UnifiedTheory-1: NATURE OF THE BASIC SUBSTANCE & ELEMENTS

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An element composes other particles but it itself is non-composite. None of the over 200 basic particles of the Modern Standard Model satisfies the definition of 'element'. The real *Sharmon Medium* propagating light is the all-composing & all-pervading 'basic substance' composed by new particle '*sharmon*' comprising a positive *positrino* & a negative *negatrino,* named *cosminos*. Cosminos, the two elements compose all forms of energy & mass, particles of matter & antimatter including quarks and energy quanta like photon. Mass of a particle is innate, not acquired from Higgs boson of flawed concept. An element has a single charge since multiple charges imply that many constituents. Cosmino charges are unified.

1. **Historical**

Indian sage *Kanaad*, the author of *Vaishesik Darshan*, was the first to conceive *parmanu* (atoms) and *anu* (molecules) in the 14th century BC. John Dalton's book '*New System of Chemical Philosophy'* (1808 AD) postulated *atoms* (meaning indivisible) as **elements**, the non-composite particles, which compose compound particles, the *molecules*. That is why the Periodic Table is still called as that of elements. The discovery of subatomic particles has made the term '*atom*' a misnomer because the atom was later found to be divisible.

However, by the end of 19th century the discovered 'elements' were nearing hundred. In 1911, Ernest Rutherford discovered the atomic nucleus. Around 1935 the elements stood at four: proton, neutron, electron and neutrino, or at five if photon is also included.

This parsimonious view of Nature was disturbed in 1950s and 1960s when the proton and neutron were found to be members of a very large family of hadrons, and the electron and neutrino as those of leptons, raising the number of 'elementary particles' again above hundred.

However in 1964, Murray Gell-Mann [1] and George Zweig [2] independently showed all the hadrons as combinations of just three 'quarks'. Thus 'quarks-and-leptons' became the new most basic elementary constituents of matter under the Modern Standard Model.

At present, there are 18 quarks, 6 leptons, 6 antileptons and 13 other quanta mediating 4 fundamental forces plus undefined number of Higgs bosons. With right and left handedness of weak charge the total number of elementary constituents of matter again exceeds hundred. Every one of them is independent and not derivable from other(s). This unwieldy number makes the term "element" meaningless. Nay, the Supersymmetry doubles this number by adding a 'super partner' to every one of them. Thus the Standard Model of the current theories of Physics has over 200 elementary particles, all non-composite, independent and not derivable from other(s).

This author was the first to predict the compositeness of quarks theoretically in his Jan'90 book **Unified Physical Theory** [3]. On its basis he contested, in the 4 Nov'90 interview given to the Press Trust of India, the claim announced in October 1990 of the Physics Noble prize winners of having revealed quarks as the non-composite basic constituents of matter. Since a non-composite particle cannot be compressed the Unified Theory's theoretical prediction for the compositeness of quark [3] got experimental support by the compressibility of quarks observed during measurements of the electric and magnetic polarizabilities of neutron and proton in early

1991 itself [4-6]. Later the D-Zero [7] and CDF [8] collaborations of over 400 international scientists each *observed* transient '*creation'* of some Quarks & Leptons during the proton-antiproton collisions at 1.8 TeV kinetic energy. In our Unified Theory [3, 9], the quarks & leptons are composed by and are therefore assembled out of the cosminos and sharmons composing the energies of the colliding particles (see below). Compositeness of leptons can be inferred even otherwise. For example, the negatron (or electron) is in volume equal to, but in mass 1837th part of, proton, indicating that its contents swell 1837 times on ejection outside the radioactive nucleus during beta/negatron decay.

Therefore, none of the over 200 particle(s) of the modern Standard Model can be considered as an 'element' in the strict sense of the definition as "composing other particles but it itself being noncomposite".

2. **The Basic Substance**

For a child there is no commonality between the solid ice and the gaseous steam. But with the growing years the child makes out that it is the same liquid water that turns into ice cubes on cooling in a fridge or into steam whistling out from a pressure cooker on heating. On further probing it is found that solid ice, liquid water and gaseous steam are inter-convertible because all the three are made of the same *invisible* water molecule H_2O. The H_2O molecule is subtler than and common in ice, water and steam. Hence there is the composition continuity and inter-convertibility of the three. Let us push this analogy deeper.

Right up to the early twentieth century it was generally believed that matter and energy are entirely different and distinct, which could not inter-convert, although one form of energy could change into another form. For example mechanical energy was known to convert into heat while rubbing the hands and into electric energy on running a turbine, but never into mass or vice versa.

In 1905, however, Einstein [10] gave the thought provoking equation $E = mc^2$ (c squared, c being the velocity of light). It described and predicted the inter-conversion of energy E and mass m, one gram of mass generating about $9x10^{20}$ ergs of energy. It explained the observations on the creation of the pair (e^-e^+) of the material particles, electron e^- and positron e^+, from, and annihilation into, the photon(s) of light energy. This equation also paved the way for the developments of the atomic and hydrogen bombs. It has since been repeatedly verified by experiments and found to be correct. For the transient "*creation"* of some Quarks & Leptons during the proton-antiproton collisions [7, 8] the electric charge is conserved and the energy-mass satisfy the equation $E=mc^2$. The modern Physics stops here fully satisfied but the basic question of the underlying physical mechanism remains unanswered, nay even unasked!

The basic substance composes all physical entities in the universe and is itself composed by non-composite 'basic elements'. All the above observations and the equation $E=mc^2$, however, point to the existence in Nature of an entity, which composes and is subtler than all forms of energy E and mass m. This is analogous to the inter-conversions of solid ice, liquid water and gaseous steam because all the three are composed by the same water molecule H_2O. Einstein or any other scientist did not go beyond the mathematical equation $E=mc^2$ to inquire into the physical nature of the common subtle entity. Modern physicists therefore have no idea about it.

The transiently created Quarks and Leptons during particle smashing experiments [8, 9] are composed by and are assembled from the more basic physical entities, the *cosminos*, which also compose the energies of the colliding particles. The Quarks and Leptons of Modern Standard Model, being compressible and assembleable, cannot be the *noncomposite basic elements*.

It is clear that for the overall compositional unity the most basic elements must be those, which compose the subtlest physical entity in Nature. The work of Thomas Young and Augustin Fresnel on interference and diffraction of light had established the wave nature of light by 1827. James DeMeo's review (http://www.orgonelab.org/miller.htm) stresses that Dayton Miller's '*positive*' results yielded more-than-zero ether drift as evidence for the existence of 'ether' or a

light-propagating medium in space. The compositional unity of energy and mass into a subtler substance needs to be extended to encompass the space-medium since the electromagnetic radiation including light, as a *wave*, is compositionally one with its propagating medium. As the composition of water wave and the pond water on or through which it moves, is the same. It follows that in the real objective Nature there is an intrinsic unity or continuity in the compositions of all forms of mass, energy, radiation and the space medium, which propagates light. *The real physical medium in space, which propagates light wave, is the subtlest physical entity in Nature and is the '**basic substance**'.*

Is this space medium continuous or discontinuous i.e. particulate? Actually, ours is the universe with ubiquitous granularity of compositions at all levels. Moreover a continuum, if existent, would retard, nay prevent the motion of heavenly bodies and even of photons to propagate light through it, which has never been actually observed. According to Unified Theory and the common sense, therefore, the new space medium also is composed by a new particle, say **sharmon**, named after this author. It indicates that the '*sharmon medium*' is not the old classical ether, which had to be 'extremely more rigid than air' as it had to propagate light (wrongly assumed as longitudinal elastic wave like sound) much faster than sound. It is also different from Relativity's *spacetime,* and Quantum Theory's *physical vacuum,* the Dirac sea of negative energies.

3. **The Cosminos**

The absence of free electric charge in free space demands sharmon to be neutral. Ability of sharmon medium to propagate transverse electromagnetic waves suggests sharmon's polarizability and hence composition from two sub-particles: electrically positive (+ve) ***positrino*** and negative (-ve) ***negatrino***. The positrino and negatrino thus emerge as the most basic non-composite '***elements***' composing all forms of energy & mass, quarks & leptons and particles of matter and antimatter and energy-quanta like photon in the Cosmos, hence given the common name ***cosmino***.

The two separate conservations of mass and energy now unifiedly combine into a single conservation law of the basic substance.

The total mass-energy content of the universe is eternally conserved at a constant value because no quantity of mass-energy can be created from, or dissolved into, *nothing*. The eternal continuity in time, however, does not impart unending divisibility to mass-energy [11]. The divisibility of mass ends with the indivisible basic elements, the two cosminos. The most basic elements in Unified Theory, namely the two cosminos, are neither the Salam-Pati's '*pre...preons*', Dehmelt's massive "cosmon" [11], nor Dirac's point particles [12].

To fix ideas, the cosmino diameter 2r is somewhat arbitrarily (this arbitrariness is removed below) equated to Planck length lp = 1.61567×10^{-33} cm. But since the divisibility limit of matter is unknown and lp is not the smallest *quantum* of length, this assumption is open for future experimental needs to consider even cosminos as composed by still smaller sub-particle(s). This may, for example, be needed to provide for a physical medium for the intra-sharmon inter-cosmino forces.

Thus cosminos, in a way, are the 10^{-33} cm level elementary particles. For cosminos, holds Unified Theory's dynamic Principle of "e*quivalence or equipartition of basic charge energies*". This is suggested and supported by unification of the two basic charges, since the cosmino charges cause, carry and propagate the two basic fields in the sharmon medium. That is, negatrino's gravitational mass energy $m_n c^2$ equals the electric charge energy q_n^2/r, m_n being the mass and $-q_n$ the electric charge of a negatrino.

This equality does not hold for any composite particle because then the inter-constituent space wrongly counts in the diameter, and hence q_n^2/r will have to be multiplied by a distribution factor less than unity. Here, the q_n^2/r is not the Weisskopf's logarithmically divergent self-energy,

as the test particle has to be assumed isolated in absolute vacuum, for theoretically computing its intrinsic physical parameters like radius, mass and electric charge. The "vacuum foam" in "superspace" of John Archibald Wheeler at 10^{-33} cm and other Quantum Gravity ideas do not block these considerations because the basis of Quantum Gravity viz. the objectivity of Heisenberg Uncertainty relations is not valid in Unified Theory.

The electron (mass m_e = 9.109389x10^{-28} gm, electric charge e=-4.806532x10^{-10} esu) is composed by n_1 negatrinos and n_2 sharmons (mass $m_s = 2m_n$); $e=n_1q_n$, $m_e= n_1m_n + n_2 m_s$. Experimental gyromagnetic ratio g_e = -2.0023193 for free electron and -2 +(-11x10^{-11}) for its 10^{-20} cm Dehmelt core [11]. Its dynamic mass-to-charge ratio $(m/q)_e=(m_e/e + m_n/q_n)/2 = 2/g_e.m_e/e$ is the mean of the values at centre (m_e/e) and periphery (m_n/q_n) as against -1.0 m_e/e for the non-composite point electron of Dirac QED [12]. Hence, $q_n= rc^2(4/g_e -1).m_e/e$ =1.3729x10^{-30} esu; $m_n= q_n^2/rc^2$ = 2.596116x10^{-48} gm, $n_1=e/q_n$=3.50x10^{20}, $n_2= (m_e/m_n - n_1) /2$ = 3.944x10^{17} [9]. The positrino has the same mass as negatrino but its charge is equal and positive. The mass density of the primal matter (cosminos) is 1.1756x10^{51} gm/cm^3. Both cosminos have a spin ½.

4. **The Sharmon**

The sharmon, comprising a positrino and a negatrino, has the mass $m_s=2m_n$= 5.192232x10^{-48} gm. This derivation supports and is supported by the alternative derivation [3] from the longest wavelength of electromagnetic (e.m.) radiation. Since sharmon is the basic quantum of energy and photon is an energized 1-spin sharmon, the minimal energy photon is equivalent to $2m_s$ and the minimal wave-energy equals m_s, which corresponds to the longest e.m. wavelength $\lambda=h/m_s c$= 4.25 x 10^{10} cm or 4.25 hundred thousand (lac) Kilometers. And actually observed [13] electromagnetic spectrum is also found to extend up to few hundred thousand kilometers in wavelength. This strengthens the validity of the Unified Theory's above dynamic principle: $m_nc^2 = q^2/r$. If we take the cosmino mass $m_n = m_s/2 = h/2\lambda c$ as computed from the longest observed electromagnetic wavelength [3] we can deduce, NOT arbitrarily assume, that 2r ~ lp, as above.

In its 0-spin state, the opposing ½-spins are attractive to give a positrino-negatrino contact pair 1.616x10^{-33} cm across and 3.23x10^{-33} cm long, having centre-to-centre distance between cosminos 1.616x10^{-33} cm, and hence its Electric Dipole Moment (EDM) as 2.218x10^{-63} esu.cm.

The repulsive co-directional ½-spins in the 1-spin sharmon keep the cosmino surfaces lp apart giving the centre-to-centre distance 2lp and EDM as 4.436x10^{-63} esu.cm. The separation of cosminos in 1-spin sharmon is put at lp as it is the smallest length on the Planck scale [9].

Both the scalar 0-spin sharmon and the vector 1-spin sharmon are stable and can inter--convert. Their constituent cosminos not only spin but also vibrate along the common axis, imparting an electric as also a magnetic dipole moment to the sharmon. The potential energy of electric attraction $q_n^2/2lp$ for the 1-spin vector sharmon is half of q_n^2/lp for the 0-spin scalar sharmon. The electromagnetic properties of the material particles, photons and the sharmon medium are generated from those of the composing cosminos and sharmons.

Bosonic condensations of sharmons, supported by close distance attractions among sharmon's oppositely charged constituent cosminos, impart gregarious properties to sharmons, which can aggregate to compose energy and neutral mass of material particles. Electrically positive or negative charged mass of the charged particles is composed by the +ve or -ve cosminos. *No particle or energy quantum is therefore massless, sizeless or "virtual"* (*i.e. unreal*). The neutrinos, photon, graviton &c have more-than-zero mass and size. Since the negative potential energy of electric attraction for 0-spin sharmon is lower than that for 1-spin state, the matter is more predominant than radiation in the universe.

