

MICROVITA: A HOLISTIC PARADIGM FOR A NEW SCIENCE OF MATTER, LIFE AND HEALTH

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SCOPE

P.R. Sarkar's concept of microvita is proposed as the basis for a new scientific paradigm. Microvita are subtle, sub-microscopic living entities that organise energy to create forms, structures and processes in the universe. Millions of microvita may compose one electron. A quantitative microvita model for the form of an electron and a photon has been derived, using known experimental facts and a proposed spiral motion of microvita. The model explains the experimental value of the electron's spin. A new interpretation of quantum theory is proposed, based on microvita. An experimental test of the microvita hypothesis in the area of quantum physics is suggested. Microvita are related to viruses, and may help explain the origin of life and evolution of species through the creation and addition of new genes. The interplay between positive and negative microvita in the human body and mind explains the cause of disease, and suggests a new approach to health.

1 INTRODUCTION

There is a search on for new, more holistic approaches to scientific and medical research.[1] One promising approach is the growing body of experimental evidence relating energy and form, particularly biological form.

It appears likely that biologically active or form-carrying information can be stored in water and transmitted through electromagnetic fields. There is the work of Popp [2] on biophotons, and the work of Reid [3] on the transmission of crystal structure information by an electric current. There is the hypothesis of Sheldrake [4] that morphic fields may transmit form and behavioural information without use of electromagnetic or other known physical fields. The work of Benveniste [5] on both in vitro and in vivo biochemical effects at very high dilutions shows that biologically active information can apparently be stored in water. The work of Endler et al [6] on the effect of highly diluted thyroxine in sealed ampules on amphibian development, shows that biochemical information from various substances can even be transmitted through glass with biological effects. However, none of this experimental evidence is supported by an accepted scientific theory, and the subject remains controversial.

2 MICROVITA

As yet there is no generally accepted scientific theory relating energy to form, which could explain the above experimental results. Indian philosopher P.R. Sarkar [7,8] proposed in 1986 a new concept that could lead to such a theory. It is the microvitum, or in plural, microvita. Some of the properties of microvita are described below.

Microvita are living, sub-microscopic, indivisible entities whose function is to organise energy into the structures and processes we call matter, protoplasmic organisms, and minds. Microvita are themselves aware, having subjective experience, as well as having objective properties that may be determined through research, both empirical and mental. Microvita live, reproduce and die. They may be positive, negative or neutral. Microvita move unbarred throughout the universe, creating matter and individual minds, as well as destroying them.

Thousands of millions of microvita make up a carbon atom, according to Sarkar. So the number of microvita in a single electron could be in the millions, or perhaps even less than a million. Microvita can travel through various sensory modalities, as well as through mind, and can convey information from one mind to another. Positive microvita are responsible for the

evolution of living protoplasmic beings and individual minds, and for maintaining good physical and mental health. Negative microvita evolve material structures such as sub-atomic particles out of energy, and direct the mind. Microvita may also be neutral in their effects.

2.1 The Formation of Matter

Energy is formed into material particles and fields by the action of microvita. A model for this for the photon and electron will be described in the section on microvita physics. Quantum phenomena such as the electron's spin, the origin of the electron's charge and the paradoxical double-slit experiment may be better understood in the light of microvita structuring of physical particles.

2.2 The Evolution of Life

More complex physical and chemical structures are further evolved with the help of more subtle microvita. Protoplasmic organisms are formed with the help of positive microvita, and individual primitive minds emerge at this stage. Bodies and minds evolve with the help of positive microvita, from unicellular organisms through plants and animals to human beings with highly evolved minds and bodies. A general mechanism for chemical and biological evolution in terms of microvita is proposed in the section on microvita biology.

2.3 The Nature of Health

Disease and health can be understood in a new light through microvita. Health is a result of a proper balance or psycho-physical parallelism between the waves of the body and the mind. Physical or mental disease is caused by an excess of negative microvita. Positive microvita are therefore necessary to fight the disease-causing negative microvita and restore health. Medical treatment should supply positive microvita to the patient through various means to help the body's natural healing processes. One new approach to therapy based on microvita is described in the section on microvita medicine.

3 MICROVITA PHYSICS

The concept of microvita can lead to useful quantitative descriptions in the area of sub-atomic physics, and particularly by providing new models describing the size and structure of elementary particles such as the electron and photon. The microvita approach also leads to a new interpretation of quantum physics. Quantitative dynamic models of the electron and the photon have been developed based on the concept of microvita and combining known experimental facts about electrons and photons.[9] The models are presented and further developed below.

According to Sarkar, "each and every existence has its own peculiar wavelength and its peculiar rhythm." So this applies to microvita as well. We may interpret rhythm here as vibrational frequency, measured in cycles per second. Wavelength might be measured in metres. So any particular microvita will have its own frequency and wavelength. The photon or quantum of light energy is also described in terms of frequency and wavelength. Electrons and other sub-atomic particles with a "rest mass" also have a wave nature and can also be described in terms of a frequency (which depends on a particle's total energy) as well as a wavelength, called the de Broglie wavelength (which depends on a particle's velocity or its momentum.)

