Chapter 3

THE QUANTUM PROCEDURE OF AN OPEN THERMODYNAMIC SYSTEM

Let us now pursue an understanding of a variance between classic open or closed systems. We sill use analogies of living versus nonliving systems in our discussion. Open versus closed will display thermodynamic versus intracellular functioning. The rods and balls analogy used to teach chemistry is an inapropriate one as that in reality the subatomic particles are not hard objects but quasi energetic fields. These fields interact in mathematical ways.

A stationary state system (as defined by Yourgrau) is found when the parameters of temperature, pressure, composition and entropy do not depend on the time of the macroscopic parameters or macroscopic dynamics. The parameters of concern, though invariant in time, will alter from point to point throughout the system, but will attain a degree of stability. For example, if we add heat at a constant rate to one end of a metal rod, and withdraw heat at an equal rate from the other end, the temperature at each point of the bar will approach a time-independent value. The temperature will vary along the length of the rod, and entropy will be continuously produced as a result of the conduction of heat Another example follows: if an electric current flows through a metal wire embedded in a hot object, the temperature of the wire as a whole and the electrical potential at each point will remain constant, although each point will be different Entropy is predictable: energy in, energy out, stability of flow.

The stationary states and their macroscopic, measurable variables can lose their dependence on position, and sometimes will become uniform throughout the system. This is common of a thermostatic equilibrium, and therefore constitutes a subclass within the class of stationary states. This is an example of an adababc flow. An equilibrium state can only be obtained in an isolated system, or a system in contact with a consistent environment Non-equilibrium stationary states only exist if the entropy-producing processes are continued by a constant change of energy. Turbulent fluctuations result in chaotic pools, as in chaos theory. This change in matter or energy between the system and its surroundings produces the non-equilibrium stationary state process. Fractal dynamics shows that even turbulent chaos follows some consistency. The interplay of predictability allows for stability. However, intercellular biology must to be extremely responsive to external fluctuations. The environment on Earth is a very inconsistent and unstable situation.

Let's take a stationary state system with N types of positions, and evaluate them at X_1,X_2,... to X_n. If we let a number of them have a fixed value, then the system will sooner or later find a stage in which the remaining forces will remain constant with the passage of time. This will produce an equilibrium stationary state in the order of n. Stability through independence can occur without feedback in a stable entropic system if the external environment is remarkably consistent This is typical of a Newtonian dynamics, which allows for classical thermodynamic systems to work.

Laws of Thermodynamics

0. Zeroeth Law:

   There is a factor known as temperature, which can be measured.

1. First Law:

   Energy cannot be created or destroyed. Kinetic Energy + Potential Energy = Total Energy.

2. Second Law:

   Heat tends to pass from a hot body to a cold body in a process of entropy.

$$dS = d_{e}S + d_{i} \quad \text{and} \quad d_{i}S \geq 0$$
$$S \geq 0$$

3. Third Law:

Entropy can be reduced in a closed system through reduction in heat.

$Entropy_A$ (T, P) + EntropyB (T,P) - as T → 0.

4. Fourth Law:

Osager's reciprocity theorem: Entropy can be resisted in an open situation by boundary interaction, micro-steps and symmetry.

$$L_{Ij} = L_{jI} (I, j = 1,\ 2,\ \ldots\ N)$$

$$\frac{\partial J_i}{\partial X_j} \ X_{k \neq j} \ = \ \frac{\partial J_j}{\partial K_i} \ X_{k \neq i}$$

This works on microscopic reversibility, fluctuation theory, and regression of fluctuation.

A stationary state of the first order can result when a constant temperature is maintained. If energy is allowed to flow in matter, and the chemical potential gradient is allowed to adjust itself and cause the flow of mass, but not of energy, then a stationary state of the first order will result But ff the external environment fluctuates, disorder will ensue. Disorder will follow fractal dynamics.

A stationary state of the zero order is identical with the state of thermostatic equilibrium, and this is where there is no change of mass or of energy. Thus a stationary state represents a very stable situation. This type of external stable system is rare in the real world. Biology would need much more responsiveness. Thermostatic equilibrium in a state occurs when entropy reaches its maximum value in relationship to the adiabatic independence. Flow in being stable will produce flow out of a stable nature if the mid current system is capable of resisting the turbulent breakdown.

The following formula of describes such an equilibrium.

(1)

$$\sigma = \sum \sum L_{ij} X_i X_j \geq 0$$

This is an example of a uniform system under thermodynamic statistical control.

When a positive quadratic form of the forces of x exists so that the solution is 0, then all the x's must be 0 (they must have 0 or a positive number), which would result in

(2)

$$0 = \frac{\partial \sigma}{\partial X_i} = \sum_j \ (L_{ij} + L_{ji})\ X_j \qquad \partial = \textit{Boundary Influence}$$

$$= 2\sum_j \ L_{ij}\ X_j = 2J_i, \qquad (i = k+1,\ k+2,\ \ldots,\ n)$$

Here we see the extreme stationary state, which can only occur in a highly stable external environment. L, in this case, expresses the reciprocity relation of statistical stability. Without cybernetic control or feedback, subtle changes amplify and eventually destroy such systems, pushing them to fractal turbulence and chaos. But even chaos yields to some fractal predictability.

So we find that there is minimum entropy production when the stationary states are of the order K. This theorem was proven by Prigogine, and later de Groot So entropy can be reduced in a small number of events (which is our hypothesis in quantum biology). (See Quantum Biology section).