5. **Higgs boson: a flawed concept**

Peter W. Higgs of the Edinburgh University proposed this boson to complete the Modern Standard Model [14] of the fundamental particles and forces. The 0-spin Higgs boson produces a constant scalar Higgs field through out all space including outer vacuum. The Unified Theory's 0-spin sharmon is also like that but in addition, it can be raised to the 1-spin state. Moreover Unified Theory does NOT consider outer space to be vacuous since the sharmon medium exists there too. The Higgs-graviton coupling is assumed to produce [14] a huge "cosmological constant" to curve the universe to the size of a football. To overcome this conceptual difficulty, it is assumed that the "true" vacuum (one without Higgs field) has a negative curvature to flatten out space as we actually see it. The cosmological constant implies an anti-gravity force permeating space and its author, Einstein himself later opposed it as a blunder of his life. The Unified Theory's non-expanding universe [9] is free from such conceptual problems.

The Higgs field generates mass by coupling to a massless elementary particle, which, so to speak, "eats" the Higgs boson to gain mass. But the nature and mechanism of this coupling is kept unclear. The concept of separate Higgs boson(s) imparting mass to elements is flawed, more so since a massless electron cannot gain 0.51 MeV/c^2 mass or a neutrino the 0.1eV/c^2 mass by eating an 812-846 MeV/c^2 or 115 GeV/c^2 Higgs boson [14]. It is not clear what the wasteful hunts for the non-existent Higgs boson have so far found or will in future find, in its name, say with the Geneva based Large Hadron Collider due to be switched on during 2008.

6. **Unification of Cosmino charges**

In Unified Theory [9], therefore, the cosminos have only two charges: gravitational (mass), and electric (+ve, -ve) or in reality only a single primal charge: the cosmino itself. See below.

As a matter of fact, an "element", being non-composite having isotropic and homogenous properties throughout its entire whole has to be singly charged. This is because its multiple charges imply that many sub-constituents as the number of charges. And attraction among different charge species namely mass and electric is anti-intuitive. One can think of chargeless (neutral) mass but not a massless electric charge. Therefore the two basic charges (mass & electric) are two different (gravitational & electric) manifestations of a single primal charge, the *mass-electric charge* or the cosmino itself into which they inseparably unify. The gravitoelectric nature of a cosmino appears as its properties of mass and electric charge. The two manifestations are mediated via the two basic fields, gravitational and electromagnetic, which feel and are felt by the two corresponding basic charges. And the concept of separate Higgs boson [14] to impart mass to elementary particles is invalid.

7. **The 'sharmon medium' in space is real**

The work of Thomas Young and Augustin Fresnel on the interference and diffraction of light had established the wave nature of light needing a light medium. James DeMeo [6] gives a comprehensive and up-to-date review of the experimental work on measuring the ether drift. Of all the workers Dayton Miller had used the most sensitive instrument and took the largest number of observations spread over the longest period of time. But Miller presents convincing positive evidence for the non-zero ether-drift and hence for ether as the light medium. Interestingly DeMeo cites Dayton Miller:

"The effect [of ether-drift] has persisted throughout. After considering all the possible sources of error, there always remained a positive effect." — Dayton Miller (1928)

Dayton Miller's '*positive*' results yielded more-than-zero ether drift as evidence for the existence of a light-propagating medium in space, the Sharmon Medium.

7.1 ***The number & mass densities of Sharmon Medium***

In its free state the sharmon medium is an open system. At the time averaged inter-sharmon distance a_s the number of sharmons along 1 cm length is $(1+1/a_s)$, and in a 1 cm cube it is $n_s = (1+1/a_s)^3$ or $n_s \sim a_s^{-3}$ [9]. The a_s equals the λ / 4 for the shortest electromagnetic wavelength λ, because then the neighbouring sharmons have $\lambda/4$ phase difference. The particle aspect of electromagnetic radiation manifests up to ~ 7000 A^o in photochemical effects and up to ~ 3000 A^o in photoelectric effects. Their lower double mean (3+(3+7)/2)/2x1000 or 4000 A^o is the shortest wavelength in this context. It gives $a_s \sim 10^{-5}$ cm. The time-averaged inter-sharmon distance ~ 10^{-5} cm compares with the Mean Free Path for the real gasses (e.g. for Hydrogen 1.12x 10^{-5} cm, Oxygen 0.64x10^{-5} cm, Nitrogen 0.595x10^{-5} cm). Therefore sharmon medium is a kinetic gas with its **number density** $n_s \sim 10^{15}$ sharmons per cm^3 [9].

With sharmon mass 5.192x10^{-48} gm, the average mass density of sharmon medium becomes d_s = 0.519x10^{-33} gm.cm^{-3}, which can be compared with 3x10^{-31} gm.cm^{-3} for the Steady State Cosmology. Its rigidity is 4.68x10^{-12} and viscosity 0.65x10^{-22} dyne.sec/cm^2 [9].

8. **Cosmino-sharmon composition of other particles**

The Unified Theory [9] shows that all leptons contain ±3.50x10^{20} cosminos. The sharmon content of electron and positron is 3.94x10^{17}, of 105.7 MeV muon and antimuon 3.6x10^{22} and that of 1807 MeV tau & antitau is 6.19x10^{23}. The positive up, charm and top quarks have 2.33x10^{20} +ve positrinos. The negative down, strange and bottom quarks have 1.167x10^{20} -ve negatrinos. The sharmon contents are: for 0.39 GeV up & down 1.337x10^{23}, for 1.55 GeV charm 5.31x10^{23}, for 0.51 GeV strange 1.749x10^{23}, for 199 GeV top 6.82x10^{25} and for 4.72 GeV bottom 1.619x10^{24}. Further there are other details to interest the curious reader [9].

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UnifiedTheory-2: NATURE OF THE ELECTROMAGNETIC RADIATION

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The electromagnetic radiation including light is a wave-quantum UNITY and not wave-or-quantum DUALITY. Experiment proves *wave-quantum* unity for radiation and moving particles of matter. The 0-spin sharmon-packet energy quantum per unit frequency cycle is propagated along a transverse electromagnetic wave in sharmon medium contiguously via 1-spin sharmons, which do not physically move but provide a physical carrier. The propagating 1-spin sharmon returns to its 0-spin state on transferring the wave energy quantum to the contiguous neighbour in the medium and finally to the target. The 1-spin photon as such is not emitted, absorbed or propagated. Energized 1-spin sharmon replaces 1-spin photon. The photoelectric effect, Compton scattering and interference of light can be explained from real sharmon medium, which also re-deduces the Maxwell equations.

1. **Historical**

Light is an electromagnetic radiation. It is older than man. It has been investigated by many great scientists, some of whom even got the Nobel prize for their work. A number of great generally accepted theories are based on it. But all these have been only part narrow views, missing the true wholesome nature of light. In the 17th century Isaac Newton conceptualized light as comprising a stream of corpuscles emitted by the source and moving in straight lines. As the corpuscles could jolly well move in a vacuum he did not commit on the light ether. Christian Huygens, on the other hand, thought it to be a wave, like sound, in an elastic ether 'extremely more rigid than air' to account for its high velocity. The work of Thomas Young and Augustin Fresnel on the interference and diffraction of light had established the superiority of wave theory over the corpuscular theory by 1827 but could not overcome the Huygens problem of rigid ether. Einstein's explanation of the photoelectric effect in 1905 won him the 1921 Nobel Prize but he discarded the light medium for Relativity theories and made no secret of his life long unclarity on the true nature of light. Special Relativity and Quantum Theory, the two great theories of light continue to stand apart. Observations on the redshift in the light from stellar sources led to the theories of expanding universe invoking unrealistic initial 'creation of matter from nothing'. So the true nature of electromagnetic radiation including light remains obscure. No current theory satisfactorily explains why it behaves some time as a wave and at other time as a particle. But Unified Theory [1] tries to clarify the existing confusion.

1.1. ***The wave-particle unity and current theories***

The long wave electromagnetic (e.m.) radiation, like the radio waves, is predominantly wavelike and the short waves like X- and gamma rays show corpuscularity. As the transition from one part of the electromagnetic spectrum to the other is continuous, its '**wave-quantum unity**' is inescapable [1]. *But no existing theory of Physics, old or current, accepts and addresses this true nature of light.*

As stated above, in the 17th century Newton conceptualized light as comprising corpuscles and Christian Huygens thought it to be a wave. Currently accepted theories are no better. Maxwell theory [2] and Special Relativity [3] ignore the corpuscular aspect and describe it unrealistically as a 'wave in empty space without the propagating medium'. Although in reality a wave exists only in its propagating medium. Einstein's revived corpuscular theory [4] explained the photoelectric effect to win him the 1921 Nobel Physics prize but ignored the wave aspect. It also did not explain light velocity's invariance to source-observer motion, which forms an axiomatic pillar postulate for Special Relativity. Relativity theories replace the light medium with 4-dimensional spacetime continuum and do not address the wave-quantum unity of light.

Heisenberg [5] evaded the issue in a philosophical manner and argued that wave and particle are mutually too exclusive in properties for visualizing a thing to be both at the same time. The Quantum Theory was therefore formulated as a mathematical scheme to circumvent this visualization of wave-quantum unity. It describes mathematically the wave-or-quantum '**duality**', NOT the wave-quantum '**unity**' but introduces the unrealistic violations of the inviolable conservation laws through its Uncertainty Principle. For Quantum Theory electromagnetic radiation is some un-visualizable single entity. Its duality arises from the limitations of the language. And since words can describe only things which mind visualizes, one cannot even invent a new language to describe the objective reality in words.

Einstein too, on 12 December 1951 wrote to M. Besso: "*All these 50 years of conscious brooding have brought me no nearer to the answer to the question: What are light quanta*?" Why? This was because he, with Maxwell, had discarded the light medium and therefore could not think properly about the light 'wave'.

Einstein treated the wave [3] and corpuscular [4] aspects of light separately. The confusion got confounded when Quantum Theory split the wave-quantum **unity** of electromagnetic radiation into wave-or-quantum **duality** with the precarious support of the Principle of Complementarity. So, Quantum Theory and Special Relativity, the two major current theories of light continue to stand apart. The Unified Theory [1] explains through its real 'sharmon medium' what these two theories were to but did not account for.

2. **The Wave-quantum Unity of light in Unified Theory**

When the emitting electron in a black body or an atom or a molecule falls from its higher energy state E_2 to the lower energy state E_1, the energy quantum $\Delta E = E_2 - E_1 = h\nu$ is emitted. It, comprising 0-spin sharmons as an aggregate, is transferred unidirectionally to the nearest sharmon, in the 'sharmon medium'. The sharmon on being thus energized shifts from its 0-spin to the 1-spin state to originate an electromagnetic wave of frequency ν. The emission of electromagnetic radiation from the source is consistent with the differential equation for a harmonic function of time t:

$$\partial^2 \varphi/\partial t^2 = - 4 \pi^2 \nu^2 \varphi = - 4 \pi^2 \Delta E^2/h^2 \varphi.$$

The 'origin' of an electromagnetic wave is not its source and its 'terminus' is not the target. The electromagnetic wave energy quantum, after emission from the source is initially received by a sharmon in the medium, which rises to its 1-spin state and thus marks the effective '*origin*' of the electromagnetic wave. And the last 1-spin sharmon of the medium, which finally transfers the wave energy quantum as a 1-spin photon to the target and itself returns to the 0-spin state, marks the '*terminus*' of the wave. Both origin and terminus of the electromagnetic wave are situated in the sharmon medium.

From origin to the terminus, the 0-spin sharmon-packet energy quantum per unit frequency cycle is propagated along a transverse electromagnetic wave in sharmon medium contiguously via 1-spin sharmons, which do not physically move but provide a physical carrier. The 1-spin

sharmon participating in the process of propagation returns to its 0-spin state on transferring the wave energy quantum to the contiguous neighbour in the medium and finally the last 1-spin sharmon transfers the wave-energy quantum to the target then returns to the 0-spin state. However, the transmission, always and throughout, is a wave-quantum UNITY. Only the quantum of photonic energy, composed by 0-spin sharmons, is propagated but this energy is of the propagating 1-spin sharmon, the two together constituting the 1-spin photon, which is an energized 1-spin sharmon. That is, after emission and before absorption it is a 1-spin photon or energized 1-spin sharmon always at any and every instant.

Since the spin of an emitter or an absorber does not change, what is emitted or absorbed is NOT the 1-spin photon but only its energy comprising 0-spin sharmons. Therefore only the photonic energy comprising 0-spin sharmons is emitted, propagated and/or absorbed. The 1-spin photon as such is neither emitted, nor propagated nor absorbed.

The quantum of photon energy E (= $h\nu$) is the energy per unit frequency interval of the wave and is related to the wave frequency ν. The wave velocity c (= $\nu\lambda$) = $(e_o.\mu_o)^{-1/2}$ is determined by the electric permittivity e_o and magnetic permeability μ_o of the sharmon medium. The two then fix the wavelength λ (=c/ν) of the wave, which is related to the momentum p (= h/λ) of photon.

3. **Non-existence of the conventional photon**

The Planck-Einstein-Lewis photon of the modern Relativistic Quantum Theory is a 1-spin corpuscle or quantum of energy E (=$h\nu$) and momentum p(=h/λ) emitted from the source unidirectionally and moving in the free space rectilinearly with constant velocity c = 2.9979×10^{10} cm/sec invariant to source-observer motion, ν being the frequency and λ the wavelength of its propagating electromagnetic wave. Its rest mass is zero. In fact it is never at rest, and disappears if and when stopped. The relativistic total energy $E = c\,(m^2c^2 + p^2)^{1/2}$ shows that the zero mass (m=0) particle like photon can exist but it moves always at the velocity c of light in vacuum with total energy E=cp. But this description is incomplete, flawed and internally inconsistent.

First, the kinetic energy and momentum can conceivably be associated only with a material carrier, but there is no such core carrier in the photon.

Secondly, if the photon had any material core the Relativity would not have allowed it to move at velocity c because then its kinetic energy would have become infinite.

Thirdly, the Relativity postulates invariance of c to source-observer motion, but it is inconceivable how the velocity of a freely moving particulate photon, relative to an observer, could remain unaffected by the motion of the source and/or observer.

Fourthly, the particulate photon is inconsistent with the wave properties of electromagnetic radiation required to explain the phenomena of interference and diffraction.

Fifthly, the constancy and invariance to source-observer motion of c put the photon in a privileged class of particles without explaining the why and how of it.

Sixthly, it is not clear how photons of infinitely different and varied energy, corresponding to the infinite electro-magnetic spectrum are non-composite.

All the above arguments go against the existence of a real photon with the contemporary concepts and properties ascribed to it. The Unified Theory gives the status of a 1-spin photon to the energized 1-spin sharmon and provides realistic explanations of the known properties and nature of light and electromagnetic radiation.