The frequency of a photon is directly proportional to its energy, while its wavelength is inversely proportional to its momentum. The wavelength of an electron is inversely proportional to its momentum, like the photon. The frequency of an electron is directly proportional to its total energy (its rest energy plus its kinetic energy or energy of motion.) So for both photons and particles with rest mass, the formulas for energy and momentum are

$$E=hf \text{ and } P=h/L \text{ (1)}$$

where h is a fundamental physical constant called Planck's constant. These formulas are also true relativistically, i.e. for particles with velocities approaching the speed of light. Photons move at the speed of light, independent of their energy. In a vacuum their velocity is $c = 300,000$ kilometers per second, approximately.

For particles with rest mass, the energy contained in the particle is given according to Einstein by

$$E = mc^2 \text{ (2)}$$

where m is the total mass of the particle, which depends on its velocity. The momentum of a particle with mass is given by

$$P = mv \text{ (3)}$$

where m also depends on the velocity of the particle.

Since microvita are said to compose electrons and atoms, we can assume they compose photons as well. We can assume that microvita have a frequency and a wavelength, and that they carry energy and momentum related to their frequency and wavelength, respectively, similar to elementary particles. But the proportionality constant is not h but a constant much smaller than h , which may be called S (for Sarkar).

$$h = N S \text{ (4)}$$

where N is the number of microvita in an electron, which may be in the millions or less. S is a fundamental constant that relates energy and momentum to the spacio-temporal pattern or form of movement of microvita. We may assume for now that the number of microvita in an electron and in a photon is the same, given by N .

So for microvita in a photon,

$$E = S f \text{ and } P = S/L \text{ (5)}$$

for the energy and forward momentum of a microvita, respectively, where f is the frequency and L is the wavelength of a microvita, and $S = h/N$.

4 THE MICROVITA STRUCTURE OF A PHOTON

A photon has a momentum given by

$$p = h/L \text{ (6)}$$

(where L is the wavelength) and angular momentum or spin is given by

$$s(\text{photon}) = h/(2p) \text{ (7)}$$

The spin of a photon may be positive (in the direction of motion) or negative (in the opposite direction.) Light that is right circularly polarised consists of photons with one type of spin, while left circularly polarised light consists of the other. With circularly polarised light, the electric field direction (perpendicular to the direction of propagation) rotates 360 degrees as the light moves ahead one wavelength. The tip of the electric field vector follows a helical

path. So we can assume that the microvita making up a photon also move in a helical path which rotates 360 degrees clockwise or counterclockwise for each advance of one wavelength.

So the rotational movement of the microvita around the axis of the helix accounts for the spin of the photon, while their forward motion parallel to the axis of the helix gives the photon its linear momentum.

There will be a relationship between the radius of the microvita helix for a photon and the wavelength of the photon. (For a photon, a radius is not defined in current physics, only a wavelength.) This radius will tell us something of the microvita structure of a photon.

INSERT FIGURE 1 ABOUT HERE

Assume that the total momentum vector P for the photon is directed along the helical path of the microvita at each point on the helix. (See Figure 1.) Let A be the angle that this total momentum vector makes with the direction perpendicular to the photon's linear motion. Then the component of P (the vertical P vector in Figure 1) that contributes to the spin is $P \cos A$.

The component of P (the horizontal P vector in Figure 1) that produces the linear momentum of the photon is $P \sin A$.

So if r is the radius of the helix, then the angular momentum is

$$\text{Angular momentum} = rP \cos A = h/(2p) \quad (8)$$

while the linear forward momentum is given by

$$\text{Linear momentum} = P \sin A = h/L \quad (9)$$

where L is the wavelength (distance between turns of the helix.) Dividing (9) by (8), we get

$$(P \sin A)/(rP \cos A) = (h/L)/(h/2p) \quad (10)$$

or

$$(\sin A)/(\cos A) = (2pr)/L \quad (11) \quad \tan A = (2pr)/L \quad (12)$$

When the microvita move around one circumference ($2pr$), they also move forward one wavelength L . So according to this geometrical relationship in Figure 1,

$$\tan A = L/(2pr) \quad (13)$$

Comparing equations (12) and (13) we see that

$$(2pr)/L = L/(2pr) \quad (14)$$

This will only be true if

$$\tan A = 1 \text{ and } A = 45^\circ \quad (15)$$

for photons of any wavelength, and

$$L = 2pr \quad (16)$$

that is, the circumference of the microvita helix of a photon equals the wavelength of the photon.

Therefore, the radius of the microvita helix of a photon is

$$r = L/(2p) \quad (17)$$

where L is the photon's wavelength.

So if the wavelength of a photon increases or decreases, (corresponding to a decrease or increase in the energy and momentum of the photon, respectively,) the radius of its microvita helix changes proportionately.