Yourgrau, Merwe and Raw report that there can be stationary states of minimum entropy production. This can be put into a graph, which will be elliptic paraboloid, referring to

(3)

$$\sigma = L_{11}X_1^2 + 2L_{12}X_1X_2 + L_{22}X_2^2 \geq 0$$

As we can see, the vertex is at the origin, where X_1 and $X_2 = 0$. As the poisson distribution of X_1 and X_2 fluctuates, we will generate the rest of this verapoloid graph. Here we can see that at minimum entropy . this will result from a small number of events that will allow for a quantic type of control that might be used in this minimum state.

In 1932 Van Bertalanffy put forth a hypothesis that a living organism in cells should be treated as an open thermodynamic system. In this open thermodynamic system states of minimum entropy must be achieved. Schrodinger later advanced the term neg-entropy. Here we would not have a minimum amount of entropy, but actually a negative entropy, which causes order rather than entropy, or thermodynamic entropy in the cell. This violates the law of thermodynamics in which entropy $ 0.

In 1946 Prigogine and Warne further reinforced this theory of Bertalanffy's open thermodynamic systems. Their conclusions were:

1. This theory of open thermodynamics would explain many facts of the features of life which were inconsistent with the laws of classical physics.

2. An open system theory would allow quantitative laws that would regulate basic biological phenomena, such as metabolism and growth.

When a nonliving thing is placed in uniform surroundings, the system will gradually attain a stability in thermodynamic ways which will then be equalled out All of the permissible chemical reactions will proceed and finally reach a point of adiabatic stability at which the internal energy will be balanced. All the different systems will come to a stable, observable end, and thus a maximum entropy is achieved. This maximum entropy can also be seen as a maximum disorder in the system, which has now gone to an adiabatic stability, not a turbulent flux, as with fractals.

In quantic systems something of a different nature happens: systems will yield to quantum dynamics and not follow the dynamics of an isolated system, but will have that of an open thermodynamic system as proposed by Bertalanffy. A variation of Osager's theorem might allow for such a system.

In the living cell the transition states do not proceed towards disorder, but towards order. Each of these fluctuations of the external environment are reacted upon and dealt with by the organism, which leads into a steady state of equilibrium and proceeds against entropy. Bertalanffy said that if the system could be treated as an open system of thermodynamics, he could explain some of these phenomena. It is the treatise of this book that the open system of dynamics can be applied to intracellular, or interstitial, fluids between the cells of the human body.

But within the system we have to proceed to an even greater system of control than that proposed by Bertalanffy's open system. Here we need to move to a system of quantic understanding of intercellular phenomena. The system will have to produce a negative entropy; in other words, as Schradinger pointed out, the system will have to resist entropy, not in a passive process, but with an active resistance to the entropy in a neg-entropic way.

Of course, it must be pointed out that the external environment around a cell will still have its high and low parameters that will determine the healthy range in which it can live. There are certain pH levels that cells cannot tolerate; certain temperatures, either in the low or high range, that the cell cannot tolerate; and many other values that can impose destruction on the cell. This sets up the torus by our fractal dynamics of the range of activity in which the cell can live. Within this torus of destruction of high and low there is also a central torus, where the cell is most optimum in its ability to find health and cellular stability. The cellular stability will allow for ease of flow in metabolism and reproduction.

When the steady-state system is established, neg-entropy can be at its peak. Schr6dinger had the idea that humans and other living organisms needed to eat other living organisms because they needed to feed on the neg-entropic factors within these living things, and that actually organisms would feed upon negative entropy rather than feeding on energy. In other words, the human being would need to eat food so that he could maintain his fight against entropy, rather than trying to generate energy.

We quote from Schrddinger, “Since negative entropy may be considered a measure of order, it is legitimate to say that an organism maintains a steady state by continually extracting order from its surroundings. In the case of human beings and higher animals, it is clear how this process is realized. Food stuff consisting of highly-organized, entropy-poor organic molecules are taken in by the body. Their energy is partially utilized, and finally returned to the environment in a highly-disorganized, or entropy-rich, form. Organisms, thus, will feed on negative entropy, rather than on energy.”

So in the SchrOdinger theory, the essential purpose of eating, drinking and breathing is not to provide energy for the functions, but perhaps to rid the system of the entropy it cannot avoid producing while alive (see Quantum Biology). Here we can see the need for not using synthetic compounds in our foods, as these compounds by definition are entropic. The move towards natural foods and entities will receive a real boost from this quantic type of understanding.

We must argue with Schrddinger, in the fact that we do need to eat, at least in some ranges, for energy. A minimum amount of energy must be attained in order to play football, or any heavy-duty sport or extreme activity.

The case of breathadans must also be dealt with in our biology. SchrOdinger has put it into a theory that allows for us to understand the breatharian event in biology. As we have pointed out in Quantum Biology, there are well over five thousand documented cases of people who have lived for over ten years without eating. These breatharians are able to achieve the needed neg-entropy from a stability of spirit and mind, and also by breathing good air and maintaining a healthy lifestyle. All of the breathariians report that spiritual, heavy negative emotions such as anger, lust, and so on disturb their ability to be breatharians. Negative entropy could also result from a high degree of spiritual purity. Positive emotions could possibly fight against such entropy.

So we can see that Schr6dinger was perhaps correct in the fact that neg-entropy, if achieved, could produce a type of condition in which a person would no longer even need to eat. This situation would have to come from an extreme spiritual stability. Negative emotions would be toxic, and could produce disease and instability.