4. **Unified Theory's energized 1-spin sharmon replaces photon**

As mentioned above, the 'photon' is instantly energized that 1-spin sharmon, which along with such other 1-spin sharmons participates in the propagation of the photonic energy, composed of 0-spin sharmons. The light at a velocity of 2.9979×10^{10} cm/sec takes about 3.3×10^{-16} sec to cover the inter-sharmon distance of 10^{-5} cm in the sharmon medium. So the photon at any position exists for this duration of 3.3×10^{-16} second before shifting the position to the contiguous sharmon in the sharmon medium.

Thus, the 1-spin energized sharmon takes over the instantaneous position, role and function of the conventional "photon" of the Quantum Electro Dynamics. In deference to convention and for the sake of continuity we still retain "photon" as the name of the energized 1-spin sharmon.

5. **Propagation of wave-quantum unity in electromagnetic radiation**

Using the relations:

$$c = \nu\lambda = E/p \text{ and } c^2 = c\nu\lambda = \nu^2\lambda^2 = E^2/p^2$$

in the general wave equation:

$$\nabla^2\varphi - 1/c^2\, \partial^2\varphi/\partial t^2 = 0$$
$$\text{with } \nabla^2 = \partial^2/\partial x^2 + \partial^2/\partial y^2 + \partial^2/\partial z^2$$

we get the new time-containing wave equations

$$\nabla^2\varphi - 1/c\nu\lambda\ \partial^2\varphi/\partial t^2 = 0,\ \nabla^2\varphi - p/cE\ \partial^2\varphi/\partial t^2 = 0, \text{ and}$$
$$\nabla^2\varphi - 1/\nu^2\lambda^2\ \partial^2\varphi/\partial t^2 = 0,\ \nabla^2\varphi - p^2/E^2\ \partial^2\varphi/\partial t^2 = 0.$$

This represents the unity of the two coexistent wave and quantum characters during propagation of the radiation within the sharmon medium in free space at velocity $c = (e_o.\mu_o)^{-1/2}$ set by the electrical permittivity e_o and magnetic permeability μ_o of the sharmon medium. For a homogenous medium its phase velocity w replaces c in the above wave equations. And

$$\nabla^2\varphi - \mu_r/c\nu\lambda\ \partial^2\varphi/\partial t^2 = 0,\ \nabla^2\varphi - p\mu_r/cE\ \partial^2\varphi/\partial t^2 = 0, \text{ and}$$
$$\nabla^2\varphi - \mu_r/\nu^2\lambda^2\ \partial^2\varphi/\partial t^2 = 0,\ \nabla^2\varphi - \mu_r\, p^2/E^2\ \partial^2\varphi/\partial t^2 = 0,$$

describe the continued propagation of the wave-quantum unity in a refractive medium with $\mu_r = c/w$ as the refractive index, w being the radiation velocity in the medium and c that in the free space. In a dispersive medium the energy E (frequency ν) and momentum p (wave length λ) of the radiation depend on the velocity w and the refractive index μ_r. For the free space $\mu_r = 1$.

As mentioned above, a physically admissible monochromatic (single ν) or mono-energetic (single E) solution of the above wave equations would also conform to the differential equation for a harmonic function of time t for its emission from the source, as above. This leads to the following time-free versions of the above time-containing wave equations:

$$\nabla^2\varphi + 4\pi^2/\lambda^2\ \varphi = 0,\ \nabla^2\varphi + 4\pi^2\, p^2/h^2\ \varphi = 0, \text{ and}$$
$$\nabla^2\varphi + 4\pi^2\, \mu_r/\lambda^2\ \varphi = 0,\ \nabla^2\varphi + 4\pi^2\, p^2\mu_r/h^2\ \varphi = 0.$$

For a particle of mass m, moving with velocity u, momentum p, total energy T and potential energy V, $p^2 = m^2u^2 = 2m(T - V)$. This with the above wave equation follows [1] the famous Schrodinger Wave Equation of Wave Mechanics

$$\nabla^2\Psi + (8\pi^2 m/h^2)(T - V)\Psi = 0.$$

6. **The corpuscular properties of radiation**

The corpuscular parameters of the radiation are the energy $E(=h\nu)$ and momentum $p(=h/\lambda)$ of the 0-spin sharmon aggregate per unit frequency cycle propagated along the electromagnetic wave. These have been used to explain the photoelectric effect and the Compton scattering [1].

7. **The wave properties of radiation**

Above wave equations for the electromagnetic radiation give the cosine equation

$$A = A_o \cos(2\pi\nu t - 2\pi r/\lambda + \phi)$$

where A stands for the electric or magnetic field intensity at the varying point (t, r), and hence $A_o^2 = ½\, h\nu$ for the electric or magnetic energy per half unit frequency interval of the electromagnetic wave, ϕ being the phase angle. Since the wave energy is transmitted at the same velocity c in all directions, this equation describes a single ray as well as a spherical wavefront in the isotropic and homogeneous sharmon medium. It, as usual, has been used to describe the diffraction pattern for an illuminated single slit or the interference pattern for coherently illuminated two slits [1].

8. **The wave and quantum properties in one experiment**

A. Tonomura et al. [7] set up experiments with beams of low intensity light or of electrons to observe both wave and particle aspects at the same time. For interference, explainable from the wave properties, the beams have two paths from the source to the detector (e.g. a screen). When the beam intensity is sufficiently low and the detector suitable, the impact of particles (photon or electron) one by one, can be observed. The energy quanta are then localized as if particles in space and time. The detector output is displayed on a TV-monitor in a set of frames. The first frame is early on and the last after a long time of impact collection. The interference pattern is slowly built up by impacts of individual particles. These experiments support and are supported by the Unified Theory's *wave-quantum* **unity** for radiation and moving particles of matter [1].

9. **Creation and annihilation of e^-e^+ pair**

The electron e^- is composed by $n_1=3.50\text{x}10^{20}$ negatrinos plus $n_2=3.944\text{x}10^{17}$ sharmons, the positron e^+ by n_1 positrinos plus n_2 sharmons, and 1-spin 1.022 MeV photon by $(n_1 + 2n_2)$ sharmons of which one has spin 1 and the rest spin 0. A ½-spin negatrino and a ½-spin positrino produce a sharmon of 0 or 1 spin when the ½-spins are anti- or co-directional respectively. The phenomenon of the creation of e^+e^- pair from 1.022 MeV photon is described by the following:

sharmon Δ positrino + negatrino

1.022 MeV photon ↘

= ((n_1 positrinos + n_2 sharmons) + (n_1 negatrinos + n_2 sharmons))

↓

(positron) $e^+ \leftarrow e^+e^- \rightarrow e^-$ (electron)

The huge ~10^{20} number of constituents makes the actual content and composition of electron, positron and photon fluctuable. That is why the newly created electron and positron move away from each other back to back. And some sharmons, from the 1.022 MeV photon, generate the needed kinetic energy. Had they been mutually at rest the e^+e^- pair would have immediately annihilated into two 0.511 MeV photons as described below.

e^+e^-

$\downarrow$

0.511 MeV photon $\leftarrow$($n_1 + 2n_2$ sharmons) $\rightarrow$ 0.511 MeV photon.

10. **The electromagnetic radiation**

10.1. *Displacement charge & current in sharmon medium*

Polarizability of the sharmon renders the sharmon medium polarizable under an electric field E to induce a charge $\pm q$ and an electric dipole moment $p_e = ql$ of arm l. The deforming force $F_1 = Eq$ and the restitution force $F_2 = q^2/e_o l^2$, e_o being the electric permittivity of the sharmon medium. Since $F_1 = F_2$, $q = e_o E l^2$ and $p_e = e_o E l^3$. Invoking spatial symmetry in the sharmon medium, the 2-dimensional Displacement Charge Density $D = q/l^2 = e_o E$ and the Displacement Current Density $I_d = dD/dt = e_o dE/dt$.

This provides the much needed physical bases to Maxwell's displacement charge and displacement current in free space which he used only as mathematical exigencies without any physical carrier. It was the culmination of the 19th century view of vacuum, which could be created by possible removal of all solids, liquids and gases as also the thermal radiation by cooling the void. The light from the sun was supposed to travel to earth largely through absolutely empty space. This gave rise to the concept of a "*wave without its propagating medium*" which Unified Theory rejects but Einstein incorporated it in the Special Relativity to discard the light medium.

10.2. *Maxwell equations for electromagnetic radiation in Unified Theory*

The above realistic deductions justify Maxwell's assumption that the displacement current is solenoidal and gives rise to a magnetic field H like conduction current. Therefore

$$\text{div } Id = 0 = \text{div } dD/dt$$
$$\text{and curl } H = dD/dt = e_o dE/dt. \qquad \text{..... (a)}$$

Likewise the other two equations are

$$\text{div } H = 0 \qquad \text{..... (b)}$$
$$\text{curl } H = -\mu_o dH/dt\,. \qquad \text{.....(c)}$$

Here μ_o is the magnetic permeability of the sharmon medium.

Thus, Maxwell's original equations for the free empty space or vacuum are the same as now for Unified Theory's real physical sharmon medium.

On curling eqn. (a) we get

$$\text{curl curl } H = (\text{ grad.div} - \nabla^2)\, H = e_o \text{ curl } dE/dt$$

where $\nabla^2 = (\partial^2/\partial x^2 + \partial^2/\partial y^2 + \partial^2/\partial z^2)$ is the Laplace operator.

This with time differential of eqn. (c) gives

$$\text{grad div } H - \nabla^2 H = -e_o\, \partial^2 H/\partial t^2 ,$$

which with eqn. (b) leads to

$$(\nabla^2 - e_o.\mu_o\, \partial^2/\partial t^2)\, H = 0.$$

So the propagation velocity for magnetic field H is

$$c = (e_o.\mu_o)^{-1/2}.$$

Similar relations follow for E, D and p_e, which all are propagated with the same velocity $c = (e_o.\mu_o)^{-1/2}$ of light, where e_o is the electric permittivity and μ_o the magnetic permeability of sharmon medium.

10.3. *Conduction of electromagnetic waves in sharmon medium*

The electric field E, magnetic field H and the dipole moment p_e induced in the sharmon medium, have the same frequency ν of Simple Harmonic Variation decided and impressed by the source. The direction of energy flow is given by the Pointing radiant vector R = E.H, normal to the plane containing E and H oscillating at right angles to each other.

A plane electromagnetic wave of wavelength λ may therefore be described by

$$E = E_o \cos 2\pi(\nu t - x/\lambda)$$
$$H = H_o \cos 2\pi(\nu t - x/\lambda)$$
$$p_e = p_{eo} \cos 2\pi(\nu t - x/\lambda)$$

The propagation velocity $c = (e_o.\mu_o)^{-1/2}$ is determined by electrical permittivity e_o and magnetic permeability μ_o of the sharmon medium.

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UnifiedTheory-3: A REAPPRAISAL OF THE EINSTEIN MODEL

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A wave exists only in its propagating medium but Einstein discarded the medium for light wave. The real physical sharmon medium propagates light as a wave-quantum UNITY. The non-substantive abstract concepts of space & time cannot fuse into any concrete spacetime continuum that if existent would retard motion of heavenly bodies, which is not observed. All multidimensional spacetime continua are mere mathematical constructs and theories based on them are unrealistic. The actual length of an object, viewed by say, 100 differently moving observers cannot undergo 100 different objective contractions at the same time, making the 'contraction of length' an unrealistic concept. So is 'dilatation of time'. Unified Theory re-explains Photoelectric Effect, Bending of Light in a Gravitational field. It explains also the observed variability of light velocity which invalidates Relativity Theories.

Standard Model is the conceptual soul for the body framework of a theory. Modern Standard Model constitutes the basic conceptual guide for the current theories of Physics and Cosmology. However, the Einstein's theories and thoughts had a profound influence on the twentieth century Physics. One can even identify the 'Einstein Model' as an inseparable significant part of the Modern Standard model. This paper will reappraise the conceptual component of the Einstein Model, which lies beneath its mathematics, to bring out its unrealities and rectify the same through Unified Theory [1]. But first we will consider the 'Maxwell Model' [2] and the 'Planck Model' [3], which in fact formed the forerunner bases of Einstein Model.

1. **The Maxwell Model**

In his theory of electromagnetic radiation, Clark Maxwell [2] derived the velocity of electromagnetic waves $c = (e_o.\mu_o)^{-1/2}$.in terms of the electric permittivity e_o and magnetic permeability μ_o of the free space. The magnitude of c (= 2.997×10^{10} cm/sec) calculated from the known values of e_o (= 8.85×10^{-12} Farad/meter) and μ_o (=1.26×10^{-8} Henry/meter) for free space was equal to that of light in vacuum. Since the light from the sun to the earth travels mostly in vacuous space Maxwell declared that light is an electromagnetic **wave** propagated in empty space or vacuum. Thus the seed idea of a 'wave without its propagating medium' was created by Maxwell, which was later adopted by Einstein in relativity theories.

2. **The Planck Model**

Starting from the '*law of equi-partition of energy*', Raleigh & Jeans found that the energy density E_ν for frequencies between ν and $\nu+d\nu$, is $E_\nu = (8\ \pi\nu^2/c^3)$ KT. Here K is Boltzmann constant, T the absolute temperature and c the velocity of light in free space. This Raleigh-Jeans law agrees with the experimental results at low frequencies. But at higher frequencies its integral leads to *infinite* energy density, the so called "*ultraviolet catastrophe*".

However, Max Planck [3] hypothesized that the law of equi-partition of energy was not applicable to the black body radiation because the micro oscillators exchange energy with the surroundings not in a continuous manner but as the quanta of discrete units given by $E = h\nu$. Here h is a universal constant, now called Planck's constant of action. His expression for the energy density is $E_\nu = (8\pi h\nu^3/c^3)/(e^{h\nu KT} - 1)$. This Planck's law holds at all frequencies, lower to higher. The ultraviolet catastrophe is avoided because the available energy states at high frequency ν are now widely separated.

Since absorption is only reciprocal to the phenomenon of emission the Planck Model essentially connotes that the electromagnetic radiation is emitted and absorbed as quanta of energy $E = h\nu$.

It also supports the existence and the possibility of experimental creation of absolute vacuum, which is empty of all solids, liquids and gases and also can be freed of the thermal radiation by cooling the void. A tacit assumption in Planck Model, like the Maxwell Model, is that the electromagnetic energy quanta, including light, do not need a physical medium for propagation.

3. **The Einstein Model**

Einstein [4-6] adopted the Maxwell Model and the Planck Model in a somewhat extended and modified form.