Mathematically, the coordinates of position of one microvita moving along its helix of radius R are

$$x = r \cos(2p z/L) \quad (18) = (L/2p) \cos(2p z/L) = (1/k) \cos(kz) \quad (19)$$

$$y = r \sin(2p z/L) \quad (20) = (L/2p) \sin(2p z/L) = (1/k) \sin(kz) \quad (21)$$

where k is the wave number ($k=2p/L$), z is the distance along the helix, and x and y are directions perpendicular to z. The maximum slope of these sine and cosine curves is 1, that is, 45 degrees, independent of the wavelength of the photon.

A photon whose energy equals the rest energy of an electron, has a wavelength equal to h/mc . So the radius of the microvita helix for this photon would be, from the above results,

$$r = L/2p = h/(2pmc) \quad (22)$$

The length h/mc is well known in physics and is called the Compton wavelength. It equals $.0243 \times 10^{-8}$ cm for an electron. A photon with this wavelength has an energy corresponding to the rest mass of an electron.

We may model a photon as a spiral of N microvita. All N microvita move along the same spiral path one after the other, like beads sliding along a string. The microvita may be considered to be equally spaced along the photon spiral. If the photon is many wavelengths long, the N microvita would be spread out evenly over the total length, while if the photon is only a few wavelengths long, the N microvita would be concentrated along this shorter total length. In each case the formula $E = hf$ for total energy as a function of frequency would apply. A long and a short photon having the same wavelength and frequency have the same total energy. Let us see how this microvita model for a photon compares with that of an electron composed of microvita.

5 THE MICROVITA STRUCTURE OF AN ELECTRON

An electron is known experimentally to have its own spin or angular momentum. In quantum theory the electron is described as having "intrinsic" spin and no size, although it does have a measurable wavelength which varies inversely with its velocity. The spin is thought to be too small to arise from the orbital motion of particles. This leads to a lack of a visual model for an electron as well as for other particles in quantum theory. But the microvita model below shows that the electron's measured value of spin can arise from a closed spiraling movement of microvita. The microvita model of an electron accounts for the electron's spin, even though the moving microvita themselves are point entities. These microvita have no internal structure or spin, but carry momentum and energy due to their movement in space.

5.1 The Radius of a Microvita Electron

A particle with a rest mass can be first modeled as a closed circular path of vibrating energy, with microvita travelling around the circle in one rotational direction. Assume that all the microvita in the particle vibrate in parallel in a single circular pattern. The wave motion of the microvita moves around the circle at the speed of light.

Now assume that the circle's circumference, the distance around the vibrating circle of microvita, is the minimum length for a stable structure. That means the circumference of the circle is one wavelength. Assume that all the microvita in the particle vibrate together at a common frequency and common wavelength, so that the particle's wave pattern is a simple circular one. The radius of the particle can then be calculated by knowing the circle's circumference.

Assume that the rest mass of the particle is m . Then it contains energy $E = mc^2$, by Einstein's equation. This energy is the total energy of all the microvita vibrating together in the particle. From that total energy, the frequency of the vibrating microvita can be calculated by

$$E_{\text{total}} = N(Sf) \quad (23)$$

for N microvita vibrating at frequency f . Therefore

$$E_{\text{total}} = hf \quad (24)$$

since

$$NS = h \quad (25)$$

So

$$mc^2 = hf \quad (26)$$

for the vibrating particle. Since the microvita wave travels in a circle at the speed of light, the relationship of the wavelength L to frequency f is

$$Lf = c \quad (27)$$

or

$$f = c/L \quad (28)$$

so

$$m c^2 = h c/L \quad (29)$$

or

$$m c = h/L \text{ or } L = h/mc \quad (30)$$

but

$$L = 2\pi r \quad (31)$$

where r is the radius of the circle. So

$$2\pi r = h/mc \quad (32)$$

or

$$r = h/(2\pi mc) \quad (33)$$

So the radius of this circle depends on Planck's constant h , its rest mass m , and the speed of light c .

The angular momentum or spin of the particle is calculated by

$$\text{Spin} = r P \quad (34)$$

where r is the radius and P is the momentum at the distance r ,

$$P = E/c = m c^2/c \quad (35)$$

or

$$P = mc \quad (36)$$

so

$$\text{Spin} = r P = h/(2\pi mc) mc \quad (37) = h/(2\pi) \quad (38)$$

In units of $h/(2\pi)$, this particle would be said to have spin equal to 1 unit.

But an electron is known to have spin of $1/2$ unit. So the above description cannot be that of an electron. How can a particle be structured from microvita so that its spin equals $1/2$?

