear that these T-oscillations neither cease nor change in a significant way due to the operation of the fan. It is also clear that the total oscillation ΔT excursion is a large percentage (sometimes 100%) of the total diurnal temperature variation in this room.

Since the 3 m (10 ft.) measuring point was in the hallway outside the office depicted in Fig. 13, it was possible to close the office door and compare the T-oscillations both inside the Faraday cage with those outside in the hallway. It was apparent that the air T-oscillation amplitudes did decline significantly with distance from the FC. However, they were still measurable more than 3 m

Fig. 12c, d Legend see page before



away. The inset in Fig. 15 shows the simultaneous, real-time data at these two locations. The Fourier analysis for these two oscillation data sets reveals that they share the same basic wave harmonics, despite the fact that they were separated by a 3 m (10 foot) distance, a closed door and a Faraday cage. Clearly, it is predominantly something other than standard air that is being monitored here (perhaps the vacuum phase within the air molecules?)!

Discussion

From this remarkable experimental data, several important insights can be drawn:

1. The prime directive of the specific intention was, over time, fulfilled for each target experiment.
2. The specific imbedded intention in an IIED appears to act just like a thermodynamic potential to intelligently produce change in the needed physical processes and thus alter the basic properties of the materials involved.

3. Some kind of "soaking" process with respect to this new field appears to be taking place so that, with the passage of time in this field, a critical new ingredient is being enriched in the environment. This is directly related to the site conditioning needed for material property change.
4. The site conditioning appears to alter the state of gauge symmetry for that locale so as to manifest and stabilize a higher symmetry than our normal U(1) gauge.

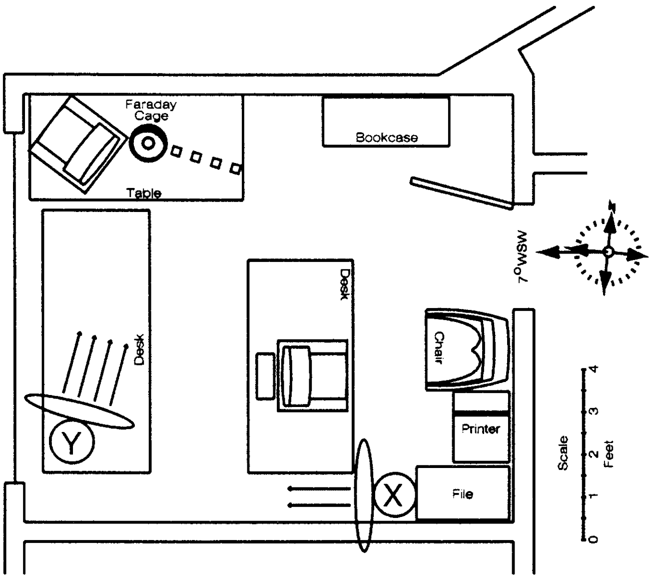


Fig. 13 Forced convection experiment using a mechanical fan to perturb the air around a series of aligned temperature measurement probes. Fan location positions (X is on the floor, Y is on a desk) relative to the water vessel in a Faraday cage on upper left table top and a line of temperature probes (small boxes) 6″ (15.24 cm) apart

5. Property oscillation behavior seems to be a natural manifestation of this site conditioning after some initial incubation period.

Let us see if there is a rational picture that draws all these observations together and gives us a quantitative basis for understanding them.