But even these breatharians cannot maintain high degrees of metabolic activity. They couldn’t play on the offensive line of the Green Bay Packers. These people would need to eat also for energy, as well as neg-entropy. We have found from the production of synthetic products that nobody can live totally on synthetic products for very long; we still need active plants and animals in our diet. If we were to give a person just the inorganic minerals and synthetic compounds that would supply all the chemistry for life, we would find that the person could not live on this or be healthy for long. So SchrOdinger could perhaps be correct about our neg-entropic needs. This might explain the breatharians in our society’s history who have been able to achieve neg-entropy through the powers of the spirit and mind. This will further push the idea of fresh and raw vegetables and other living food stuffs as being a mainstay in the diet if one wants to be healthy and productive.

Prigogine and Wiame put forth a little bit more of an explanation on this process when they used this type of negative entropy to explain some of the following observations:

1. That when we take a look at animals’ sizes versus their metabolisms, we will see that the intensity of metabolism per unit mass diminishes as the size of the animal increases

2. That migrating animals usually settle in conditions that provide them the ability to function with minimum amounts of metabolism

3. That bacteria will have a tendency to develop in the direction of states of minimum metabolism

This was used to further provide proof for neg-entropy, and also the conditions of the open thermodynamic systems of Bertalanffy. If biology is to become an exact science, we must understand these proceedings in more in-depth terms.

Let us now consider the ergodic problem (of self-imposed reactive stability). In nonliving systems of closed thermodynamic relations the system’s phase orbit can lie completely on the surface H(q,p) = E in phase space. This is consistent with the atomic theory of matter. All the properties can be measured in a nonliving system as it falls outside the quantic rule. Living systems, however, require a more complicated approach. Momentum and position are known as the phase functions, and can be measured in this system. This will fall into the formula

(4)

$$F_\tau = \frac{1}{\tau} \int_{t_0}^{t_0+\tau} F(q^0, p^0, t)\, dt$$

In a system of equilibrium we assume that FT can be replaced by the time average $\overline{F}$ of F(q,p), defined by

(5)

$$\overline{F} = \lim_{\tau \to \infty} F_{\tau} = \lim_{\tau \to \infty} F_{\tau}.$$

Finally,

(6)

$$\overline{F}_{MEN} = F$$

The shape of orbits and imposed dynamics is recreated here.

In an open situation, such as the living system, a different type of mathematics will have to be utilized. Life must be responsive to a wide variety of stimuli. This responsiveness can be achieved by a large number of possible energy states in our metabolism matrix.

Dr. Isaacs poses the condition of the ergodite in his matrices. This is a compound that can contact or help many situations. Thus water becomes an ergodite, phosphorous or oxygen, because they can occupy many different spots and involve many different actions. In a thermodynamic system these ergodites can affect every situation. They can thus help control the overall condition. In a quantic system they have the probability of interaction. Ergodites might have hundreds to millions of functions and levels of activity.

The study of reductionistic biology could not grasp the concept of an ergodfte, because in reductionistic philosophy we try to reduce complex situations to simple, reductionistic terms. In other words, an organism might be reduced to simply his blood pressure. This type of simplistic, reductionistic philosophy is contrary to understanding an item when we have such a thing as an ergodite. How can we possibly reduce an ergodite's utilization if it is involved in millions of processes? Thus to study water's effect on biology would be nearly impossible with reductionistic techniques. We might reduce the organism to simple things, such as satiation of thirst drives, or the quantity of water drank, and perhaps counter that even with water dispelled through urination or perspiration. But even this type of over-simplistic approach would not make it possible for us to understand water's true potential, because of its ergodic type processes. So here again the factors of reductionistic studies and statistical protocols do not seem to fit our new parameters of a quantic philosophy of biology.

The ergodic problem, which has been posed to physicists and mathematicians for some time, offers some intriguing answers for biology. It was first advanced by Bottzmann in 1887. He asserted that the orbit of a phase point must transverse each point on the surface. ("Ergodic" is a combination of the Greek words for "energy" and "path").

First, with only one orbit passing through any point in the Hilbert space, the ergodic hypothesis implies that the surface of constant energy consists of a single-phase orbit. All image points will thus be in approximate closeness to the same trajectory, and systems will differ from one another solely in relation to the time that the point will transcend a particular phase space. So the average time dependent on the orbit, not on the value of the initial time, will be the same for all members of the group. The start of the time sequence is irrelevant and the process must have symmetry. Second, we will be dealing with a stationary group. The average time of the space is the same as the phase average at an arbitrary time. Third, we will make an assumption that it is irrelevant whether the averaging over time precedes or succeeds the averaging over phase. Our measured properties are measurable in at least one degree.

1. Single phase orbit
2. Stationary ensembles (groups)
3. Average of time or phase is irrelevant (both proceed simultaneously)

Since no trajectory can cross itself, but a trajectory is quite capable of filling the whole space, Ehrenfest suggested a quasi-ergodic hypothesis. This hypothesis was that the trajectory approaches closely each point of the energy surface, H(q, p) = E, without actually transversing each point.

Von Neumann and Birkhoff had a new idea of the ergodic problem in 1932. They related the position to the surface and also the constant energy of the system. Constraints on both occur, as in the Pauli exclusion principle. This prohibits two quantic bodies from occupying the same quantum levels simultaneously.

The ergodic problem cannot be solved using any type of statistical dynamics. It can only be solved through an Isaacsonian type of hermitian matrix, in which certain items can have ergodic relationships. These items can do many, many functions.