3.1. *The Newton's corpuscular theory revived*

Einstein [4] extended the Planck Model and postulated that the electromagnetic radiation, including light, of frequency ν and wavelength λ is not only emitted and absorbed but also propagated as quanta of energy $E = h\nu$ and momentum $p = h/\lambda$. Lewis, in 1926, named this energy quantum of light radiation as 'photon'.

This, in a way, revived the Newton's corpuscular theory of light. With this theory Einstein [4] explained the 'photoelectric effect', which won him the Physics Nobel Prize in 1921. But see sec. 4.4 below for the Unified Theory explanation of the photoelectric effect.

3.2 *The theory of Special Relativity*

In accord with the Maxwell and Planck Models Einstein [4-6] stated that the light photon and the electromagnetic [4, 5] and gravitational [6] waves are propagated in the free space without a physical medium. He discarded the light medium as superfluous for his mathematical theories needing no frame at absolute rest and introduced the 4-dimensional spacetime continuum instead. The constancy of light velocity in Maxwell Model was upgraded as the pair of two axiomatic postulates of the theory of Special Relativity [5]. He postulated that the velocity of light c is not only constant but also invariant to the source-observer motion. That is the light velocity remains unchanged as c and does not add up to (c+v) if and when the observer moves with a *uniform* velocity v relative to the source of light. The Special Relativity is also called the Restricted Theory of Relativity because it is restricted to the uniform motion of the observer relative to the source. The theory of General Relativity removes this restriction.

For an observer moving with a velocity v along the x-axis of the stationary frame of reference the space and time coordinates x and t appear as x' and t' on the moving primed frame given by the so named Lorentz transformation formulae. The length $l' = dx' = l/\beta$ at rest on the moving frame with its both ends observed simultaneously ($dt' = 0$) appears shorter as l on the stationary frame and also reciprocally the length $l = \Delta x = l'/\beta$ at rest in the stationary frame ($\Delta t = 0$) appears shorter as l' in the moving frame. Here $\beta = (1 - v^2/c^2)^{1/2}$.

That is, when two bodies are in relative motion, the lengths appear shorter on the other than on themselves reciprocally in the same ratio of $1: (1-v^2/c^2)^{1/2}$. It is called Lorentz-Fitzgerald contraction [7] after the initial authors of the hypothesis, which Einstein thus supported, with this mathematical derivation of the same formula.

On the other hand $\Delta t' = \beta \Delta t$ is the relation between the time intervals on the two frames. That is, the interval of time $\Delta t'$ between two events at the same site ($\Delta x' = 0$) is minimum in the reference frame stationary with the site of events. In a frame moving in relation to the site of the natural event, however, the time gets dilated or slowed down.

The kinetic energy E of a particle of mass m moving at a velocity v is $E = mc^2 (1/\beta - 1)$ and not $\frac{1}{2}mv^2$. The kinetic energy E becomes infinite when v=c. So c is the upper limit of natural velocities and no particle with mass (>0) can move at a velocity $v \geq c$.

The expression for the total energy $E = c (m^2c^2 + p^2)^{1/2}$ predicted the massless (m = 0) particles, like photon, moving at velocity c with momentum p and kinetic energy E = pc.

During the inter-conversions of energy E and mass m, as for example during the creation and annihilation of electron-positron pair or for the nuclear reactions, the relation $E=mc^2$ holds [8]. That is one gram of mass yields $\sim 9 \times 10^{20}$ ergs of energy. The mc^2 is the energy content of a body with mass m.

An elementary particle does not have a composition. Hence it is extremely rigid and cannot deform. So a force must be transmitted to its whole instantly. An electric force, for instantaneous transmission to the whole of a particle with more-than-zero finite size, needs a velocity > c, which is prohibited by Relativity. Therefore in the current Relativistic Quantum Electrodynamics, all elementary particles like electron, proton, neutron &c are sizeless points

3.3. *The theory of General Relativity*

The theory of General Relativity [6] stated that the light velocity c is invariant to any non-uniform source-observer motion.

The rectilinear world line element ds of the Special Relativity [5] is defined by the relation

$$ds^2 = c^2dt'^2 = c^2dt^2 - (dx^2 + dy^2 + dz^2),$$

And the uniform velocity v of the source-observer motion is given by

$$v = (dx^2 + dy^2 + dz^2)^{1/2}/dt.$$

In the theory of General Relativity [6], however, the curvilinear line element ds for a non-inertial frame is given by

$$ds^2 = \sum g_{mn}\, dx_m\, dx_n, \quad m, n = 1 \text{ to } 4$$

Here the metric tensor g_{mn} of the non-Euclidean 4-D spacetime is a function of the three space coordinates x_1, x_2, x_3 and the time coordinate $x_4 = ct$, c being the velocity of light photon in vacuum.

The General Relativity [6] treats the 4-dimensional spacetime as an entitative continuum and applies to it the Reimannian differential geometry to develop a theory of gravitation.

The 4-dimensional spacetime continuum curves under a gravitational field. Therefore a ray of light from a distant star bends around a heavenly body of mass M and radius R by an angle θ given by the following relation.

$$\theta = 2GM/Rc^2 \text{ radian.}$$

Arthur Eddington verified this relation during the total solar eclipse on May 29, 1919.

The free motion of a mass body, not subjected to external force, is uniform in a straight line. In a gravitational field, all bodies have the same acceleration. And freely moving bodies, when viewed from a uniformly accelerated non-inertial frame, appear to have an equal and opposite

acceleration. That non-inertial reference frame, therefore, is equivalent to a "certain" gravitational field. This is the "Principle of Equivalence" [6] in the general relativity.

3.4. *The conceptual content of the Einstein model*

The Einstein model can be summed up to contain the following conceptual assumptions and conclusions.

(a) There is no real physical medium in space to propagate electromagnetic radiation, including light.

(b) The 4-dimensional spacetime continuum propagates electromagnetic and gravitational forces, fields and waves.

(c) The electromagnetic radiation, including light, of frequency ν and wavelength λ, is not only emitted and absorbed but also propagated as freely moving particles or quanta of energy $E=h\nu$ and momentum $p= h/\lambda$.

(d) The velocity of light in vacuum is constant and invariant to source-observer motion, whether uniform (Special Relativity) or non-uniform (General Relativity).

(e) The light velocity in vacuum c is the upper limit of natural velocities. No material body with a more-than-zero mass can move with a velocity $v \geq c$ otherwise its kinetic energy is infinite.

(f) The photon, graviton, gluons, neutrino and the antineutrino, which move at a velocity of light c are massless.

(g) Non-composite elementary particles like electron, proton and neutron are sizeless points.

(h) The length contracts and time slows down as and when observed from a frame moving relatively to the site of an event.

(i) The gravitational field curves the 4-dimensional spacetime continuum. That is why a ray of light bends in a gravitational field.

(j) A uniformly accelerated non-inertial frame is equivalent to a "certain" gravitational field.

(k) The energy E and mass m are inter-convertible according to the relation $E=mc^2$.

4. **The Unified Theory reappraisal of the Einstein model**

4.1. *Unreality of the spacetime continua*

In Unified Theory the space and time are not real physical entities having substance but are mere abstract concepts evolving from the direct human perceptions of successive motions and changes in the surrounding objects. The concept of space arises from the successive perceptions of 'there, here, there' and that of time from successive perceptions of 'then, now, then'. The "time arrow" moves only forward and never backwards due to irreversibility of the natural processes of change generating the time concept. That is why all the living beings always grow (change) from childhood through youth to old age and all the plants from seed through seedlings to trees. The day always changes from morning through noon to evening and the position of the sun always changes from east to west. And so on and so forth. These and all other natural processes proceed only in one natural direction, which is never reversed.

The two concepts of space and time are too intangible and abstract to fuse into any substantive spacetime continuum. In the universe with complete ubiquity of granularity throughout right up to the micromost cosmino levels, the existence of a non-granular continuous infrastructure is inconceivable. In fact the existence of **any** spacetime continuum would have retarded, nay prevented, the motion of terrestrial and heavenly bodies and of even photons to propagate light through, which is not actually observed. Therefore all the various spacetime continua of 4, 5, 10, 11, …32 dimensions are mere mathematical constructs bereft of real physical existence and theories of relativity [5, 6] and others [9-13] based on them are unrealistic.

Einstein is reported [14] to have said that theoretical physicists cannot do without a physical space medium. He did assign to the 4-dimensional spacetime the property of a physical medium to propagate electromagnetic light and gravitation and discussed the Maxwell equations of electromagnetic radiation [5] but did not go further. The 4- dimensional spacetime does not have mass density or viscosity etc. Such a non-entitative concept can exist only in mathematics, not in real Nature.

4.2. *The 'sharmon medium' in space is real*

In fact Einstein was unclear about the real nature of light and the light medium in 1905 when he formulated the Special Relativity and the theory to explain the photoelectric effect that won him the 1921 Nobel Physics prize and remained so through out his life. On 12 December 1951 he wrote to M. Besson thus: "*All these 50 years of conscious brooding have brought me no nearer to the answer to the question: What are light quanta*?"

The work of Thomas Young and Augustin Fresnel on the interference and diffraction of light had established the wave nature of light needing a light medium. James DeMeo [15] gives a comprehensive and up-to-date review of the experimental work on measuring the ether drift. Of all the workers Dayton Miller had used the most sensitive instrument and took the largest number of observations spread over the longest period of time. But Miller presents convincing positive evidence for the non-zero ether-drift and hence for ether as the light medium. Interestingly DeMeo cites Dayton Miller:

"The effect [of ether-drift] has persisted throughout. After considering all the possible sources of error, there always remained a positive effect." — Dayton Miller (1928)

Dayton Miller's '*positive*' results yielded more-than-zero ether drift as evidence for the existence of 'ether' or a light-propagating medium in space.

The Unified Theory [1] presents convincing scientific logic for the 'sharmon medium' composed by the new particle 'sharmon', which in turn is made of the two micromost basic elements: electrically positive *positrino* and negative *negatrino*. The positrino and negatrino compose all forms of energy, mass, energy quanta, particles of matter and antimatter in the Cosmos, hence given the common name '*cosmino*'.

A cosmino has the diameter lp = 1.6×10^{-33} cm, mass = 2.596×10^{-48} gm, electric charge $=1.37 \times 10^{-30}$ esu, and spin = ½. The sharmon mass is 5.192×10^{-48} gm. Its spin is 0 or 1.

The time-averaged inter-sharmon distance ~ 10^{-5} cm in the sharmon medium compares with the Mean Free Path for the real gasses (e.g. for Hydrogen 1.12×10^{-5} cm, Oxygen 0.64×10^{-5} cm, Nitrogen 0.595×10^{-5} cm). Therefore sharmon medium is a kinetic gas with its number density $n_s \sim 10^{15}$ sharmons per cm^3. Its mass density is 0.519×10^{-33} $gm.cm^{-3}$, rigidity 4.68×10^{-12} and viscosity 0.65×10^{-22} $dyne.sec/cm^2$.

Due to its nature as a kinetic gas, the sharmon medium approximates as a 'kinetic continuum' effectively obliterating the interstices between sharmons in fleeting contact. It fills all space leaving no 'vacuous space' with 'nothing inside' and rules out the existence of absolute vacuum for any significant period of time. It propagates electromagnetic light and gravitation.

4.3. *Propagation of wave-quantum unity of electromagnetic radiation in Unified Theory*

From origin to the terminus, the 0-spin sharmon-packet energy quantum per unit frequency cycle is propagated, as a wave-quantum UNITY, along a transverse electromagnetic wave in the sharmon medium contiguously via 1-spin sharmons, which do not physically move but only provide a physical carrier. The 1-spin sharmons participating in the process of propagation return to their 0-spin state on transferring the wave energy quantum to the contiguous neighbour in the sharmon medium and finally the last 1-spin sharmon transfers its energy to the target and returns to its 0-spin state.

After emission and before absorption it is always the energized 1-spin sharmon, which in deference to convention and for continuity is still called 1-spin "**photon**". But Unified Theory [1] denies the existence of conventional 'photon'.

Since the spin of an emitter or an absorber does not change what is emitted or absorbed is NOT the 1-spin photon as a whole but only its energy comprising 0-spin sharmons. However, the transmission, always and throughout, is of the energy of the 1-spin photon as a wave-quantum UNITY. The 1-spin photon as such is **not** emitted, propagated or absorbed.

The **Quantum Theory** [16] could not satisfactorily explain why the electromagnetic radiation behaves sometime as a wave and at other time as a particle. Moreover, it also wrongly split the coexistent intrinsic *wave-quantum* ***unity*** of radiation into *wave-or-quantum* ***dualities***.

In fact both radiation and moving material particle have intrinsic **wave-quantum unity** of Unified Theory [1], which appears as **wave-or-quantum duality** of **Quantum Theory** due to experimental limitations to observe only one of the two coexistent characters at a time, not both simultaneously.

Einstein was conspicuous for ignoring and not addressing the wave-quantum unity of radiation and moving material particles. His theories [4-6] did not and in fact could not provide any explanation for these phenomena. He even did not elucidate the physical mechanisms for the propagation of the electromagnetic and gravitational waves in the 4-D spacetime continuum. The freely moving particulate photon of his corpuscular theory [4] could not avoid sharing the source-observer motion. Hence its velocity could not be invariant to source-observer motion, as required by his theory of special relativity.

But interestingly, both the particle and wave aspects for both low intensity light and stream of electrons have been demonstrated [17] simultaneously in one and the same experiment. This provides experimental support to Unified Theory's wave-quantum unity much against Quantum Theory's wave-or-quantum duality.

4.4. *The Unified Theory explanation of photoelectric effect*

Einstein [4] explained the photoelectric effect by postulating that light is propagated as quanta and the energy of one particulate photon is imparted to one electron, which overcomes the force or energy binding it to the metal surface.

In Unified Theory the energized sharmon replaces the photon. If w is the energy binding the electron with the metal surface or the work function of the metal, ν the frequency of the incident ultraviolet light and hence $h\nu$ the energy of the energized sharmon, the kinetic energy E of the ejected photoelectron is given by

$$E = h\nu - w.$$

This is exactly the well-known Einstein equation [4] already verified by experiments.

4.5. *Constancy & invariance to source & observer motion of the light velocity*

The special relativity [5] was based on these two axiomatic postulates, which Einstein did not explain but are now explained realistically from Unified Theory. However this Unified Theory explanation does not in any way validate the theory of Special Relativity. Not only this, the Unified Theory can even explain the actually observed variability of light velocity c, which otherwise invalidates both the special and general theories of relativity.