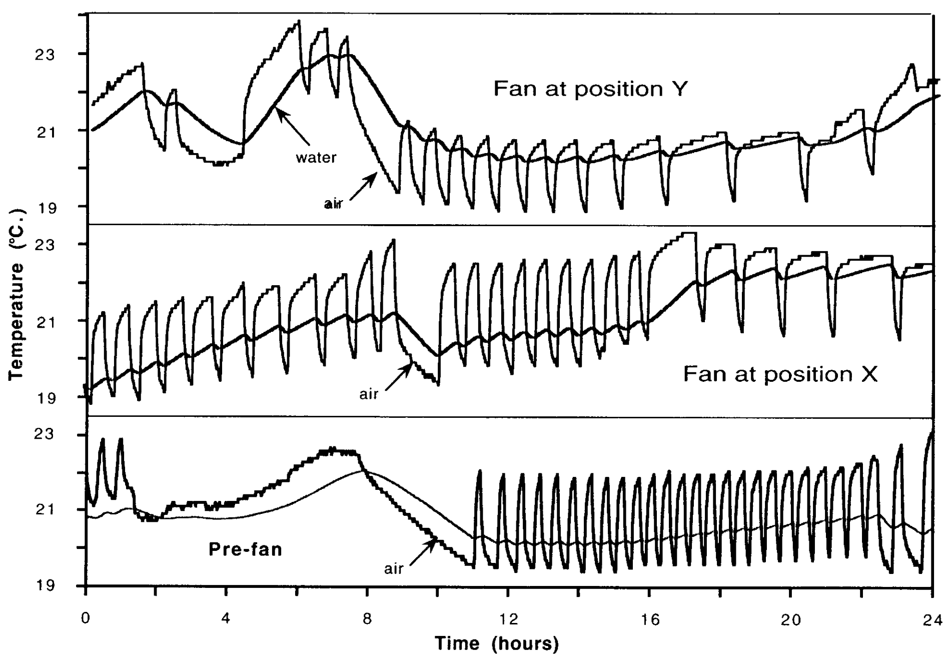
Our standard thermodynamics of homogeneous systems arises from a Taylor's series expansion of the Gibb's free energy function, G (P, T, C), where (P, T, C) are the extensive thermodynamic variables. It is from the first order terms in this expansion that we gain the familiar relationships:

$$\left(\frac{\partial G}{\partial P}\right)_{T,C} = V; \quad \left(\frac{\partial G}{\partial T}\right)_{P,C} = -S; \quad \left(\frac{\partial G}{\partial C}\right)_{P,T} = \mu \qquad (1)$$

where V = volume, S = entropy and μ = chemical potential. As we move beyond the linear terms to the higher order terms, we begin to define a thermodynamics of inhomogeneous systems. However, mathematics tells us that the Taylor's series approach is the appropriate one only if there are no mathematical singularities present in the variable space. If there are, then it is more proper to use the Laurent series expansion about the point G_o (P_o, T_o, C_o). Laurent's series becomes Taylor's series when there are no singularities present.

One need only look to the work of Dirac, Feynman, T'Hooft and others concerning the quantum theory of fields to find an abundance of mathematical singularities in the very foundations of materials science theoretical expressions. Eventually these infinities were sidestepped via using a renormalization procedure. This essentially subtracts infinite quantities so as to leave finite results. The important point for us, here, is that we should be using Laurent's series expansion for a more comprehensive thermodynamics and this involves both ascending and

Fig. 14 Temperature oscillations in air (1 foot (30.5 cm) outside FC) and water (inside FC), with and without the fan operating



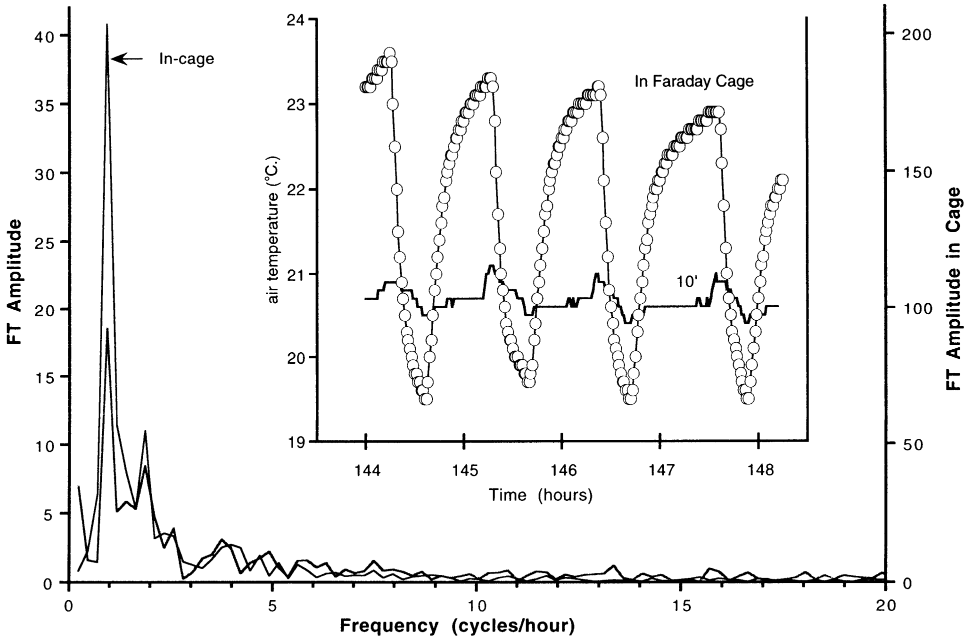


Fig. 15 Amplitude spectra from Fourier analysis of air, T-oscillation real-time data (see inset) both in the FC and 10 feet (3.05 m) away *outside* the closed door of Fig. 13. Note the high correlation between the oscillations measured at locations separated by ten feet (3.05 m), a closed door and a FC