The simplest way is that the microvita move around in a double loop before joining together. The total length of the double loop is still one wavelength L , and the wave motion still moves around its length at velocity c . But the particle radius r_e is now smaller because the structure is two loops instead of one. So the circumference of this smaller loop is $L/2$. The radius of the particle is then given by

$$2\pi r_e = L/2 \quad (39)$$

So

$$r_e = (1/2\pi) (h/mc)/2 \quad (40)$$

where $L = h/mc$ as before, or

$$r_e = (1/4\pi) (h/mc) \quad (41)$$

That is, the radius r_e of the circle for a spin $1/2$ particle (the electron) is half that of a particle of the same mass with spin 1. Confirming the spin of the electron, we see that

$$\text{Spin}(\text{electron}) = r_e P = (1/4\pi) (h/mc) (mc) \quad (42)$$

where

$$P=mc \text{ (43)}$$

as before, or

$$\text{Spin}(\text{electron}) = 1/2 h/(2p) \text{ (44)}$$

So to obtain a spin of 1/2 for an electron, the microvita structure requires a double circular loop of radius

$$r_e = h/4p mc \text{ (45)}$$

What is the calculated value of this radius r_e of an electron made from microvita in the double loop structure described? Since the actual structure of the microvita electron, as shown in the detailed microvita electron model below, is neither circular nor spherical, it does not have a single radius. But we can take $r = h/4p mc$ (the radius of the double-looped circle generating the electron's closed helix) as a measure of the radius.

Substituting the values for Planck's constant h , the mass m of the electron and speed of light:

$$h = 6.63 \times 10^{-34} \text{ joule sec (46)}$$

$$m(\text{electron}) = 9.11 \times 10^{-31} \text{ kg (47)}$$

$$c = 3.00 \times 10^8 \text{ meters/sec (48)}$$

we find

$$r(\text{microvita electron}) = (1/(4p)) (h/mc) \text{ (49)}$$

$$= 1.9 \times 10^{-13} \text{ meters (50)}$$

This calculated value for the radius of a microvita electron contrasts with the radius of an atom of about 10^{-10} meters and the radius of a small atomic nucleus of around 10^{-15} meters. That is, the electron's radius is calculated to be roughly 1/500 times the radius of an atom but around 200 times the size of a small nucleus.

In this preliminary model therefore, an electron consists of a quantum of energy (proportional to the mass of the electron) shared by perhaps millions of microvita circling at the speed of light on a double-loop path of total length equal to one Compton wavelength.

5.2 Detailed Microvita Structure of the Electron

The actual motion of microvita for the double loop particle above will not be a circular motion but a closed spiral motion with the double circular loop as the center line of the closed spiral. What is the amplitude of the microvita motion around the double loop? We can consider that the microvita structure of an electron is created when the helical path of microvita making a photon is curved so that the centre line of the microvita spiral follows a double-looped circular path and the spiral closes on itself after travelling a centre-line distance of one wavelength (the distance between two successive turns of the corresponding microvita photon spiral.) The circumference of the circle of each single loop is therefore one-half the wavelength of the corresponding microvita photon spiral.

The microvita electron structure is therefore generated by rotating the helix radius, whose length is $(1/2p) h/mc$, around a point moving along a circle of radius $(1/4p) h/mc$, rather than rotating it along a straight line, as with a microvita photon helix. The radius of the helix generating the microvita electron is therefore twice the radius of the double-looped circle. The point travelling along the circle moves twice around the circle, or 720° , while the radius of the helix rotates through 360° about the moving point.

The above operation creates a closed-loop three-dimensional path for microvita (see Figure 2) whose shape is uniquely specified (except for mirror image reversal) by the geometrical parameters of the photon (spin 1) and the electron (spin $1/2$), and whose size is determined by the electron's mass (as well as by Planck's constant h and the speed of light c .)

INSERT FIGURE 2 ABOUT HERE

We can assume for our microvita model that a number N of microvita move spread out along the three-dimensional pathway all in the same rotational direction. This microvita electron has several interesting features. First, if it is turned upside down (rotated 180° degrees about the x-axis) the same form is obtained, but with the microvita moving in the opposite direction. This corresponds to an electron whose spin is down (the original orientation is the spin up orientation.) Second, a mirror image of the form gives a "left-handed" version of the form, which cannot be made to coincide with the original form. This corresponds to a positron (the anti-particle of the electron) if the original form is that of an electron.

The double-looped microvita model of an electron is consistent with an aspect of quantum theory of electrons related to spin. In the double-looped model, the helical path of microvita composing an electron closes on itself after one turn of the helix spread over two turns around a circle, i.e. after $2 \times 360^\circ$ or 720° . In quantum theory, the mathematical wave function describing the spin of the electron also has a rotational periodicity of 720° .

The coordinates of the above three-dimensional closed loop microvita structure for an electron can be derived straightforwardly from the above geometrical relationships and are given below. The xy , xz , and yz projections of the three dimensional form are shown in Figure 2.

$$x = r_e (1 + 2 \cos(q/2)) \cos(q) \quad (51)$$

$$y = r_e (1 + 2 \cos(q/2)) \sin(q) \quad (52)$$

$$z = 2 r_e \sin(q/2) \quad (53)$$

where q (theta) is an angle running from 0 to 720° (once around each loop of the double-looped circle generating the helix) and

$$r_e = (1/4p) h/mc \quad (54)$$

the previously calculated microvita electron radius from equation (45). This microvita electron structure can also be expressed in radial notation:

$$r = r_e (1 + 2 \cos(q/2)) \quad (55)$$

$$z = 2 r_e \sin(q/2) \quad (56)$$

where q goes from 0 to 720° (i.e. 4π), before the pattern repeats itself. In these expressions, the coordinates are expressed in units of r_e , the radius of the circle which the helix is rotating around, or $(1/4p) h/mc$. So in units of r_e the generating circle has radius of 1 and the helix has radius of 2 . The generating circle is in the xy plane with its center at $x = 0$ and $y = 0$. For

example, at $q = 0$, the above expressions give $x = 3$, $y = 0$, and $z = 0$. Here x is the sum of the radius of the generating circle (1 unit) and the radius of the helix (2 units). As ω increases, the y and z components increase as the helix rotates about the circle. The resulting form represents the path of flow of microvita in an electron.