Light begins creatively at the 'origin' and ends vanishingly at the 'terminus' both in the sharmon medium. The particulate photon energy comprising 0-spin sharmon aggregate per unit frequency cycle is carried along the transverse electromagnetic wave from origin to terminus as a wave-quantum unity via contiguous mechanisms.

Due to creative origin in the medium the light velocity c is independent of the source motion and destructive termination makes c independent of the observer motion. The constancy and invariance to source-observer motion of c [= $(e_o.\mu_o)^{-1/2}$] also follow from the fact that the e_o & μ_o of the sharmon medium are constant and not affected by the motion of the source or observer. .

4.6. *The observed variability of c and superluminality invalidate relativity theories but are consistent with Unified Theory*

Even the observed variability of c [18-20] and superluminality [21] (light velocity exceeding c), which invalidate the theories of Special and General Relativity, also follow from the Unified Theory by merely affecting e_o & μ_o and the refractive index μ_r of the propagating sharmon medium ***locally*.**

It may be re-emphasized here that not only in free space but also within any gross material medium whatever, the light does and can propagate only through the pervading subtle sharmon medium whose local e_o, μ_o determine the velocity of light in that medium.

The sharmons in the medium, which propagate light and the propagated sharmon-composed photons are ultimately made of the electrically charged ±ve cosminos. The sharmons have both electric and magnetic moments. All this gives rise to e_o & μ_o of the sharmon medium and photon's orthogonal electric and magnetic fields. The e_o = 8.85×10^{-12} Farad/meter and μ_o $=1.26 \times 10^{-8}$ Henry/ meter customarily assigned to vacuum are actually of the sharmon medium in free space. Hence c = $(e_o.\mu_o)^{-1/2}$ = 2.9979×10^{10} cm/sec is the phase velocity for individual photons in free space.

The group of photons comprising the light pulse and other conditions in experiments of Wang *et al.* [21] affect the shape of the pulse and e_o & μ_o of the pervading/propagating sharmon medium.

This affects the phase and group velocities (v, v_g) as well as the refractive index ($n_g = c/v_g$) in the gross medium. As against L/c = 0.2 ns to cover L = 6 cm in free space, the observed 62 ns time lead means that time lag = - 62 ns = (L/v_g - L/c) = (n_g - 1)L/c. That is (n_g - 1) = -310 for the light pulse inside the 6 cm cell with atomic cesium gas. Therefore, the refractive index n_g is -309 and the group velocity v_g is -c/309. This explanation adversely affects special relativity and quantum theory by necessitating a light medium but not the causality principle.

4.7. *Unreality of the Lorentz transformation formulae*

The velocity of light c is constant and invariant to source-observer motion but that of a material particle or of a reference frame v is not so. Thus the kinematics of a light photon and a material particle are too exclusively different for giving same status to c and v and using them in a formula to describe any real motion.

The velocity of no real object can vary with (like v), and also be invariant (like c) to, the source-observer motion at the same time. Therefore the Lorentz transformations of Special Relativity [5] do NOT describe any actual motion in the real Nature. Their leading conclusions viz. 'contraction of space' and 'dilatation of time' are the unrealistic demands on Nature to change to fit their mathematics.

Even otherwise, the actual length of an object, viewed by say, 100 differently moving observers cannot undergo 100 different objective contractions at the same time, making the 'contraction of length' an unreal concept. Likewise, 'dilatation of time' too is unrealistic.

4.8. *Basic flaws in General Relativity*

The General Relativity is flawed for using Reimannian differential geometry of a non-existent 4-D 'spacetime' continuum. It as a theory of gravitation and its equivalence of a gravitational field with a uniformly accelerated frame is incomplete since no coordinates' transformations of no non-inertial frame can eliminate the actual centripetal gravitational fields. However the fields to which non-inertial systems are equivalent vanish on transformation to an inertial system.

4.9. *Bending of light in a gravitational field in Unified Theory*

A photon comprising sharmons of non-zero mass, experiences the acceleration due to gravity $g = GM/R^2$ of the heavenly body of mass M and radius R. Light from a distant star goes past the body in time $t = 2R/c$, to fall by the distance $s = ½gt^2 = ½(GM/R^2).(2R/c)^2 = 2GM/c^2$. For a distance D the light bends by the angle

$$\theta = s/D = 2GM/Dc^2 \text{ radian.}$$

This is exactly the Einstein formula for the bending of light in a gravitational field verified by Arthur Eddington during total solar eclipse on 29 May 1919. It supports the Unified Theory [1] because the 4-D spacetime is non-existent as above.

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UnifiedTheory-4: A REAPPRAISAL OF THE QUANTUM THEORY

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The wave & particle aspects of electromagnetic radiation & moving material particle coexist blended together as wave-quantum UNITY, as also supported by experiments. The wave-or-quantum DUALITIES appear due to experimental limitations to observe only one and not both of the two aspects simultaneously. Conservation of mass & momentum are inviolable. Matter‘s creation from, or dissolution into, ‘nothing’ is unrealistic. So the Uncertainty Principle is rejected as unrealistic and new Principle of Null Action with universal applications is introduced.

This paper will bring out and rectify the unreality of Heisenberg-Bohr [1] approach and also explain from sharmon medium of the Unified Theory [2], the Wave-Quantum '**unity**' appearing as Wave-or-Quantum '**duality**', which the Quantum Theory was all about but could not explain. The Uncertainty Principle will be rejected as unrealistic and a new Principle of Null Action with universal applications introduced.

1. **The objective reality exists irrespective of the observer**

We observe an object through the signals, emanating or reflected from it, received by our senses and interpreted by the brain/mind. The human senses and intellect have their own limitations and the mediating signals themselves introduce the distortion or uncertainty of observation. It turns precise objective reality into imprecise subjective appearance.

Heisenberg [1] made the subjective imprecision as the very nature of things and based his Quantum Theory on the observer's imprecise view of the intrinsically precise physical reality.

But the physical objects, phenomena and events, which their theories purport to describe, do not actually need any observer for their existence and are, in fact, governed by NOT the observed but actual magnitudes of their physical parameters like energy, momentum, time, length etc. For instance, the moon or distant galaxies or invisible micro particles exist not only during the attention of the viewer but also without an observer.

In order to formulate physical laws in terms of the observed or measured magnitudes, the Quantum Theory is erroneously based on “what can be known”, instead of on “what actually there is”, in the objective reality. That is on the observed, and not on the actual magnitudes, putting the observer's imprecise view super-most in derogation of the inherent precision in the observed objective reality.

2. **Wave-or-Quantum duality of matter & radiation in Quantum Theory**

Heisenberg [1] noted with scientific curiosity and concern that the β-rays emitted from radioactive elements showed definite tracks in Wilson photographs like fast moving particles. The same β-rays could also show diffraction phenomena like waves in the experiments conducted by G.P.Thomson, Davison, Germer, and others.

The X-rays and electromagnetic radiation showed the same dual behaviour in general. The X-rays when passed through a crystalline mass produce diffraction rings on photographic plates like G.P. Thomson's experiments with β-rays. However, in the Compton-Simon experiments on scattering and in the Franck-Hertz collision experiments, X-rays behaved as particles.

Einstein [3] explained the results of these experiments and those on photoelectric effects by the postulate that X-rays or any electromagnetic radiation of frequency ν and wavelength λ was propagated as quanta of energy $E = h\nu$ and momentum $p = h/\lambda$.

Thus, both material particles and electromagnetic radiations possess and manifest a duality of wave-or-quantum properties. But Heisenberg [1] argued that a thing cannot be a wave motion and a particle at the same time because the two characters are too exclusively different in nature. He further said that in reality, matter and radiation are both single entities of some yet unimaginable kinds and the observed apparent duality arises due to limitations of our language, which was invented to describe experiences of daily life involving large numbers of atoms. The present language cannot even be modified or a new one invented to describe these atomic phenomena because words can describe only things of which we can form mental pictures.

Therefore to circumvent visualization of the inherent wave-quantum unity a mathematical scheme - the **Quantum Theory** - was devised to treat the atomic processes. The Quantum Theory does not need or admit visualization. For visualizations, we have to content with two incomplete analogies of wave and corpuscle. Thus, one could deduce the limitations of particle concept from that of a wave and vice versa, leading to the Heisenberg's mathematical uncertainty relations.

3. **Wave-quantum unity of radiation & matter in Unified Theory**

Both Einstein and Heisenberg were unclear about the wave-quantum unity of radiation. Einstein treated the wave aspect of electromagnetic radiation in his theory of Special Relativity and the particle aspect in the revived Corpuscular Theory [3] separately. Heisenberg's Quantum Theory split the wave-quantum **Unity** into wave-or-quantum **dualities**.

The Unified Theory instead, postulates basic **wave-quantum unity** via the sharmon medium for both radiation and matter. That is, both wave and corpuscle characters are blended together in the motion of mediator photon for electromagnetic waves and also for the motion of material particles as shown below. This basic wave-quantum **unity** appears as the wave-or-quantum **duality** *due to limitations not of the language but of experiments* to observe only one of the two coexistent characters at a time, not both simultaneously.

3.1. *The Wave-quantum unity for radiation in Unified Theory*

In Unified Theory, the Planck-Einstein-Lewis photon comprises multiple sharmons, which have mass. Therefore it is NOT massless but has more-than-zero mass. The 0-spin wave energy quantum, after emission from an excited electron in an atom of the source, is initially received by a sharmon in the medium, which rises to its 1-spin state to mark the effective “origin” of the electromagnetic wave. Similarly, the last 1-spin sharmon of the medium, which finally transfers the wave energy quantum as a 1-spin photon to the target and returns to the 0-spin state, marks the “terminus” of the wave. Both origin and terminus of the electromagnetic wave are situated in the sharmon medium. From the origin to the terminus, the 0-spin sharmon-packet energy quantum is propagated as a wave-quantum **unity** along a transverse electromagnetic wave in the sharmon medium contiguously via 1-spin sharmons, which do not physically move but only provide a physical carrier.

Since the spin of the emitter or the absorber do not change only the 0-spin energy is emitted or absorbed and NOT the 1-spin photon. During transmission, only the 0-spin energy quantum is transmitted. But this energy is of the propagating 1-spin sharmon, the two together constituting

the 1-spin photon, which in effect is the energized 1-spin sharmon. So after emission and before absorption at every instant and always it is a particulate energized 1-spin sharmon.

The wave quantum (photon) energy E (= hν) per unit cycle of the wave, set by the source is related to the wave frequency ν, and its momentum p (= h/λ) to the wavelength λ. The wave velocity c (= νλ) = $(e_o.\mu_o)^{-1/2}$ is determined by the electric permittivity e_o and magnetic permeability μ_o of the sharmon medium.

Thus, "radiation" is a wave contiguously propagating the particulate mediator boson in the sharmon medium.

3.2. *The Wave-quantum unity of matter in Unified Theory*

Lewis Victor de Broglie [4] was the first to work out the wave aspect of matter by associating "matter wave" with a moving material body. The frequency ν (= E/h) of the de Broglie wave is related to the kinetic energy E = ½mv^2 and the wavelength λ (= h/p) to its momentum p = mv. But the physical nature of the de Broglie wave has remained so unclear that Max Born [5] tried to describe it even as a probability wave. The probability, in reality, could apply to only an ensemble of large number of particles and could not be used to explain observed wave character of individual particles, moving singly.

According to Unified Theory, the material particle moves in a straight line through the sharmon medium. The kinetic energy E (= ½mv^2) of the particle comprises 0-spin sharmons with an intrinsic electric-cum-magnetic dipole which executes a Simple Harmonic Motion whose natural frequency ν is related to E by ν = E/h. This induces electromagnetic dipoles of the same frequency ν in the ambient sharmon medium to generate the "sharmon ripple" tightly associated and moving with the moving particle at its velocity u. Its wavelength λ is related to the particle's momentum p by λ = h/p.

As actually observed, the nature of this sharmon ripple is the same whether it is associated with the negative electron, positive positron/proton, or neutral neutron/atom. That is it is independent of the electrical nature of the moving particle. Its velocity equals that of the particle and is not set by the properties of the sharmon medium. Hence it cannot be an electromagnetic or a gravitational wave in nature since they both move at light velocity c determined by physical parameters of the sharmon medium. It is found to affect the photographic plate.

Therefore it is an *energetic* mechanical ripple in the sharmon medium localized around and moving with the particle. Its frequency ν (= E/h) and wavelength λ (= h/p) are given by the de Broglie relations. The E (= ½mv^2) is the 0-spin sharmon composed kinetic energy and p (=mv) the momentum of the particle.

Thus, the moving material particle is a particle moving through the sharmon medium and carrying the associated sharmon wave (or ripple) with itself.

The similarity of the mathematical relations between the parameters of the particle (E, p) and wave (ν, λ) aspects for radiation and matter is herein raised to the status of the identity of the physical natures of the energy quantum for being composed by 0-spin sharmons in both the cases. So in Unified Theory, both the wave and corpuscle characters, in both the radiation and moving material particle, are blended or intertwined and move together as wave-quantum '**unity**'. This unity appears as wave-or-quantum '**duality**' due to experimental limitations to observe only one of the two coexistent characters at a time, not both simultaneously.

However, Tonomura et al. [6] have observed both wave and particle aspects of low intensity light and moving electrons in one and the same experiment testifying to the existence of inherent wave-quantum unity proposed in Unified Theory. The Quantum Theory was although all about the duality of wave and corpuscle properties but could not explain it, which in Unified Theory follows naturally.

3.3. *Propagation of wave-quantum unity in matter*

A particle of matter moves in a straight line setting up a wavelet '*ripple*', in the sharmon medium. The ripple moves with the particle at its velocity v. The frequency ν (= E/h) and wavelength λ (= h/p) of the ripple are given by the de Broglie relations, E (= $\frac{1}{2}mv^2$) being the sharmon-composed kinetic energy and p (=mv) its momentum. The relations $E = h\nu$ and $p = h/\lambda$ also apply to the radiation. This mathematical similarity is in Unified Theory, raised to the physical identity of the qualitative natures of wave energies associated with radiation and the moving material particle since both comprise the 0-spin sharmon aggregates per unit frequency cycle. The time containing wave equations

$$\nabla^2\varphi - 1/\nu^2\lambda^2 \ \partial^2\varphi/\partial t^2 = 0, \ \nabla^2\varphi - p/\nu\lambda E \ \partial^2\varphi/\partial t^2 = 0,$$

and $$\nabla^2\varphi - p^2/E^2 \ \partial^2\varphi/\partial t^2 = 0$$

represent the wave-quantum unity for the moving particle. Here the kinetic energy $E = \frac{1}{2}mv^2$ (frequency ν=E/h) and momentum p=mv (wave length λ=h/p) of the ripple wavelet depend on the velocity v of the particle as for the radiation in a dispersive medium.