A combination of Planck's constant and the DeBroglie wave theorem, relating the orbitals and k values of quantum biology, allows us to more closely approximate a condition to solve the ergodic problem. Planck's constant sets the limit of our understanding or approximation as we estimate whether we know the position or momentum of an item, whether we know the angular momentum versus the angle, or whether we know the energy versus the time. This is the limitation of our knowledge.

As we try to develop a hermitian matrix, we encounter the k values developed in quantum biology by the researchers from the Santa Bell island. They found that there was an ionizing layer of electrons around items such as ubiquinone, vitamin C, cytochrome and the like. This type of outer shell could be used for electron transfer, and is the key of the krebs cycle and the photosynthesis cycle allowing for plant life. This will be further espoused in Chapter 10. In that chapter and others we will see that electron transport chains will need to be sensitive to allow the electron to transfer through these ionization pathways. Ubiquinone, cytochrome, and a lot of other compounds having ergodic properties can occupy many different parts of this cycle.

The transfer of energy from glucose to ATP must involve such a cycle and be sensitive to the various quantum transfer items, which can be measured for various k values. Like transferring a golf ball down a set of stairs, there is a distinct jump with each stair that has an implication of energy imposed by gravity onto the golf ball. This is a similar type of process allowing for the transfer of energy from one item to another; instead of the stairs we have items that have various quantic energy states. These quantic energy states have an ionization potential, developed through their outer shells, which will be plotted on an item of radii, which now involves n. Planck's constant will come in, telling us that we cannot precisely know this energy versus its time, nor can we know the angular momentum of these radii versus the angle, nor the position versus the momentum.

Thus in developing our science we must involve both Planck's constant and the DeBroglie wave theorem, utilizing and understanding the k values. This will generate our hermitian matrices found in Chapter 11. The ergodic problem can only be solved through indeterminacy as items can be involved in multiple processes simultaneously (ergodic by definition).

Quantum mechanics relates that the state of any system which has n points should property be represented by a continuous, finite, and single-valued function that generalized coordinates with the time.

But a hermitian matrix is needed to display changes in the system. The Hamiltonian eigenvalues can only be understood in such fashion.

The wavefunction, sometimes known as the state function, obeys the SchrOdinger wave equation. This is key to understanding quantum dynamics. The Schr6dinger wave equation will be a wavefunction undetermined to its numerical factors.

The Schrddinger wave equation, for any state function, will have an infinite number of solutions (dramatic responsiveness of metabolism). These possible types of solutions can be called eigenvalues. In a Hamiltonian equation, H(q,p) the Schrodinger wave equation will allow us to discover a possible set of these eigenvalues, or the energy levels of the system. These are frequently represented in hermitian matrices with horizontal lines and distances proportional to the energy differences (see Chapter 10). Any measurable quantity is said to be quantized if it falls into the matrix. For biology a possible hermitian matrix would help in approximating energy shifts. The system is confined to a physical, finite volume. If the volume grows indefinitely, the density levels of the high-energy ranges would increase and give rise to powerful increases in energy. The quantum of energy of any electromagnetic radiation is determined by Planck's constant times the wavelength (see Chapter 5).

Biology consists of microstates that can have an astronomically large number of energy packets in these quantum energy states. This is usually reflected in a given set of macroscopic parameters, which define the macro appearance of the thermo-physical system, but are actually a reflection of the multitude of micro states.

Thus there are literally millions, if not millions of millions, of guesses we can make as to the dynamics of a quantic hermitian matrix for biology, and since macro observations seem to parallel micro state values, we will use some observations of the mathematics of nature in choosing our best guess for a hermitian matrix. This will relate to all matter, and will use the quantic laws of interaction. The mathematics of the "big suck" (see Chapter 1) will be echoed in all things. Biology is the ultimate display of the beauty of quantum mathematics.

Our system must be cyclic in order for it to be of any use. In fact, in 1890 Poincaré stated a theorem of periodicity, which simply says that any finite isolated mechanical system must be very nearly periodic to be precise. Poincaré talked about the recurrence time of the Poincar6 cycle, which in some values would be extremely long, and in others, extremely short. This describes a lot of the periodicity observations that we see in biology, such as cyclic reproduction, pituitary/pineal performance, the reaction of circadian rhythm, and even reactivity to the change of the seasons of the year. There are several other periodicities, which might even be expressed in longer periods. The army ants of South America band together and attack once every twelve years, locusts come out every seven years, etc. There are an infinite number of micro periods that cycle and recycle information, energy, and matter. All things are in cycles, all things are in a state of flux, and all things are ultimately vibration.

So our matrix system must have a built-in periodicity at many levels (micro and macro), as energy that enters and leaves requires several opportunities for cyclic behavior, a radically large number for metabolism, and a small stable number for reproduction.

We must be able to control the wide variety of quantic energy states reflected in quantum numbers. The first three quantum numbers are: N, the large original quantum number; L, the magnitude, and M, the angular(azmuthal) momentum. Other quantum numbers are that of spin and spin angular momentum, and total angular momentum. Particles with integer spin numbers are named bosons, after Bose, and those with half integer spin numbers are known as ferrnions, after Fermi. Other quantum numbers will reflect magnetic moment and static moment as well, and must be reflected in our matrices.

The second law of thermodynamics comes into play when Boltzmann's equation of $S = k \log w$ is taken in conjunction with the H theorem. S in this equation is entropy, k is the Boltzmann constant, w is the work done by the system.