descending powers of our four-space coordinates (x, y, z, t); i.e., terms in (x^{-1}, y^{-1}, z^{-1}, t^{-1}) also enter the expansion. In this case, a more appropriate base space for viewing Nature's expression would be the eight-space (x, y, z, t, k_x, k_y, k_z, k_t), where $k_j = 2\pi/j$ and j = x, y, z, t. A Taylor's series expansion of G about G_o in this eight-space formalism leads to the same results as the Laurent series expansion of G about G_o in our familiar four-space formalism. This means that there are additional first order terms to be considered in our thermodynamics that are of negligible magnitude for the U(1) gauge symmetry state but which could grow in magnitude for higher gauge symmetry states.

It is important for us to recognize that this $\underline{k}$-space is a frequency domain and thus is a natural domain for wave quality expressions. Thus, if the particle aspects of substance are most naturally described in terms of the (x, y, z, t) components of this 8-space and the wave aspects are most naturally described in terms of its (k_x, k_y, k_z, k_t) components, then the wave/particle duality feature of quantum mechanics is automatically built into this biconformal space formalism. Perhaps just as important, these direct space, (x, y, z, t), and reciprocal space, (k_x, k_y, k_z, k_t), features of substance are well known to materials scientists from crystallography and solid state theory. As expected from quantum theory, there are some definite constraints connecting particle motion in direct space and its complementary wave motion in reciprocal space [16]. However, one piece that has not been sufficiently appreciated is that the Fourier transform (FT) relationship must always exist between the conjugate qualities manifesting in these two spaces [17]. Thus, for a one-dimensional representation of the quality, $Q_D(x)$, in direct space we require that

$$FT_R(k_x) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\infty} Q_D(x) e^{i2\pi x k_x} dx \qquad (2a)$$

$$Q_D(x) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\infty} FT_R(k_x) e^{-i2\pi x k_x} dk_x \qquad (2b)$$

where FT_R is the reciprocal space mate to Q_D.

It is target experiment 4 that leads to insight number 4 listed above. This is because our normal U(1) gauge symmetry involves electric monopoles, magnetic dipoles and the standard Maxwell equations of electromagnetism. Thus, the magnetic force is proportional to $\underline{H}^2$ (|H| = magnetic field strength) for this gauge symmetry so there should be no difference in properties of water for N-pole up vs. S-pole up experiments. But target experiment 4 shows that $\Delta pH \neq o$ in a conditioned space so the physics of such a partially conditioned space can no longer be of U(1) gauge symmetry.

Any space that exhibits $\Delta pH \neq o$ requires a physics wherein magnetic monopoles are having an influence on material properties. It is in the SU(2) gauge symmetry state of nature that one finds functional electric and magnetic monopoles plus non-Abelian Maxwell equations [18]. Thus, it is reasonable to conclude that a partially conditioned space represents a mixture of the SU(2) gauge symmetry state and the U(1) gauge symmetry state with the proportion of the former increasing as the degree of locale conditioning increases. Now, we all know that physics has searched long and hard with its conventional tools and has not conclusively observed the magnetic monopole. The reasoning of this paragraph would state that one should first utilize an IIED to condition the space around the necessary piece of magnetic monopole test equipment so that a high proportion of SU(2) gauge symmetry manifests in that locale, and <u>then</u> conduct these experiments.

The last link in our speculative chain takes us back to DeBroglie's 1920's concept of a particle and its pilot wave. Of course, the group velocity of the pilot wave, υ_g, moves at the same velocity, υ_p, of the particle; however, the velocity of the individual wave components, υ_w, for those entering and leaving the group as the particle moves along, are relativistically constrained to satisfy the equation [19]

$$\upsilon_p \upsilon_w = c^2 \tag{3}$$

Here, relativity theory requires that υ_p <c so υ_w >c is required. This has been dubbed an "information" wave so as not to create problems for relativity theory. Let us now make the postulate that the moiety that writes the pilot wave is the magnetic monopole which travels at υ >c. This then leads to the problem of how the particle and its pilot wave are forcefully coupled together. We solve this by proposing that the coupling agent between these two moieties is a higher dimensional substance that doesn't need to obey standard relativistic constraints. We will label this higher dimensional coupling substance "deltrons" and it is thought to respond to the force of human intention [17].