A physically significant solution of an above time-containing wave equation would also satisfy the differential equation

$$\partial^2 \varphi/\partial t^2 = - 4 \pi^2 \nu^2 \varphi = - 4 \pi^2 \Delta E^2/h^2 \varphi$$

for the harmonic function in time t. This gives the time-free wave equation,

$$\nabla^2\varphi + 4\pi^2 p^2/h^2 \varphi = 0.$$

When the total energy E = kinetic energy T + potential energy V, $T = E-V = \frac{1}{2}mv^2$ and $p^2 = 2m(E-V)$. This leads to the famous Schrodinger wave equation

$$\nabla^2\varphi + 8\pi^2 m (E-V)/h^2 \varphi = 0.$$

As actually observed or inferred from the produced diffraction patterns, the nature of this sharmon ripple is the same whether it is associated with the negative electron, positive positron/proton, or with neutral neutron, atom or molecule i.e. independent of the electrical nature of the moving particle. Its velocity equals that of the particle and is not set at light velocity c by the physical parameters of the sharmon medium. But it affects the photographic plate.

Therefore it is an *energetic* mechanical ripple in the sharmon medium localized around and moving with the particle. In contrast, the nature of de Broglie matter waves was so unclear that Max Born described them as even mathematical probability waves.

One can now explain diffraction of energetic particles from associated sharmon wavelet ripples of wavelength $\lambda = h/mv$.

Thus, both wave and corpuscle characters, in both radiation and moving material particle, coexist and are inseparably blended to move together as a '*wave-quantum'* **unity**. Due to experimental limitation to observe only one, not both, of the two co-existent characters at a time, this **unity** appears as "*wave-or-quantum"* **duality** described by the current Quantum Theory [1].

4 **The Heisenberg Uncertainty Relations**

Niels Bohr and Werner Heisenberg showed that the atomic processes could be described equally in terms of waves or corpuscles. Therefore, traditional concepts of velocity, energy,

momentum, position etc. to describe the mechanical behaviour of macroscopic bodies need to be suitably modified in relation to microscopic particles to develop the Quantum Theory.

The consequent realization emerged that every experiment performed to determine some numerical quantity renders the knowledge of others illusory or uncertain since the uncontrollable perturbation of the observed system alters the magnitude of previously determined quantity. As essentially basic to the Quantum Theory, it was shown [1] that energy and time (E, t) or momentum and distance (p, x) cannot be simultaneously observed less imprecisely or uncertainly than the limits set by:

$$\Delta E \,.\, \Delta t \geq h/2\pi \quad .... (1);$$
$$\Delta p \,.\, \Delta x \geq h/2\pi \quad ... (2)$$

because the measurement of E ($ih\, \partial/\partial t$) after measuring the t or of p ($-ih\, \partial/\partial x$) after x, throws the observed system uncontrollably out of the state left at the end of t or x measurement due to $\partial/\partial t$ or $\partial/\partial x$ variation. The Heisenberg relation (1) with $\Delta t = \Delta x/c$, or the relation (2) with $\Delta p = \Delta E/c$ gives the relativistic energy-distance uncertainty relation

$$\Delta E \,.\, \Delta x \geq ch/2\pi. \quad .... (3)$$

The perceptual (not objective) relations (1), (2), and (3) were essentially deduced for the uncertainties in the magnitudes of observed parameters. The confusion arose which still continues when ΔE, Δt, Δp, Δx were misconstrued to also represent actual variations or spontaneous fluctuations in the objectively actual parameters of the observed physical object or system. The confusion got confounded when these relations were given the status of natural laws more basic than even the established laws for the conservation of energy and momentum. Violations, within the limits set by the relations (1) and (2), of otherwise inviolable conservation of energy and momentum, were thus introduced or validated which wrongly implied the unrealistic concepts of "objective indeterminism" and "non-causality".

Relations (1) and (2) led to the unrealistic concepts of the spontaneous creations and annihilations of "virtual" i.e. unreal energy quanta and particle-antiparticle pairs in Nuclear Physics and of the '*initial creations of matter out of nothing*' in the Big Bang [7] and Steady State [8] theories of expanding universe.

Relation (3) put into disarray all the classical concepts of location, boundary & trajectory, and even of the size and composition of micro particles. It led to the bizarre notion of a micro particle being constituted and bound by more massive subparticles because in confining to small Δx the uncertainty ΔE in energy E becomes larger than E itself. A radius of Planck length 1.6×10^{-33} cm got linked with the Planck mass 10^{-5} gm yielding a mass density of 10^{94} gm/cm^3. That is how the Dehmelt's cosmon, Markov's maximon, Stanyukovich's planckion, and Pati-Salam's preonic substructures of quarks and leptons became massive.

Heisenberg advocated the formulation of physical laws using only the observable or measurable parameters. But the very processes of measurement uncontrollably altered the measured magnitudes as given by (1) and (2) relations. Therefore he was against even assuming a definite value of any objective parameter.

The Unified Theory does not accept these conclusions. The physical objects and objective reality exist irrespective of whether viewed by an observer or not. Any real object and its natural phenomena are governed by NOT the observed or measured but objectively actual parameters of velocity, energy, momentum, time, size, distance etc .all of which <u>*objectively*</u> *stand simultaneously defined precisely down to any micro scale. And all these magnitudes also belong to the same eigenstate simultaneously.*

The Unified Theory scores over the Quantum Theory by explaining the wave-quantum unity and dualism of radiation and matter (not explained in Quantum Theory). It, at the same time, saves the conservation laws and the causality principle.

The Heisenberg relations (1) & (2) relate to observational uncertainties and interventional or perturbative changes, and NOT to the objectively actual parameters or to their variations, and hence do not describe the objective reality correctly. The micro particles down to any subatomic micro scale like the 10^{-33} cm level cosminos have precise size, mass, location etc. The composite micro particles are constituted and bound by lighter, NOT heavier, subparticles.

4.1. *Realistic derivation & interpretation of Heisenberg relations*

In Unified Theory "action" is a dynamic evolute of the sharmon. Hence, it is not merely a mathematical construct but a real physical entity. Its quantum is Planck constant h. During a signal mediated observer-observed interaction any and every variation ΔE in energy E or Δp in momentum p generates the action.

$$\Delta E \,.\, \Delta t = nh \quad .... (1a)$$
$$\Delta p \,.\, \Delta x = nh. \quad .... (2a)$$

Here ΔE and Δp are the objectively actual increases, in contrast to the subjectively observed uncertainties of Heisenberg Uncertainty Principle. However, these above relations are equivalent to the Heisenberg relations (1) and (2).

The natural conservation of energy and momentum ordains the conservation of action too. In Unified Theory, the relations (1a) and (2a) lead to a new Principle of Null Action which is conceptually superior to the Hamilton's Principle of Least Action as below.

5. **The New Principle of Null Action**

As stated above, "action" is a dynamic evolute of the sharmon. Hence, it is a real physical entity and not merely a mathematical construct. Its quantum is the Planck constant h. Any and every variation ΔE in energy E or Δp in momentum p is associated with a turnover ΔA of action A. An increase in energy or momentum generates the action and a decrease expends it: This leads to the relations (1a) and (2a) above.

Here ΔE and Δp are the objectively actual variations, in contrast to the subjectively observed uncertainties of Heisenberg Uncertainty Principle given by the relations (1) and (2) above. The natural conservation of energy and momentum ordains the conservation of action too.

In Nature, the path chosen by an isolated closed system during a real physical change through a succession of intermediate states from the initial equilibrium state `a' to the final equilibrium state `b' is such that the summation or integration of action covering all variations of energy or generalized momentum is zero or null. Hence the name: "Principle of Null Action".

The summation applies to the micro phenomena wherein the quantum nature of action is revealed. In macro phenomena of gross physical changes the "graininess" of action cannot be appreciated and hence it appears as a continuous physical variable, calling for the integration.

A general case involves inter-conversions between two sets of form of energy or generalized momentum E_x ($x = 1, ..., n_1$) and E_y ($y = 1, ..., n_2$). The total action integral

$$A = \int (\sum \delta E_x - \sum \delta E_y)\, dt = 0,$$

or $$A = \int \delta F\, dt = 0,$$

where $F = \sum E_x - \sum E_y$.

Here F is a twice differentiable continuous function of n physical variables q_k (k = 1, 2 , 3 , . . , n) of which one, say $q_m = t$, is parametric and canonically conjugate to E, and of q_k's mutual derivatives $q_{kr} = dq_k/dq_r$ (r = 1, ..., m-1, m+1, ... , n) which in themselves are continuous functions of q_k. That is,

$$F = F (q_k, q_{kr}).$$

The above equations lead to the following "*working equations*" of this new Principle of Null Action:

$$d/dq_r (\partial F/\partial q_{kr}) - \partial F/\partial q_k = \partial F/\partial q_r . q_{rk}$$

Their application to any specific case requires expressing F in a suitable form and then solving the resultant (n-1) differential equations.

5.1. *Hamilton's Principle of Least Action vs Principle of Null Action*

In a mechanical system, natural transformations involve inter-conversions between the kinetic energy T and potential energy V, so $F = T - V = L$, the Lagrangian. The above Equation

$$A = \int \delta F \, dt = 0, \text{ transforms to } A = \int \delta L \, dt = 0.$$

It is operationally equivalent to Hamilton's Principle of Least Action

$$A = \delta \int L \, dt = 0.$$

But the Unified Theory's concept of associating action turnover with the variation ΔE in energy E and hence ΔL in the Lagrangian L is more logical and realistic than with unvaried Lagrangian L of Hamilton's Principle.

5.2 *Applications of the Principle of Null Action*

The Unified Theory [2] has successfully derived the generally accepted equations for the following: Schwinger's Quantum Dynamical Principle, Klein-Gorden Field Equations, Schrodinger Wave Equation, Special and General Relativity, Euler's Equations, Lagrange's Equations, Maxwell Equations for Electromagnetic Radiation, Newton's laws of motion, Thermodynamic Equation of State, Discharge of Capacitance through Inductance & Resistance.

6. **The Copenhagen interpretation and Unified Theory**

All the unrealistic concepts of Quantum Theory can be attributed to its "Copenhagen Interpretation" [9], so called as to emphasize the influence of Niels Bohr on the Brussels (1927) conference of physicists. Its major conclusions are:

(i) *Quantum Theory is a complete theory since it works.*

Hoyle [8] used the same logic to justify the concept of continuous creation of matter out of nothing, because it works. The Unified Theory does not consider this as sufficient argument. The first basic necessity, which Quantum Theory does not fulfill, is realistic nature of the basic concepts. Moreover, the claim that it works is far fetched. It does not explain the wave-quantum unity in radiation and matter, which it was all about. In addition it introduces the violations of otherwise inviolable conservation of energy and momentum. *Therefore in reality the Quantum Theory does NOT work*

(ii) *The Quantum Theory deals in what can be known about, and not in what there actually is in, the micro cosmos.*

Relativity, likewise, is also based on the observed magnitudes of governing parameters. The Unified Theory on the other hand addresses the actual reality as it is and deals in the objectively actual parameters because the real objects and physical reality exist irrespective and independently of the observer. And the physical phenomena are governed by NOT the observed/measured but actual objective parameters.

(iii) *Quantum Theory regards objective reality as a metaphysical speculation out side of Physics, hence does not recognize things as they really are.*

The Unified Theory, in contrast, proposes to develop a "realistic Physics" providing a realistic description of the objective reality as it exists and answers to the various why's and how's. See also para (ii) above.

(iv) *Since tracing of individual atoms and molecules is not feasible, Quantum Theory is contented and concerned with the statistical description of their "group behaviour".*

The Unified Theory, *in addition*, goes deeper to their individual properties as well.

(v) *In view of the intimate connection between the statistical character of Quantum Theory and the lack in precision of all perception, it may be suggested that behind the "statistical" universe of perception, there lies hidden a "real world" ruled by causality. But such speculation is useless and meaningless*.

The Unified Theory, in contrast, works on the realistic speculations about objective reality, eliminating the perceptual distortions as far as possible.

(vi) *The wave and particle aspects of both matter and radiation are complementary. The two sets of concepts, though mutually exclusive, are nevertheless necessary for exhaustive description.*

For Unified Theory, the two aspects are not mutually exclusive but coexist blended together in the wave-quantum unity for both radiation and moving material particles.

(vii) For Niels Bohr, *isolated material particles are nothing but abstraction, as their properties can be defined and observed only because of their relations with other systems.* Heisenberg saw *the world as a complicated "tissue" of reactions, in which the breaking of a single thread affects the structure of all the rest*.

But he did not elucidate its physical bases, like Unified Theory's all composing and all pervading sharmon medium.

Not all physicists participating in the historic Brussels conference agreed with the 'Copenhagen Interpretation'. For example, Einstein wrote to Max Born about Born's statistical approach: "*The great initial success of quantum theory cannot convert me to believe in that fundamental game of dice*". To his friend Dr H. Zangger he wrote even thus: "*The more success the quantum theory has the sillier it looks*". Schrodinger said: "*Quantum theory, while extending atomism, almost without any limit, has at the same time plunged it into a crisis that is more serious than most people are prepared to admit. On the whole, the present crisis of modern science points to the necessity of revising its foundations from the basic layers up*".

This is exactly what the Unified Theory [2] does and this paper is all about.

The Unified Theory disagrees with Quantum Theory on basic issues. The objective reality, which Physics is to describe, is not a metaphysical abstraction but exists whether within or outside the view of an observer i.e. in spite and independently of the observer. The physical objects and their natural phenomena are governed by NOT the observed or knowable, but

objectively actual, physical parameters of velocity, energy, momentum, size, distance etc., and these can all be simultaneously defined precisely down to any micro scale. The wave and particle aspects of both matter and radiation are not merely complementary but integral characters existing and moving together.

The Unified Theory regards Quantum Theory as a mathematically sound but unrealistic theory which deals in the observational distortions or uncertainties of the objective reality and does not describe it faithfully or correctly. The wave-or-quantum duality, of radiation and material particles which the Quantum Theory is all about but cannot explain, emerges in Unified Theory as the observational appearance of the basic wave-quantum unity due to experimental limitations to observe only one of the two (not both) characters at a time. This wave-quantum unity for both radiation and matter follows naturally from the Unified Theory's real sharmon medium.