The change in S will be greater than or equal to 0. Then the state of the system will develop from small values of w to more large probable states, with larger values of w. The equilibrium occurs at the state in which w attains its maximum value. w is the work done by the system, as well as potential
thermodynamic probability.

In our Boltzmann equation we see that for S to produce a neg-entropy, we would need the log of w to be a negative number, which can happen when w is the inverse and when w involves i, which is an irrational number of a complex series. Thus for biology to stabilize and produce neg-entropy in light of the Boltzmann equation, biology will have to involve this complex, or imaginary, number. This could only be done by some type of magical system of biology.

For ease in analyzing large super-systems of interaction, Hamiltonian relations can be laid out in a hermitian matrix. This matrix, if expanded, could be used to plot possible interchanges of all biology.

(7)

$$\begin{array}{l|} E_1(0),\ E_2(0),\ldots \\ E_1(1),\ E_2(1),\ldots \\ \ldots\ldots\ldots \\ E_1(n^*),\ E_2(n^*),\ldots \end{array}$$

This matrix (the Isaacs matrix) could be the basis of a periodic table for biology.

(8)

$E_1(0)$, $E_2(0)$, $E_3(0)$, $E_4(0)$, $E_5(0)$, $E_6(0)$, $E_7(0)$, $E_8(0)$, $E_9(0)$, $E_{10}(0)$, $E_{11}(0)$, $E_{12}(0)$

$E_1(1)$, $E_2(1)$, $E_3(1)$, $E_4(1)$, $E_5(1)$, $E_6(1)$, $E_7(1)$, $E_8(1)$, $E_9(1)$, $E_{10}(1)$, $E_{11}(1)$, $E_{12}(1)$

$E_1(2)$, $E_2(2)$, $E_3(2)$, $E_4(2)$, $E_5(2)$, $E_6(2)$, $E_7(2)$, $E_8(2)$, $E_9(2)$, $E_10(2)$, $E_{11}(2)$, $E_{12}(2)$

$E_1(3)$, $E_2(3)$, $E_3(3)$, $E_4(3)$, $E_5(3)$, $E_6(3)$, $E_7(3)$, $E_8(3)$, $E_9(3)$, $E_{10}(3)$, $E_{11}(3)$, $E_{12}(3)$

$E_1(4)$, $E_2(4)$, $E_3(4)$, $E_4(4)$, $E_5(4)$, $E_6(4)$, $E_7(4)$, $E_8(4)$, $E_9(4)$, $E_{10}(4)$, $E_{11}(4)$, $E_{12}(4)$

$E_1(5)$, $E_2(5)$, $E_3(5)$, $E_4(5)$, $E_5(5)$, $E_6(5)$, $E_7(5)$, $E_8(5)$, $E_9(5)$, $E_{10}(5)$, $E_{11}(5)$, $E_{12}(5)$

$E_1(6)$, $E_2(6)$, $E_3(6)$, $E_4(6)$, $E_5(6)$, $E_6(6)$, $E_7(6)$, $E_8(6)$, $E_9(6)$, $E_{10}(6)$, $E_{11}(6)$, $E_{12}(6)$

$E_1(7)$, $E_2(7)$, $E_3(7)$, $E_4(7)$, $E_5(7)$, $E_6(7)$, $E_7(7)$, $E_8(7)$, $E_9(7)$, $E_{10}(7)$, $E_{11}(7)$, $E_{12}(7)$

$E_1(8)$, $E_2(8)$, $E_3(8)$, $E_4(8)$, $E_5(8)$, $E_6(8)$, $E_7(8)$, $E_8(8)$, $E_9(8)$, $E_{10}(8)$, $E_{11}(8)$, $E_{12}(8)$

$E_1(9)$, $E_2(9)$, $E_3(9)$, $E_4(9)$, $E_5(9)$, $E_6(9)$, $E_7(9)$, $E_8(9)$, $E_9(9)$, $E_{10}(9)$, $E_{11}(9)$, $E_{12}(9)$

$E_1(10)$, $E_2(10)$, $E_3(10)$, $E_4(10)$, $E_5(10)$, $E_6(10)$, $E_7(10)$, $E_8(10)$, $E_9(10)$, $E_{10}(10)$, $E_{11}(10)$, $E_{12}(10)$

E1(11), E2(11), E3(11), E4(11), E5(11), E6(11), E7(11), E8(11), E9(11), E10(11), E11(11), E12(11)

$E_1(12)$, $E_2(12)$, $E_3(12)$, $E_4(12)$, $E_5(12)$, $E_6(12)$, $E_7(12)$, $E_8(12)$, $E_9(12)$, $E_{10}(12)$, $E_{11}(12)$, $E_{12}(12)$

As shown, the different eigenvalues in a two-dimensional array are portrayed in matrix form. This description of the processes contains n number of molecules found in this super-system. We can solve this if we obey the following set of criteria:

(9) $$\sum_j \sum_N N_j^*(N) = N^*,$$

(10) $$\sum_j \sum_N N_j^*(N) E_j(N) = E^*,$$

(11) $$\sum_j \sum_N N_j^*(N) N = n^*,$$

N = Number of particles
N* = Number of systems
E* = Constant energy of the system

If biology needs six hundred protein interactions, then an N of 600 would fit our matrix.

This last formula restricts the number of quantum states in the super-system. So biology has its limits and torus of attraction. This leads to

(12)

$$\sum_j \sum_N N_j^{*'}(N) N = N_1^*(0) + N_2^*(0) + \cdots + [N_k^*(N) - 1] N + \cdots = n^* - N.$$

Ω* = Number of super-systems status given for E*, N*.