With this model, the radial components of velocity of a single microvita as a function of q is given by:

$$v_r(q) = -r_e \sin(q/2) dq/dt = -c \sin(q/2) \quad (57)$$

$$v_q(q) = r_e (1 + 2 \cos(q/2)) dq/dt = c (1 + 2 \cos(q/2)) \quad (58)$$

$$v_z(q) = r_e \cos(q/2) dq/dt = c \cos(q/2) \quad (59)$$

since $dq/dt = 2\omega$, where ω is the microvita angular frequency (q rotates through 720° while the microvita make one complete 360° cycle around their closed helical path) and $2r_e \omega = c$. Note that in this microvita electron model, as in the microvita photon model, the total speeds of the microvita along their closed or open helical paths exceed the speed of light.

5.3 Calculation of Electron Spin From the Microvita Model

With the above information, we can now calculate the exact spin of the microvita electron model. Assume that the electron is composed of N microvita, which are spaced at equal intervals of q in the interval 0 to 720° (e.g. if $N = 10$, then the 10 microvita will be spaced at every 72° around the figure, like beads on a string) starting at an arbitrary initial angle q_0 , and will travel along the path of the microvita electron figure according to the velocities given above, maintaining their equal angular separations. (Remember that the microvita figure closes after traversing a range of q of 720°). Assume that at $q = 0$, where the microvita velocity is maximum, the q component of momentum of the microvita in the electron is also maximum and equal to the forward momentum of a corresponding microvita in a photon containing N microvita, having the same total energy as the electron's energy $E=mc^2$, e.g.:

$$\text{Forward momentum of corresponding whole photon} = m c \quad (60)$$

$$\text{Forward momentum of microvita of corresponding photon} = m c/N \quad (61)$$

$$\text{Maximum component of momentum of microvita in electron } P_{q\max} = m c/N \quad (62)$$

Assume that the momenta of the N microvita composing the electron are proportional to the velocities of the microvita, and are directed along the path of movement of the microvita in the electron model. This implies that the momenta of the microvita combine by normal vector addition.

$P_q(q_i)$, the q component of the momentum of the i th microvita, is then given by

$$P_q(q_i) = (v_q(q_i)/v_q(q=0)) P_{q\max} \quad (63)$$

where $v_q(q_i)$ is the q component of the velocity of the i th microvita at q_i . The contribution s_i to the electron's total spin, by the i th microvita in the electron (calculated in relation to the vertical or z axis at $r = 0$) is given by

$$s_i = r(q_i) P_q(q_i) \quad (64)$$

$$= r(q_i) (v_q(q_i)/v_q(q=0)) P_{q\max} \quad (65)$$

where i goes from 1 to N , (for N microvita). Substituting into (64) the following values:

$$r(q_i) = r_e (1 + 2 \cos (q_i / 2)) \quad (66)$$

$$v_q(q_i) = r_e (1 + 2 \cos (q_i / 2)) \, dq/dt \quad (67)$$

$$v_q(q = 0) = r_e (1 + 2 \cos(0)) \, dq/dt = 3 r_e \, dq/dt \quad (68)$$

$$P_q \text{ max} = m \, c/N \quad (69)$$

we obtain

$$s_i = (r_e \, m \, c/N) (1 + 2 \cos (q_i / 2))^2 / 3 \quad (70)$$

The above equation must be summed for all N angles q_i . This gives for the microvita electron model the total spin S_e , where

$$S_e = \sum s_i = \sum (r_e \, m \, c/N) (1 + 2 \cos (q_i / 2))^2 / 3 \quad (71)$$

$$= (r_e \, m \, c) \sum (1 + 2 \cos (q_i / 2))^2 / 3N \quad (72)$$

Now it is a remarkable mathematical fact that

$$\sum (1 + 2 \cos (q_i / 2))^2 / 3N = 1 \quad (73)$$

when summed over N equally spaced angles q_i in the range of q from 0 to 720° , (i.e. with angular separations of $720^\circ/N$) as long as N is 3 or more. So

$$S_e = r_e \, m \, c \quad (74)$$

Substituting from (41)

$$r_e = h/4\pi m c \quad (75)$$

we find

$$S_e = (h/4\pi m c) \, m \, c \quad (76)$$

$$= h/4\pi = 1/2 \, h/2\pi \quad (77)$$

which is exactly the experimentally measured spin of the electron. A similar calculation for the y components of the angular momentum of the microvita electron model gives a magnitude of 1/3 of the value of the z component above, while by symmetry the value of the x component of angular momentum in the microvita electron model is zero. (See Fig. 2) The magnitudes of the x and y components would be interchanged by a rotation of the microvita electron model by 90 degrees about the z axis.