7. **The quantum or particle nature of light**

For this the Unified Theory [2] presents explanations for the radiation emission, Compton scattering and photoelectric effect.

8. **The wave nature of light**

The interference and diffraction of light cannot be explained by Newton's Corpuscular theory even in its Einstein's revived form [3] or by the Quantum Theory [1]. Huygens-Fresnel Wave theory does account for them but the existence of its 'extremely more rigid than air' ether to propagate light is in doubt, creating a conceptual impasse. The Unified Theory [2] explains the phenomenon of interference from the realistic sharmon medium. Its generalization also covers the phenomenon of diffraction.

9. **The wave and particle nature of light in one experiment**

Tonomura et al. [6], with the beams of light and electrons, have demonstrated both the wave and corpuscular characters in one and the same experiment. Further details are given in ref. [2]..

10. **Summing up remarks**

In Unified Theory [2], the electromagnetic radiation and the moving material particle are neither a wave alone nor a particle or quantum alone, and not even a simple addition or superposition of the wave and particle properties. Actually, the wave and corpuscle characters are intimately blended or intertwined to exist and travel together. This basic wave-quantum **unity** manifests as **duality** of wave and quantum properties only during or through experiments limited in their ability to observe only one of the two, not both, aspects at a time simultaneously. An ingenious experiment [6] has also demonstrated both wave and corpuscular properties of low intensity light and electron beams simultaneously supporting Unified Theory.

The Uncertainty Principle is rejected as invalid and unrealistic. The new Principle of Null Action is realistic with universal applications.

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UnifiedTheory-5: THE COMPOSITION-STRUCTURE OF BASIC PARTICLES

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The dynamic cosmino-sharmon composition-structures of electron, proton and neutron free from the anomalies of gyromagnetic ratio (g) and magnetic moment (μ) in the Dirac's Quantum Electro-Dynamics [1] are presented. No ½-spin Fermion can be neutral. Electric Dipole Moment of neutron calculated from Unified Theory [2] agrees with observations. An almost neutral neutron always emits electron, never positron, because its outer region is negative. Radioactivity is a nuclear, not mere nucleonic phenomenon. A new Hook's law mediated short-range nuclear force is suggested.

An element is itself noncomposite but composes other particles. In Unified Theory [2] the basic elements are the two cosminos, the positive *positrino* and negative *negatrino* of diameter $1.6156\text{x}10^{-33}$ cm, mass $2.596\text{x}10^{-48}$ gm, electric charge ± $1.3729\text{x}10^{-30}$ esu and spin ½. A positrino and a negatrino constitute the neutral sharmon of mass $5.192\text{x}10^{-48}$ gm. Sharmon's spin is 0 or 1 when the ½-spins of the constituent cosminos are anti- or co-directional respectively. Two negatrinos with opposed ½-spins can give rise to a negatrino-negatrino Cooper pair 0-spin negative diad. Similarly two positrinos can yield a positrino-positrino Cooper pair positive 0-spin diad. A 0-spin ± diad can attract 0-spin sharmon to form a 0-spin ± diad-sharmon unit. The cosminos, sharmons, diads and diad-sharmon units go into the composition of basic particles.

1. **Cosmino-sharmon structure of electron in Unified Theory**

The electron with mass $m_e = 9.109389\text{x}10^{-28}$ gm and electric charge $q= e =-4.806532\text{x}10^{-10}$ esu is a dynamic composition of $n_1 =3.50\text{x}10^{20}$ negatrinos plus $n_2 =3.94\text{x}10^{17}$ 0-spin sharmons. The actual distribution of charge, mass and charge-to-mass ratio (q/m) in the electron are non-uniform. Because the experimental gyromagnetic ratio $g_e = -2.002319304$ for the free electron is different from the Dirac average -2.0, and also from the $(-2-11\text{x}10^{-11})$ value for its 10^{-20} cm Dehmelt [3] core. The time-averaged dynamic q/m value varies from 1.0 $e/m_e= 5.276\text{x}10^{17}$ esu/gm at the centre (Dehmelt core) to that of a -ve diad or of a negatrino $q_n/m_n = 1.003415\ e/m_e = -5.288\text{x}\ 10^{17}$ esu/gm at the periphery.

That is, its dynamic mass-to-charge ratio $(m/q)_e = (m_e/e + m_n/q_n)/2 = 2/g_e .m_e/e$ is the mean of its value m_e/e at the centre and m_n/q_n at the periphery as against -1.0 m_e/e for the noncomposite point electron of Dirac theory [1]. Its ½-spin consistent with Dehmelt core suggests that it has odd numbered negatrinos comprising $1.75\text{x}10^{20}$ negatrino-negatrino Cooper pair 0-spin -ve diads surrounding a single ½-spin negatrino at the centre.

The electron's q/m-distribution radius $r_d = (q_n/m_n).(h/2\pi c^3)^{1/2} = 3.306\text{x}10^{-12}$ cm giving the volume $V_e = 1.517\text{x}10^{-34}$ cm^3. The uniform volume density of diads is $d_D=1.154\text{x}10^{54}$ cm^{-3}, charge density $d_q = 3.168\text{x}10^{24}$ esu/cm^3, and inter-diad distance is $r_d / d_D^{1/3} = 5.9\text{x}10^{-19}$ cm. The volume density of sharmons $d_{sr} = d_{n2} - ar$, with $a = 7.858\text{x}10^{62}$ cm^{-4}, decreases linearly with radius from $d_{n2} = n_2/V_e = 2.6\text{x}10^{51}$ cm^{-3} at the centre (r = 0) to zero at the periphery ($r = r_d$). The mass density d_m has two components ($d_m = d_{m1} + d_{mr}$): the uniform $d_{m1} = 5.99\text{x}10^6$ gm/cm^3 due to diads and variable $d_{mr} = d_{m2} - br$, with $b = 4.08\text{x}10^{15}$ $gm.cm^{-4}$ due to sharmons decreasing with radius from $d_{m2} = 1.35\text{x}10^4$ $gm.cm^{-3}$ at the centre (r = 0) to zero at the periphery ($r = r_d$). See Fig-1 for

comparison with proton and neutron structure.

The Cooper pair 0-spin negatrino-negatrino -ve diads are stable due to attractions at 10^{-33} cm distance for gravitational and opposite spins offsetting the electrical repulsion. The opposite spin, gravitational and electric attractions at 10^{-33} cm make the 0-spin sharmon stable with gregarious properties for other 0-spin sharmons and 0-spin -ve diads. Bosonic condensations between 0-spin diad-sharmon combinations supported by gravitational attractions at 10^{-19} cm inter-diad distances, off setting electrical repulsion, produce a dynamically stable spherical electron.

Totality of 0-spin sharmons and 0-spin diads spin together with the lone ½-spin negatrino at the centre to impart a spin ½ to the electron as a whole.

The Form Factor, representing distribution of charge over spherical shells of the constant thickness dr around varying radius r from the centre (r = 0) to periphery ($r = r_d$), is $F_q = d_q.4\pi r^2 dr$. Here dr is arbitrarily chosen as a small but constant radial thickness and r varies for r= 0 at the centre to $r = r_d$ at periphery. The Form Factor for the diad distribution is $F_D = d_D.4\pi r^2 dr$. Both F_q and F_D are parabolas. The sharmon distribution Form Factor $F_s = F_{s1} - F_{s2}$ is the difference of parabolic F_{s1} and cubic F_{s2}. In the mass distribution Form Factor $F_m = F_{m1} + F_{m2} - F_{m3}$, the first two are parabolic and the third is cubic.

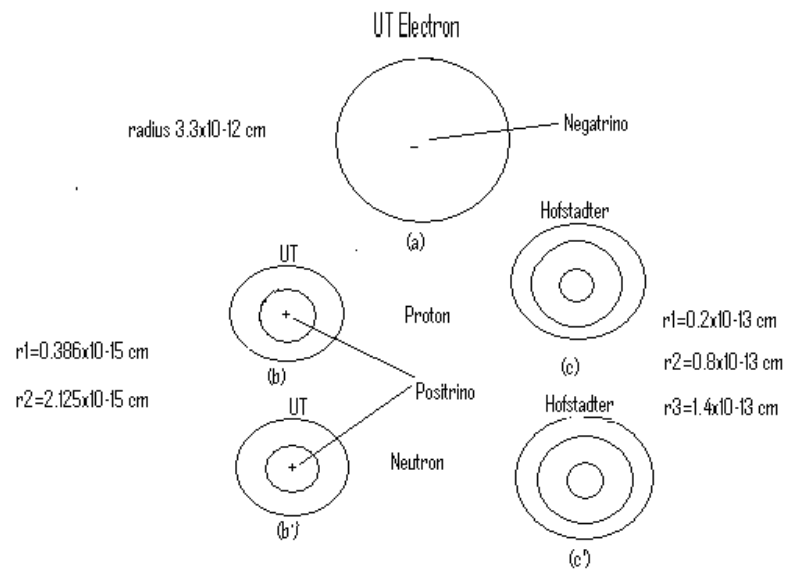

Fig-1. Structures of Electron, Proton & Neutron

(a) **UT electron, radius $3.3x10^{-12}$ cm, whole region negative.** A lone ½-spin negatrino at centre (-); 0-spin -ve diads (=), 0-spin sharmons (o), 0-spin diad-sharmon units (=o) distributed throughout..

(b) **UT proton, r_1 $0.386x10^{-15}$ cm, r_2 $2.125x10^{-15}$ cm, both regions positive.** A lone ½-spin positrino at centre (+); dynamic, interpenetrating, and overlapping two regions with 0-spin +ve diad-sharmon units (+o) distributed in both regions.

(b′) **Hofstadter proton**: static, nonpenetrating, annular 3 regions
inner positive dense core; r_1 $0.2x10^{-13}$ cm.
middle positive region, with +ve isoscalar mesons, r_2 $0.8x10^{-13}$ cm;
outer positive region with +ve isovector mesons, r_3 $1.4x10^{-13}$ cm.

(c) **UT neutron**: lone ½-spin positrino at centre (+); dynamic, interpenetrating and overlapping two regions:
inner positive region: r_1 $0.386x10^{-15}$ cm, 0-spin +ve diad-sharmon units (+o);
outer negative region: r_2 $2.125x10^{-15}$ cm, 0-spin -ve diad-sharmon units (=o) and individual 0-spin sharmons (o).

(c′) **Hofstadter neutron**: static, nonpenetrating, annular 3 regions:
inner positive dense core, r_1 $0.2x10^{-13}$ cm.;
middle negative region with -ve isovector mesons, r_2 $0.8x10^{-13}$ cm;

outer positive region with +ve isoscalar mesons,. r_3 $1.4x10^{-13}$ cm.

2. **Structure of nucleons in Unified Theory**

The experimental values of g_p = +2.79284738 and g_n = -1.93455491 for proton and neutron suggest that the dynamic $(q/m)_p$ = +1.39642369 e/m_p and $(q/m)_n$ = -0.96727745 e/m_p. The inter-convertibility between proton and neutron points to the common core with q/m = +0.21457312 e/m_p. This gives $(q/m)_p$ = +0.21457312 e/m_p + 1.18185057 e/m_p, and $(q/m)_n$ = +0.21457312 e/m_p - 1.18185057 e/m_p.

The $(q/m)(h/2\pi c^3)^{1/2}$ radii of the two regions are $r_1 = 0.38578x10^{-15}$ cm and $r_2=2.12486x10^{-15}$ cm. The common ½-spin of the nucleons arises from the common +ve core with a lone ½-spin positrino at the centre surrounded by 0-spin diad-sharmon units. The outer 0-spin region in both the nucleons spins together with the inner ½-spin region to yield an overall ½-spin.

2.1. *Proton structure in Unified Theory*

Let q_1, m_1 and q_2, m_2 be the charge & mass of the two regions of radius r_1, r_2 respectively. Here q_1/m_1 = +0.21457312 e/m_p and q_2/m_2=+1.18185057 e/m_p; $q_1 + q_2 = e = +4.806532x10^{-10}$ esu for $1.75x10^{20}$ diads and $m_1 + m_2 = m_p = 1.67252x10^{-24}$ gm comprising $1.75x10^{20}$ diads plus $2.6199x10^{23}$ sharmons.

The q_1=+$0.19389675x10^{-10}$ esu, q_2 = +$4.612635x10^{-10}$ esu; $m_1 = 3.144377x10^{-25}$ gm, m_2 = $1.3580822x10^{-24}$ gm. The number of diads and sharmons in the two regions are $D_1 = 7.06x10^{18}$, $D_2 =1.6798x10^{20}$; $s_1 = 6.04886x10^{20}$, $s_2 = 2.613919x10^{23}$.

The number densities of diad population are $d_{D1} = 2.936x10^{28}$ cm^{-3}, $d_{D2} = 4.18x10^{25}$ cm^{-3} for the two regions and $d_D= 2.94x10^{28}$ cm^{-3} as overall for the core. The three mass densities are d_{m1} = $1.307x10^{21}$ gm/cm^3, $d_{m2}=3.379x10^{19}$ gm/cm^3, $d_m=1.34x10^{21}$ gm/cm^3. (see Fig-1). The corresponding charge densities are $d_{q1} = 8.06x10^{34}$ esu/cm^3, d_{q2} = $1.18x10^{34}$ esu/cm^3 and d_q = $9.21x10^{34}$ esu/cm^3.

The Form Factors representing distributions of mass, charge, and diads are obtained by multiplying $4\pi r^2dr$ to the corresponding density, where the constant radial thickness dr is arbitrarily chosen but r^2 is varied continuously from r = 0 at the centre to r = r_d at the periphery. All Form Factors are parabolic in this case.

2.2. *Neutron structure in Unified Theory*

Its inner region is the same as for proton. But the outer region has a mixed population of two 0-spin species: -ve diad-sharmon and individual sharmons (only). Thus, q_1/m_1 = +0.21457312 e/m_p, q_2/m_2 = -1.18185057 e/m_p, q_3/m_3 = 0. Since $m_1 + m_2 + m_3$ = neutron mass m_n =$1.67482x10^{-24}$ gm = 1.0013751 m_p and q_3 = 0, q_1 = +0.04034026 e = +$0.19389675x10^{-10}$ esu = -q_2; $m_1 = 3.144377x10^{-27}$ gm, $m_2 = 1.35724x10^{-24}$ gm, m_3= $3.1444x10^{-25}$ gm.