(13) $$\log \frac{\bar{N}_k^*(N)}{N^*} = -\frac{\partial \log \Omega^*}{\partial E^*} E_k - \frac{\partial \log \Omega^*}{\partial N^*} - \frac{\partial \log \Omega^*}{\partial n^*} N.$$

So biology would set upper and lower limits or constraints on needs interaction pathways.

n* = Number of particles in the super-system
M = Boundary operator

(14) $$a = \left(\frac{\partial \log \Omega^*}{\partial N^*} \right)_{n^*, E^*} = \textit{Onsager coordinates}$$

(15) $$\beta = \left(\frac{\partial \log \Omega^*}{\partial E^*} \right)_{N^*, n^*} = \frac{1}{kt} = \textit{Reciprocal of Boltzmann Constant} \times \textit{Kinetic Energy}$$

(16) $$\alpha = \left(\frac{\partial \log \Omega^*}{\partial n^*} \right)_{E^*, N^*} = \textit{Fraction of radiant energy Absorbed by surface}$$

To eliminate the Osager coordinate assume

(17) $$\bar{N}_k^*(N) = N^* e^{-a-\beta E_k(N) - \alpha N}$$

(18) $$\frac{\bar{N}_k^*(N)}{N^*} = \frac{e^{-\beta E_k(N) - \alpha N}}{\sum_j \sum_N e^{-\beta E_j(N) - \alpha N}}$$

As we prove in Chapter 5, the Boltzmann relation gives us a predictor as to the amount of energy that can be developed by the cell. We calculated this for a small cell at normal body temperatures to be 4.59 x 10-5 watts. By placing it into equation (15), we can now see that the boundary of the natural type of cell will now come out to be the log of the number of super-system states, provided that we know the amount of energy determined from the space and temperature. Since we are dealing with one supersystem, we would say that N = 1. So we would now come to the fact that since the Boltzmann constant is equal to the energy (E'), we will see that this is the Boltzmann constant times the temperature to the fourth power. (3 in this formula equals the inverse of the Boltzmann constant times the temperature. We will cross out the temperature and the Boltzmann constants, as we multiply both sides of equation (15) by E', leaving us with the boundary of the log of the number of super states needed, being equal to 27 times 108, which is the temperature to the third power. There is a dramatically large number of possible quantic states that a cell can occupy in response to a very large changing type of environment.

The relative deviation of the occupation matrix numbers from their average values tend to zero as N grows indefinitely. At a certain level of growth, control would be lost. This would be the upper limit of sae. Thus sae extremes are set by the quantum numbers.

As we have shown before, we are able to calculate the amount of radiant energy brought out by the surface. If we adapt equation (16) with this, and insert instead of a, 4.59 x 1V watts, this will be equal to

the boundary operator log of the number of super-systems divided by the number of particles in the system. Knowing that the number of particles in an average cell can be as large as 10a, we now multiply both sides by 10°, giving us 4.59 times 10', which equals the log of the amount of super-system states needed for the cell. We can see that this is still a tremendously large number.

We find that there are limits to the factors of biology such that the end can only get so big before we start to get into the closed system of thermodynamics. External interaction rips into the cell and prohibits control. Thus the torus of temperature extremes is set. In setting the extremes of temperature, we can look at the graph below and see where the possibilities of temperature allowance can be set.

Energy Boltzmann Equation

Ceiling Temp.	75° C Deg. Centigrade		167° F Deg. Fahrenheit		358° K Deg. Kelvin
Base Temperature To Destroy Life	62.5° C	=	144.5° F	=	346° K
Hot Comfort Zone For Animals	50° C	=	122° F	=	333° K
Average Body Temp. For Animals	37.5° C	=	99° F	=	320° K
Cold for Cold-Blooded Animals	25° C	=	77° F	=	308° F
Comfort Zone for Warm-Blooded Animals	12.5° C	=	54.5° C	=	296° K
Freezing of Water	0° C	=	32° F	=	283° K
Extreme Cold No Life Can Withstand	-12.5° C	=	-9.5° F	=	270° K

In the graph of temperature we can see that something unusual happens at every 12.5° C on the scale. At 37.5° C we see the normal body temperature for mammals. If we go up 12.5° at 50° C, we will find that this is 122°, and that this type of excess temperature is about as hot as the planet Earth gets in certain locales, and if it gets beyond 122°, any life will have a hard time existing. This excludes certain types of specifically developed bacteria that can live in high thermal zones inside different parts of the ocean, but even these will have much difficulty past 122°. Going up another 12.5° we will find that 144° is a temperature that can destroy enzymes and bacteria. We must start our process of homogenization and pasteurization at 144° F. Going up one more 12.5° factor will take us to the point of total pasteurization at 167°. At this temperature any life can be destroyed.

Going down 12.5° from the norm of 37.5°, we see that at 77° F or 25° C cold-blooded animals will start to react, to huddle up and go into a variation of hibernation. Going down another degree we see that 54.5° F, or 12.5° C, is a comfort zone for mammals. Below this, heavier clothing will be needed for protection. Going down another 12.5° we now get to 32° F, which is the freezing point of water; another significant point for biology. Going down another 12.5° to -12.5° C, we can find the extreme cold temperatures in which animals can live.

This extent of temperature is one factor that sets the limit for the size of biology and its temperature ranges. We can see that at certain temperatures the environment gets too warm, starts to disrupt enzyme action, and pulls at the factors of the cell membrane.