If we check for conservation of total linear momentum for the N microvita in the microvita electron, using the microvita velocities and momenta that can be calculated from the model (Eq. 57-59), we find that the net linear momentum is zero in all directions for a "stationary" electron if N is 4 or more microvita in the electron, as long as the microvita retain their equal angular separation as they move along their common path in the microvita model. So the microvita electron model must have a minimum of 4 microvita, even though 3 are sufficient to

conserve total spin. There is no mathematical limitation on the maximum number of microvita allowed in an electron.

6 A NEW INTERPRETATION OF QUANTUM THEORY

The application of microvita concepts in physics goes beyond modelling sub-quantum structures of elementary particles. It introduces a new view of the dynamics of wave-particle systems, presently described by quantum theory. In the microvita model of the photon and the electron, a helical structure of microvita moves through space in different ways to form an electron or a photon. In these structures the total values of energy, momentum and spin are conserved for the electron or the photon composed of microvita. But momentum (in the case of the photon) or both momentum and energy (in the case of the electron whose microvita have variable speeds) are not conserved for each individual microvita. Rather, the spiraling microvita in an electron exchange energy and momentum among themselves without directly contacting each other, since the microvita are point particles that maintain a certain physical separation. The spiraling microvita in a photon exchange momentum among themselves to keep each microvita moving along its curving path.

So there appear to be forces at work on the moving microvita, (if we understand a force in the traditional way in physics as the rate of exchange of momentum with time). Force laws affecting microvita interactions have yet to be devised. But the forces acting on microvita in a photon suggest that the value of the electron's charge itself may be derived from forces between microvita.

6.1 Can the electron's charge be calculated from the microvita electron?

We can calculate the force acting on a single microvita in a photon in the spiral microvita model. In the model of a photon made of N microvita, a single microvita (mv) has both a forward momentum and a transverse momentum given by

$$p_{mv} = (1/N) h/L \quad (78)$$

Since this transverse momentum is in circular rotation, the force F_{mv} on each microvita, the rate of change of its transverse momentum, is given by

$$F_{mv} = dp_{mv}/dt = \omega p_{mv} = 2\pi f (1/N) h/L = (1/N) (hf)/(L/2\pi) = (1/N) E/r \quad (79)$$

where ω is the angular frequency of the photon, f is its frequency, L is its wavelength and E the photon's total energy, and r is the helix radius of the microvita photon (eq. 17).

But

$$E = hf = h c/L = (hc/2\pi) / (L/2\pi) = (hc/2\pi) / r \quad (80)$$

So

$$F_{mv} = (1/N) (hc/2\pi) / r^2 \quad (81)$$

Now

$$e^2/(hc/2\pi) \approx 1/137 \quad (82)$$

is a fundamental empirical relationship between e (the electron charge), h and c . So

$$F_{mv} * (1/N) (137 e^2) / r^2 \quad (83)$$

is the force acting on a single microvita in a photon of helix radius r . Note the similarity to the force law between two electron charges (Coulomb's law):

$$F = e^2/r^2 \quad (84)$$

This similarity suggests that a similar force law may be developed for the force acting on an individual microvita in an electron. It is an intriguing possibility that the value of the charge of an electron could then be derived from the forces acting between microvita, given the particular geometrical form of the electron.

6.2 Microvita and non-locality

It is the collective behaviour of microvita that makes them intriguing. In EPR-type experiments, so named for Einstein, Podolsky and Rosen [11], the measurement of the state of one particle, say spin orientation, apparently nearly instantaneously affects the state of spin orientation of a second particle which previously interacted with the first particle, and now is separated at a significant distance from it. So the states of the two particles remain correlated even at large separations. Note that in both the electron and the photon, the microvita are moving along their curved paths at speeds always greater than the speed of light, although a photon itself moves forward at the speed of light, and an electron moves always at less than the speed of light. This may be important since quantum systems appear to be able to communicate among themselves at speeds exceeding the speed of light.

In a similar way the states of the microvita in an electron or photon would also be correlated. So the non-locality that characterizes quantum correlations of distant particles also applies to the microvita composing a single electron or photon. Bell's theorem [12] and associated quantum experiments [13] established that if there are "hidden variables" underlying quantum phenomena, then they must be of a non-local nature. Microvita would satisfy this requirement for such hidden variables.

In terms of microvita, an electron or a photon (or other elementary physical particle) is a collective quantum system in itself, coordinating its physical component properties in a non-local manner. When two physical particles interact, the combined microvita of both particles form a larger quantum system, and the combined physical properties of this larger system are coordinated non-locally. What is the nature of this non-local coordination of physical properties in a quantum system, either within or among physical particles, in terms of the microvita concept?