It is presumed that there is a small but finite concentration of deltrons, $C_{\delta o}$, extant in the universe, independent of human presence, and this is sufficient to provide U(1) gauge electromagnetism. However if, indeed, the local deltron concentration, C_δ, is an increasing function of the intensity, I^*, of focussed human intention, then this would determine the ratio of SU(2)/U(1) gauge behavior that one observes in a partially conditioned space. Because C_δ is such a critical factor in direct space/reciprocal space substance coupling, Eqs. 2 must be replaced by

$$\hat{FT}_R(k_x) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\infty} Q_D(x)\, C_d(x, k_x, l^*, \ldots) e^{i2\pi x k_x} dx \tag{4a}$$

$$Q_D(x)\, C_\delta(x, k_x, I^*, \ldots) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\infty} \hat{FT}_R(k_x) e^{-i2\pi x k_x} dk_x \tag{4b}$$

where the...in $C_\delta(x, k_x, I^* \ldots)$ is meant to represent other presently undiscriminated variables and the $\wedge$ symbol is meant to designate deltron-empowerment.

It is interesting to note that, even in Eqs. 2, although Q(x) is generally mathematically real, $FT_R(k_x)$ is generally mathematically complex. However, the modulus, $I_R(k_x)$, of $FT_R(k_x)$ is <u>always</u> mathematically real. The deltron-empowered modulus, $\hat{I}_R(k_x)$, is given by

$$\hat{I}_R(k_x) = \{\hat{FT}_R(k_x)\hat{FT}_R^*(k_x)\}^{1/2} \tag{4c}$$

Here FT_R^* is the complex conjugate of FT_R. The important point here for the reader is that, since $\hat{I}_R(k_x)$ is a positive quantity, it is observable and measurable in physical reality. Thus, it enters every physical measurement of a particular material property. To make this point more explicit, let us suppose that we have a piece of material located at the spatial position (x_o, y_o, z_o) and we measure the property Q over time. Then we have

$$Q(t) = Q_D(t) + \int \hat{I}_R d(k_t) \tag{5a}$$

with $\hat{I}_R$ given by Eq. 4c with k_t substituted for k_x and

$$\hat{FT}_R(k_t) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\infty} Q_D(t)\, C_\delta(t, k_t, l^*, \ldots) e^{i2\pi t k_t} dt \tag{5b}$$

and

$$Q_D(t)\, C_\delta(t, k_t, I^*, \ldots) = \frac{1}{(2\pi)^{1/2}} \int_{-\infty}^{\infty} \hat{FT}_R(k_t) e^{i2\pi t k_t} dk_t \tag{5c}$$

For the pure U(1) gauge state, $\hat{I}_R(k_t) \sim 0$ because $C_{\delta o}$ is so small. However, as some degree of the SU(2) gauge state develops, $\hat{I}_R(k_t)$ grows in magnitude and becomes distinguishable from Q_D in Eq. 5a. For a significant ratio of SU(2)/U(1) gauge symmetry, $\hat{I}_R(k_t)$ can dominate Eq. 5a and materials science enters a new regime of property expression. The ability of tailor-making a fixed ratio SU(2)/U(1) gauge symmetry state, even in a fixed locale, indicates that surprising new materials engineering and materials technologies are in store for our society in the not too distant future. Recognizing that Q in Eq. 5a could be the Gibb's free energy function shows us that machines operating between a SU(2)/U(1) gauge symmetry mixed state and our normal U(1) gauge symmetry state can provide a mathematically real and substantial thermodynamic driving force to deliver useful work to the U(1) gauge symmetry domain [14].

In closing this paper, although much more remains to be said, we have provided what we think is a sound rationale for both the materials property/process effects created by Qigong practitioners and, as well, the materials property/process effects created by our IIED's. This is still a "work in progress", so much new development is yet to be unfolded. However, we hope it is clear to the reader that this work seems to mark a definitive separation point between our familiar physics, where the special human qualities of emotion, mind, spirit, intention, consciousness, etc., do not influence physical reality, and a new physics where they can do so in a very robust way. It promises many new and interesting opportunities for materials science and engineering practitioners in the 21st century! Of course, it should also be clear to the reader that reciprocal space is thought to be the coarsest domain of the vacuum [17].

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