Using the Boltzmann constant, we can convert any of these temperatures and find out the amount of energy life can withstand. By putting it into these formulas, we can see just why the temperature factors are set in biology; they have effects on quantum dynamics.

(19)

$$P_k(N) = \frac{N_j^*(N)}{N^*}$$

and

(20)

$$\mathfrak{Z} = \sum_j \sum_N e^{-\beta E_j(N) - \alpha N}$$

Equation (20) can be written concisely as

(21)

$$P_k(N) = \mathfrak{Z}^{-1} e^{-\beta E_k(N) - \alpha N}$$

Variations of this hypothesis can be used to calculate biology. Life has a beautiful, indeterminate, magical mathematics in all its activity. God's grace is extremely profound in its complexity. This last equation displays to us the grand canonical ensemble. Such an ensemble, as we have shown, is descriptive of some of the thermo-physical systems in biology.

Gibbs started the idea of "pent" and "grand" ensembles to describe two types of ensembles.

(22)

$$\mathfrak{Z}(T, V, \mu) = \sum_N e^{-\alpha N} \sum_j e^{-\beta E_j(N)} = \sum_N Z(T, V, N)\, e^{-\alpha N}$$

We now introduce the constants I3, a and y by the distribution law contained in our last equation. The grand canonical equation allows us to correlate these quantities, and we propose that the energy of a system can be described by

(23)

$$U = \sum_j \sum_N P_j(N)\, E_j(N)$$

Thus the energy of a cell has limitations. Too much or too little energy disrupts control. We have now set the torus of energy for biology. We can see by setting this limitation on biology that biology was able to define the environment in which it could best live. The planet Earth offered the beautiful environment for life as it provided opportunities in many ways. The factors of energy, mass, momentum, charge, and electromagnetic radiation would all have their own toruses set in this dynamics.

The limitation of mass was set as a limitation of size, which also involved the limitations of the electromagnetic radiation spectrum. As we pointed out in Chapter 8 of Quantum Biology, the actual size limitation was set by the factors of mitogenic radiation, which occurred at 10^{-5} -10^{-2} centimeters. This limitation of the wavelength set the limitation on the mass. Another factor that set the limitation on charge is the factor of the limitation of capacitance and inductance, and their limitations, in the amount of capacitance and inductance that could be tolerated by a cell. This set the dynamics of charge and magnetics; the charge being through the capacitance and magnetic limitations of the inductance.

Momentum has its limitations in the viscosity, which is set by the dynamics of the flow of the fluid. As fluid becomes increasingly thick through the accumulation of protomorphogens, aging might ensue. This factor is dealt with in Chapter 14 of Quantum Biology.

The differential of equation (23) is

(24)

$$dU = \sum_j \sum_N [E_j(N)\, dP_j(N) + P_j(N)\, dE_j(N)]$$

Using reversibility in the process, we arrive at

(25)

$$dU = \beta^{-1}\left\{-d\left[\sum \sum P_j(N) \log P_j(N)\right] - \alpha d\bar{N}\right\} - pdV$$

Using system average

(26)

$$\bar{N} = \sum_j \sum_N P_j(N)\, N$$

Equation **(25)** may be compared with the fundamental thermodynamic equation for an open system

(27)

$$dU = TdS - pdV + \mu d\bar{N}$$

Between equations (25) and (27) agreement can be established by positing

(28)

$$\beta = \frac{1}{kT} = \textit{Reciprocal of } kT$$

(29)

$$\alpha = -\frac{\mu}{kT} = \textit{Fraction of incident radiating Energy absorbed by surface}$$

and

(30)

$$S = -k \sum_j \sum_N P_j(N) \log P_j(N)$$

k is the Boltzmann constant in all of these cases.

So photon release is not a mere byproduct, but a useful communication (see Quantum Biology, Chapter 8).

Lastly Gibbs defines the free energy equation.

(31)

$$pV = kT \log \mathfrak{Z}$$

$$\mathfrak{Z} = \textit{Grand Partition Function}$$

So we can see from our analysis that by calculating the extremes of biology: temperature, energy, momentum, heat, and charge, we can now predict the capacities or limits of the Isaacsonian matrix, and we can set the limits through the quantic factors needed to handle the extremes of this utilization for metabolism and reproduction. We are faced with the difficulty of finding out just how complex biology really is. Any attempts to duplicate it synthetically, without complete knowledge of the various quantic factors, would be extremely irregular, and would produce vast disruption on biology. Such an event has happened in the wildly increasing iatrogenic diseases that have been generated by the synthetic chemical companies. It is hoped that the understanding of biology in this book will direct us back to research in homeopathy and naturopathy, and push the development of natural protocols greatly needed for understanding the factors of life. Only through increasing our understanding of life and biology can medicine shed its iatrogenic disturbances and start to cure, not drug, the patients.

So what have we described in so enigmatic a treatise? Simply put, using a hermitian matrix makes sense in biology.

(32)

$$8 \cdot \sum_{j} \sum_{N} e{-}\beta E_j(N) - \alpha N$$

As we see from this chapter, the extreme complexity presented in biology still offers alight at the end of the tunnel, as we can explore more and more of the capacitance, inductance, voltage, amperage, temperature, resistance, electromagnetic factors, as well as the other dynamics; and find out many more secrets about health and disease. Since we are dealing with quantic levels, we are dealing with an indeterminate perspective, which will give us the ability to explore for generations to come.