In this interpretation of quantum theory, microvita make choices in their collective behaviour as electrons and other physical particles and quantum systems. These choices determine the distribution of energy and momentum among the microvita within a single particle or among different particles in a single quantum system. The choices of the collective microvita are constrained by the requirements of conservation of total energy, momentum, angular momentum, electric charge and any other relevant physical parameters of the combined quantum system. An atom as a combined quantum system would have a combined coordinating capacity corresponding to all its component particles. How the quantum system actually functions is related to its capacity for choice, as determined by its collective structure of microvita.

6.3 Microvita and the collapse of the wavefunction

The movement of open and closed spirals of microvita in a photon or an electron would be described by the wavefunctions of quantum theory. The wavefunction of a photon or an electron is normally spread out in space. Yet when these particles are detected in an

experiment they seem to be highly localised. This condition is described as the collapse of the wavefunction. How does this happen?

We have previously seen how microvita in an electron or photon are spread out in space. In a photon many wavelengths long, the microvita are spread over the entire length of the photon, following a spiral path one behind the other. In quantum theory it is said that the point photon has a certain probability of being detected anywhere along the length of the photon's wave.

An electron could be composed of a long spiraling curve of microvita, which wrap themselves up in a double-looped spiral with their paths repeatedly overlapping as the microvita make successive rounds along the closed spiral path, with microvita in each round preserving their relationship with their neighbours. When such a microvita electron moves through space at some velocity, the electron will be extended linearly in space. Due to its motion, this electron would be composed of a series of many partly overlapping loops, going backwards as well as forwards, as the front portion of the curving line of microvita loops forward through space, with the rest of its looping string of microvita trailing behind. Interference among oppositely moving, Doppler-shifted microvita in the electron could give rise to the de Broglie wavelength of a moving electron. This de Broglie wavelength decreases with an increasing velocity of an electron. The extended form of a moving electron would give rise to the spatially extended wavefunctions describing an electron in quantum theory. Such extended forms of a moving electron could form closed orbits in an atom, giving rise to the atom's energy levels described in quantum theory.

When an electron or photon is detected in an experiment, however, all the microvita in the particle would follow the leading microvita to one point in the detector, perhaps at speeds much greater than the speed of light. In a photographic emulsion, for example, the energy of a photon composed of microvita would be completely transferred to an electron in a silver salt in a photographic emulsion. This is an example of the so-called collapse of a wave function in quantum theory. The energy from the photon would eject the electron from the silver salt, leaving an atom of metallic silver in the developed photographic negative where the electron arrived. When an electron is detected, again the leading microvita guide all the other microvita in the electron to a point where some of the electron's energy is transferred from its microvita. A lower energy electron will normally remain after this energy transfer. So while microvita structures are extended in space, they transfer energy in a highly localized location, giving rise to their particulate nature when they are detected.

6.4 Microvita, life and mind

Microvita are described by P.R. Sarkar as conscious entities having subjective awareness as well as physical properties. This is true of each individual microvita. An electron consisting of many microvita would have a kind of collective awareness which would allow it to coordinate the different physical properties of its component microvita. In other words, this non-local coordination of the physical properties of the microvita composing an electron, is related to the collective awareness of the microvita composing the electron.

Whether the quantum system itself chooses a particular state during a measurement process or whether this selected state is determined from outside the quantum system cannot be answered here. The whole universe could be considered to be a single quantum system with the capacity to control its individual components non-locally. Simple molecules, complex molecules, protozoic cells, plants, animals and human beings can be considered to be more and more complex quantum systems with increasing subjective awareness and self-controlling capacities arising from their complex structuring from microvita. Different structures would give rise to different sorts of awareness and self-controlling capacities. Life and mind would be different expressions of the self-organising properties of microvita in collective quantum systems.

So the concept of microvita, which has led to new insights about the sub-quantum structure of matter, is seen to also possibly shed new light on the quantum nature of life and mind as well. Is there any way to test the hypothesis of microvita in a purely physical experiment? The well-known double-slit experiment suggests a possibility.

7 TESTING THE MICROVITA HYPOTHESIS

Certain "paradoxical" phenomena in quantum theory may be more readily understood with the microvita model, for example, the double-slit experiment. In it, individual electrons directed at two parallel slits produce a certain wavelike distribution of electrons detected on the other side of the slits. The pattern reflects the influence of both slits on each electron, and is difficult to explain if the electron is a single particle highly localised in space (it is currently explained in quantum theory as due to the electron's wavelike properties.) In the microvita model, the double slit result can be understood differently. In this view, some of the microvita in an electron could pass through one slit and some pass through the other, and recombine on the other side of the slits to form an electron that displays the observed double-slit behaviour. (The same explanation would apply to photons, composed of many microvita.)

The double-slit experiment suggests an experimental test of the microvita hypothesis that millions or possibly less than one million microvita compose an electron. If the microvita in an electron divide into two groups to pass through a double slit, they should divide into four groups when faced with four slits. If faced with a hundred slits, they should divide into a hundred groups of microvita. The microvita would then combine together on the other side of the screen to form a single electron which would be detected as usual.