Now that we've shown the tremendous complexity of this system, we now need to point out that in this chapter we dealt with a completely thermodynamic, statistical system which depended on a consistent external environment. This consistent external environment would produce predictable flow rates through a thermodynamic system. These are the laws of death, not the laws of life. When we get into an analysis of life, we must drop our system of statistical thermodynamic analysis and go into a more quantic system, which is the purpose of this chapter. The quantic system will need to have subtle energy states that will be responsive to changes in the external environment. Thus this system is now open, not closed.

In this chapter we have proven that biology must have such a radically open system with large numbers of possible energy states capable of making wide responses for metabolism and growth.

The extreme complexity of this intricate cybernetic feedback system should induce reverence in the reader at this time, a reverence that we hope will dispel any thoughts of using, or participating in, any types of synthetic pharmaceuticals that do not match this type of complexity. If we use synthetic, allopathic pharmaceuticals to mask symptoms, to induce or over-stimulate processes in the body, or to sedate and cover up pain and symptoms (like shooting the messenger), we can see how much of a strain we are putting on a system, such as this complicated cybernetic feedback system we call life. Synthetic technology is contradictory to nature.

A better system choice of medicine would be that of homeopathy, in which we are looking at minute factors of control and trying to reestablish control within this system. Thus the human body might be given a homeopathic in response to disease, which could encourage the overall system to gently restore itself to full functioning. Naturopathy should be the pinnacle of medicine, not the doormat

In homeopathy we are working with subtle thermostats. We can see that the number of thermostats needed for the system of life is extremely complex; well beyond our understanding at this time. Thus homeopathy offers a very gentle, noninvasive system with much fewer mistakes, and results in much less insurance, malpractice, or iatrogenic damage.

In allopathy the simple use of an anti-histamine can have serious deleterious effects in the long run. It can upset this subtle cybernetic flow that we've described in this chapter. The presence of a large amount of synthetic anti-histamine would be very complicated for such a system to understand. As it would try to pattern itself and deal with it, a lot of other subtle systems would be affected.

As we can show in our theory of quantum biology, changing one factor in any part of our matrix will result in changes in many others. Thus the large amount of anti-histamine could possibly induce some type of other iatrogenic damage. In the case of a homeopathic we would be using a small compound, such as Allium Sepa (homeopathic onion), which would help to trigger the system to balance in just a small, gentle way. The small, gentle pathway dealing with these subtle symptoms in homeopathic terms is much more attuned to the quantic, biological system we have described in this chapter.

We also can see that the amount of complexity of the pathway of energies that must be allowed accounts for a quantic understanding. There are long-range force transfers through the body, and there are quantic actions that can be felt throughout the system; small changes at certain foci points. In a large system, such as the human body, where there are many cells locked in an overall quantic pattern. We can see that there would be lines of communication drawn along these quantic factors. Such communication would be one possible understanding for the acupuncture meridian system.

Modern science has attributed the acupuncture system to be simply an endorphin release, provoked by the use of a needle. We can now see that this is just a small, small part of the overall system, even though the endorphin release might still be true; but actually acupuncture is a system of subtle communication factors, allowing for our cybernetic system to maintain and share information and maintain control.

In the theory of acupuncture, sometimes a point might not be able to carry the information properly. By using a needle, pressure, or something destructive, we can bring the life force attention to that point to help the body to dispel the blockage and release the transfer of information, to allow the body to return back to control, balance, and health.

Our analysis of quantum physics in light of biology has given us a new dimension, which will now tell us that acupuncture, homeopathy, naturopathy and many other alternative sciences are a much deeper rationale to follow than any type of allopathic-driven concept.

SUMMARY

1. The basic problem comes from a misguided concept taught by the balls and rod chemistry. The concept of this system misleads one to see the chemical interchnges as hard unyeilding objects like billard balls, when in fact the subatomic particles are indeed quasi energetic fields of vibration , angular, spin, orbital etc. energy. The interaction of a substance with the cell wall of an organism is an encounter of enrgy probability fields encountering each other. The billard ball concept was good for instruction but decieved the thought from truth. The concept of the quasi particle is introduced in the book' A guide to Feynman Diagrams in the Many-Body Problem' by Richard Mattuck (Dover Press). The mathematical laws of the interaction of these energetic quasi particles could be expressed in a matrix.

2. **WE HAVE SEEN FURTHER EVIDENCE OF THE COMPARISON BETWEEN A STATISTICAL THERMODYNAMIC ANALYSIS OF NONLIVING ENTITIES AND THE NEED FOR A QUANTUM SYSTEM IN LIVING ENTITIES. THE DEVELOPMENT OF SUCH A QUANTUM SYSTEM IS OUTLINED IN THIS CHAPTER TO BE FURTHER DEVELOPED FOR BIOLOGY AND MEDICINE.**
3. **FURTHER PROOF OF THE NEED FOR A HERMITIAN MATRIX AND HOW THIS MATRIX COULD BE UTILIZED FOR BIOLOGY AND MEDICINE WERE DISCUSSED IN THIS CHAPTER.**
4. **MATHEMATICAL RELATIONS SHOWING THE CAPACITIES OF THE MATRICES TO HANDLE BOTH THE ENVIRONMENTAL AND GENETIC CHANGES WERE OUTLINED AS A BASIS FOR QUANTUM BIOLOGY.**
5. **FURTHER EVIDENCE AGAINST SYNTHETIC ALLOPATHY WAS OFFERED WITHIN THIS CHAPTER, AND SUPPORTIVE DEMONSTRATIONS FOR HOMEOPATHY AND NATUROPATHY AS A MECHANISM WERE ALSO SUPPLIED.**