Now if there were exactly a million microvita in an electron, then if faced with two million slits, the microvita could pass through no more than half of the slits. The position of the electron reformed and detected on the other side would depend on which slits the microvita passed through. The microvita composing the next electron would pass through a different set of slits, etc. The statistical pattern of electrons detected on the other side would not be the same as the statistical pattern that would be created according to the predictions of quantum theory, which assumes that all slits, if they are open, contribute to the pattern of electrons observed at the detector on the other side.

However, as long as the number of slits is small, quantum theory would predict the correct distribution of electrons, as all slits would be used by large numbers of microvita. Quantum theory would thus describe the statistical behaviour of large numbers of microvita in their collective behaviour (as physical particles), but should start to break in its predictive power down when microvita are forced to show individual behaviour, for example when passing through many slits.

So the microvita hypothesis predicts a gradual breakdown in the accuracy of the predictions of quantum theory in a multiple slit experiment as the number of slits increases towards a million or more. If one million microvita compose an electron, the breakdown should be apparent with two million or more slits. Such an experiment could even yield a more precise estimate of the number of microvita composing an electron. (The fewer the microvita in an electron, the fewer the number of slits needed before the quantum theory predictions start to break down.) A grid of 1000 by 1000 small, closely spaced holes in a screen would provide one million "slits" conveniently, and the principle of the experiment is the same for slits or holes. So here is a clear, testable prediction of the hypothesis that an electron is composed of on the order of a million microvita or other sub-quantum particles. A positive result implies a breakdown in the accuracy of the predictions of quantum theory under certain conditions. Such a breakdown would have many implications for fundamental physics, as well as other scientific areas relying on physical understanding, such as biology and medicine.

8 MICROVITA BIOLOGY

Microvita can give insight into the nature of the origin and evolution of life.[10] Matter and energy have an inherent tendency to self-organise to form and evolve living beings, in a way which is not yet scientifically understood. Evolution can be seen as the development and expression of desires and longings in material systems, themselves composed of microvita, by the action of other microvita. Elementary particles first form themselves into atoms and molecules. Then simple molecules organise themselves into more complex molecules. Later, living protoplasmic beings can develop.

Microvita first form and then modify genetic molecules so that simple and then more advanced living structures are formed with desires and longings that can be expressed through their associated physical structures or bodies. The collective desires of a biological species to survive in a changing environment would attract microvita carrying information for needed genetic changes. These microvita would enter the reproductive cells of the species. They would form viruses and DNA molecules carrying the new genes necessary for evolving desired changes. In this way genetic changes may be implemented during evolution and spread throughout a group of members of a species. These species members would undergo evolutionary transformations that give them greater psycho-physical expressional capacity in new environments, and a new species or sub-species would be formed.

With microvita, genetic changes would not be random (as in neo-Darwinism) or based only on use or disuse of certain organs (as in Lamarckism). Changes would be in directions desired or needed by organisms in order to survive or develop. Microvita-created evolutionary viruses and DNA originally inserted in the genes during evolution, would become activated in the developmental process of an organism to cause the organism to develop according to its evolutionary pattern.

9 MICROVITA MEDICINE

Inherited evolutionary viruses and DNA, activated at the wrong time, can give rise to cancer. Cancer is an uncontrolled proliferation of certain cells in the body due to some physico-chemical disturbance or psycho-physical imbalance. An effective treatment of cancer should help bring the body and mind back to mental and chemical balance so that these inherited genetic viruses (called proto-oncogenes in medicine) will no longer be improperly activated.

Microvita have been described as positive, negative or neutral in relation to physical and mental health.[7] Medicines containing positive microvita from different sources may be developed to help control cancer and other diseases in the future. Already a technique has been developed in Orissa, India for making microvita medicines for treat various diseases. Positive microvita are purportedly attracted from the environment by a mental concentration technique and trapped in sealed glass containers of water. The water is then "potentised" as in homeopathy by diluting with alcohol and shaking, and then used as a medicine. Some encouraging results have been found so far in the treatment of cancer and several other serious diseases. The testing of this microvita medicine is continuing in India and Europe.

In preliminary tests, several persons suffering from depression have taken microvita remedies prepared as described above, and have found some reduction in their symptoms. Of course, controlled experiments will have to be carried out to determine if the effect of microvita medicines goes beyond the placebo effect. The placebo effect itself may be due to the action of microvita that are attracted or activated if a person believes he or she is taking medicine.

There are many types of alternative medical practices such as homeopathy, acupuncture, distant healing, etc. which can be effective but whose mechanism of action is not explained in scientific terms. It may be that the action of microvita underlies some of these techniques. Experimental verification of the microvita hypothesis in the medical field could bring a revolution in medical science.

10 CONCLUSION

Microvita are proposed as a basis for a new, holistic paradigm for physics, biology and medicine. In physics, a microvita model for the dynamic structure of the electron explains its experimentally measured spin as due to a group of point microvita circulating faster than light. A proposed multi-slit electron experiment provides a direct test of the hypothesis that an electron is composed of millions of microvita. If it is successful, quantum theory will have to be reformulated to take into account the existence of microvita. If microvita can be demonstrated experimentally, new approaches to biology and medicine can be developed.

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