The number of +ve diads in the inner region or -ve diads in the outer region is $D_1 = D_2$ = $7.06x10^{18}$. The number of sharmons bound to the diad-sharmon units (+ve in the inner and -ve in the outer) are $s_1 = 5.984x10^{20}$, $s_2 = 2.61398x10^{23}$; that of free sharmons in the outer region is s_3 = $6.0559x10^{22}$.

For the two regions the densities of mass (m) work out as $d_{m1} = 1.3074x10^{21}$ gm/cm^3, d_{m2} = $1.4205x10^{19}$ gm/cm^3, $d_m = 1.34127x10^{21}$ gm/cm^3. The densities of charge (q) are $d_{q1} = 8.062x10^{34}$ esu/cm^3, $d_{q2} = 4.8249x10^{32}$ esu/cm^3, $d_q = 8.11x10^{34}$ esu/cm^3. And the densities of diads (D) are $d_{D1} = 2.936x10^{28}$ cm^{-3}, $d_{D2} = 1.757x10^{25}$ cm^{-3}, $d_D = 2.9537x10^{28}$ cm^{-3}. See Fig.1 for comparison with electron and proton.

The Form Factors representing distributions of m, q, D over spherical shells of constant thickness dr but varying radius r from centre (r=0) outwards for the two regions are obtained from the above densities by multiplying with $4\pi r^2 dr$. All these Form Factors are parabolas.

3. **Nature of the atomic nucleus**

Stable 0-spin diads (±), 0-spin sharmons, 0-spin diad-sharmon units with mutual inter-couplings are basic to the stability of free proton, electron, positron. *But the large number ~10^{23} of their constituents makes their cosmino-sharmon composition fluctuable and NOT fixed. Hence the mass & charge of electron, proton, neutron and their anti-particles may slightly vary or even split. The upcoming 'Hadron Collider' at CERN, Geneva will show how the sharmon-cosmino content of the mass and kinetic energy of the smashingly colliding protons redistributes & reassembles as new particles, their energies and sharmon-cosmino dust.*

The proton and neutron should therefore loosen their unchangeably rigid composition and structure, allowing for emission and absorption of small aggregates of 0-spin diads (±), 0-spin sharmons, 0-spin diad-sharmon units and tend to mutually merge inside a nucleus. The +ve diads and +ve diad-sharmon units compose the net positive charge of the nucleus. This supports and is supported by the following facts of observation.

First, the radius R of a (spherical) nucleus of mass number A is given by the formula:

$$R = 1.3\text{x}10^{-13}\ A^{1/3}\ \text{cm}$$

Secondly, the nuclear volume is proportional to the number A of the nucleons (proton + neutron), obliterating the inter-nucleon space.

Thirdly, the density of the nuclear matter in all nuclei is nearly the same [4].

3.1. *The mass defect*

The observed **mass defect** Δm for a nucleus of mass m_{nuc}, mass number A and atomic number Z (number of protons) is:

$$\Delta m = [Zm_p + (A - Z)m_n] - m_{nuc}.$$

That is, in forming a nucleus the nucleons (protons & neutrons) loose some nucleonic mass Δm, which comprises small aggregates of 0-spin sharmons. The loss of some electric charge Δq comprising 0-spin diads (±), 0-spin diad-sharmon units also is not ruled out.

4. **The radioactivity is a nuclear phenomenon**

In some nuclei, called the **radioactive nuclei**, even after their formation the cosmino-sharmon composition and the number of nucleons change. Emission of gamma photons composed by 0-spin sharmons suggests variation and readjustment in nucleonic mass. The (±) β decay (emission of +ve positron & -ve negatron) and the capture of an orbital negative electron involve variations in the mass and charge or the cosmino-sharmon composition of some nucleon(s). Emission of energetic alpha particle (nucleus of the atom helium having two protons and two neutrons) or of the proton or neutron changes even the number of nucleons.

The environment within a nucleus differs from outside affecting the composition of outer fringe and radioactive nature of a nucleon. Sufficient cosminos and sharmons are available only inside some nuclei for a proton to decay into a heavier neutron plus energetic positron and neutrino. The neutron, which in its free state is unstable, becomes stable in most of the nuclei.

Therefore ***Radioactivity is a nuclear rather than a mere nucleonic phenomenon.***

5. **The negatron decay of neutron**

Instability of a free neutron arises from the randomly moving sharmons in the outer region having electrical attractions of their constituent negative negatrinos with the positive inner region and of their positive positrinos with the negative diad-sharmon units in the outer region.

Therefore the free neutron, though almost neutral, exhibits only negatron decay because its outer fringe is negative.

The outer negative charge is supported by observation [5]. Hofstadter's [6] positive outer fringe of the neutron is inconsistent with observation [5] as well as with the negatron decay.

It can now be seen that during negatron decay of the neutron some 3.50×10^{20} 0-spin sharmons split into $\pm 3.50 \times 10^{20}$ cosminos. The 1.412×10^{19} positive positrinos neutralize the same number of negative negatrinos or 7.06×10^{18} negative diads in the outer region of the neutron, and the rest create the surplus 1.6798×10^{20} positive diads for the outer region of the proton. The 3.50×10^{20} negative negatrinos plus 3.94×10^{17} 0-spin sharmons constitute the β-particle or negatron. The 2.68×10^{20} 0-spin sharmons compose the 0.782 MeV total energy of the emitted negatron plus antineutrino.

The ½-spin of the antineutrino comes from the sole or odd numbered (2n + 1) negatrinos to give it a negative electric charge. Hofstadter's neutron cannot account for its negatron decay, or for its negative Electric Dipole Moment (see sec.6 below).

6. **Electric dipole moment of neutron**

The lone positrino at the centre of the inner region neutralizes the charge from one negatrino from the negative diad-sharmon and sharmon units, leaving a net negative charge of one negatrino $q_n = 1.3729 \times 10^{-30}$ esu on the neutron. So, the lower limit of neutron's Electric Dipole Moment (EDM) is 5.83×10^{-45} esu.cm = 1.2×10^{-35} e.cm, as actually observed [7, 8]. Due to natural fluctuations, however, the neutron can also acquire a few extra -ve diads giving it the net charge of (2n +1) negatrinos. This also slightly affects its q_2/m_2 ratio and the radius r_2 of the outer region. We thus get a variable EDM = (2n+1) $q_n.r_2$, as actually observed [7, 8]. Due to smallness of the charge, neutron appears "neutral" within allowed experimental errors.

6.1 *No fermion can be neutral*

The agreement between Unified Theory and experiment on the existence of electric charge on the neutron leads to the verifiable generalization that no fermion can be neutral. A fermion, with spin ½, 1½, etc., has to comprise odd numbered (2n+1) cosminos, with spin ½, of which at least one is un-neutralized. Therefore the neutron, antineutron, neutrino, antineutrino &c with spin ½, which in currently accepted theories are neutral, should actually carry $\pm 1.3729 \times 10^{-30}$ esu charge of a cosmino. This imparts an Electric Dipole Moment (EDM) to the fermion. As above, the neutron carries a negative electric charge and antineutron a positive electric charge. The antineutrino emitted during neutron's negatron decay is electrically negative. That is why it is repelled by the -ve negatron. The neutrino emitted with the +ve positron during proton's positron decay is likewise positive.

Unified Theory's predicted lower limit of the neutron's EDM 5.83×10^{-45} esu.cm = 1.2×10^{-35} e.cm, e being the electron charge, agrees with experimental findings [7, 8]. This observation on neutron distinguishes Unified Theory from, and establishes its superiority over, the current theories. Other fermions can test and verify this Unified Theory prediction further.

7. **Hofstadter vis-à-vis Unified Theory**

By curve fitting, Hofstadter [6} got three regions of 0.2 f, 0.8 f and 1.4 f (fermi f = 10^{-13} cm) radii with central +ve dense core and a +ve outer fringe for both proton and neutron. The middle region is +ve in proton and -ve in neutron. Outer two regions in proton comprise isoscalar and isovector meson clouds but vice versa in neutron. These three regions are static, annular, and non-penetrating as against Unified Theory's dynamic, overlapping and interpenetrating ones (Fig.1). Hofstadter sought the evidence from other scientists for his theory's +ve outer fringe of neutron but observational evidence [6] is for the -ve outer fringe in support of Unified Theory.

However, Hofstadter radii of 10^{-13} cm represent the range of electrical influence in elastic electron scattering, whereas Unified Theory radii of 10^{-15} cm indicate physical q/m-distribution. Their relative magnitudes are therefore mutually consistent and supportive.

8. **Nature of the large angle electron scattering centre in proton**

As against the conclusions of Friedman et al [9], sec 2.1 above shows that proton has no -ve centre to scatter electrons at large angles. But the 3.9×10^{20} negatrinos comprising every incident electron and the 3.42×10^{14} negatrino-positrino pair sharmons per eV of its kinetic energy transform into short lived -ve, neutral, and +ve prehadronic units which later reassemble into the hadrons. The -ve units scatter the -ve electrons at large angles, neutral units at small angles and +ve units at smaller angles.

This Unified Theory also eliminates the "ignorance box" from the explanation [10] of hadron jets produced in e^+e^- collider. The colliding e^+ and e^- have only 0.51 MeV rest mass energy each, hence cannot generate the GeV hadrons. This leaves 1 to 3 TeV kinetic energy as the only source substance to create hadrons, as outlined above. Modern Physics offers no physical mechanism except the relation $E = mc^2$. Likewise follows the creation of some Quarks and Leptons from the collisions of 1.8 TeV kinetic energy protons-antiprotons. This was reported by D-Zero [11] and CDF [12] collaborators.

9. **Hook's law mediated short-range nuclear force**

In Unified Theory the atomic nucleus is a dynamic composite whole comprising 0-spin diads (±), 0-spin sharmons, 0-spin diad-sharmon units with mutual inter-couplings. The +ve diads and +ve diad-sharmon units account for the net positive charge of the nucleus. Therefore the Unified Theory rejects the existence of quarks as isolated rigid units to compose the nucleons and discards the inter-quark strong nuclear force.

The short-range nuclear force operates during small deformations of the nucleus. Here the nucleus behaves like a highly condensed elastic mass whose deformation follows the Hook's law of elasticity wherein stress is proportional to the strain. So the short-range deforming force is proportional to the deformation. It is slightly modified by the added electrical repulsions among the diads with like charges and electrical attractions among oppositely charged diads, both varying as inverse square of the intervening distance according to the Coulomb's law. The Newton's law based gravitational force also operates weakly. So the net short-range nuclear force appears as an attractive force whose magnitude increases with distance, as actually observed.
Its exact mathematical form depends on the actual distribution of the composing units, namely the charged and neutral diads. In the present stage of lack of knowledge it is therefore difficult to deduce the mathematical expression from the first principles.

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UnifiedTheory-6: NEW PRINCIPLE OF NULL ACTION

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Action is an evolute of sharmon with Planck constant h as its quantum. The inviolable conservations of energy and momentum ordain conservation of action, invalidation of the Uncertainty Principle and introduction of the new Principle of Null Action. It has universal applications and is conceptually superior to the old Hamilton's Principle of Least Action.

1. **The Enunciation**

In Unified Theory "action" is a dynamic evolute of the sharmon. Hence, it is a real physical entity and not merely a mathematical construct. Its quantum is the Planck constant h. Any and every variation ΔE in energy E or Δp in momentum p is associated with a turnover ΔA of action A. An increase in energy or momentum generates the action and a decrease expends it:

$$\pm\Delta E \,.\, \Delta t = \pm nh, \quad .... (1)$$
$$\pm \Delta p \,.\, \Delta x = \pm nh. \quad .... (2)$$

Here ΔE and Δp are the objectively actual variations, in contrast to the subjectively observed uncertainties of Heisenberg Uncertainty Principle. The natural conservation of energy and momentum ordains the conservation of action too.

In Nature, the path chosen by an isolated closed system during a real physical change through a succession of intermediate states from the initial equilibrium state `a' to the final equilibrium state `b' is such that the summation or integration of action covering all variations of energy or generalized momentum is zero or null. Hence the name: "Principle of Null Action".

The summation applies to the micro phenomena wherein the quantum nature of action is revealed. In macro phenomena of gross physical changes the "graininess" of action cannot be appreciated and hence it appears as a continuous physical variable, calling for the integration.

A general case involves inter-conversions between two sets of form of energy or generalized momentum E_x ($x = 1, ..., n_1$) and E_y ($y = 1, ..., n_2$). The total action integral

$$A = \int (\sum \delta E_x - \sum \delta E_y)\, dt = 0,$$

or $$A = \int \delta F\, dt = 0, \qquad ....(3)$$

where $$F = \sum E_x - \sum E_y. \qquad ....(3a).$$

Here F is a twice differentiable continuous function of n physical variables q_k ($k = 1, 2, 3, . . , n$) of which one, say $q_m = t$, is parametric and canonically conjugate to E, and of q_k's mutual derivatives $q_{kr} = dq_k/dq_r$ ($r = 1, ..., m-1, m+1, ... , n$) which in themselves are continuous functions of q_k. That is,

$$F = F(q_k, q_{kr}).$$

The above equations lead to the following "*working equations*" of this new Principle of Null Action:

$$d/dq_r\ (\partial F/\partial q_{kr})\ -\ \partial F/\partial q_k\ = \partial F/\partial q_r\ .\ q_{rk}\ \ ....\ (4)$$

Their application to any specific case requires expressing F in a suitable form and then solving the resultant (n-1) differential equations.

2. **Hamilton's Principle of Least Action vs Principle of Null Action**

In a mechanical system, natural transformations involve inter-conversions between the kinetic energy T and potential energy V, so

$$F\ = T - V\ = L, \text{ the Lagrangian.}$$

Equation (3) transforms to

$$A\ = \int \delta L\ dt\ = 0. \qquad \ldots\ldots\ (5)$$

It is operationally equivalent to Hamilton's Principle of Least Action

$$A\ = \delta \int L\ dt\ = 0. \qquad \ldots..\ (6)$$

The Unified Theory's concept of associating action turnover with the variation ΔE in energy E and hence with ΔL in the Lagrangian L as in equation (5) is more logical and realistic than with unvaried Lagrangian L of Hamilton's Principle equation (6).

3. **Schwinger's Quantum Dynamical Principle**

Schwinger [4] developed a new Quantum Dynamical Principle on Heisenbergian Quantum Mechanics when the Hamilton's Principle was found inadequate for extension to micro quantum phenomena. If the Lagrangian L (ϕ, ϕ_u) is a function of the localized field ϕ and its gradient ϕ_u = $d\phi/dx_u$ (u = 1, 2, 3, 4),

$$\delta A\ = \delta \int L\ dt\ = 0.$$

But the non-commuting observables ϕ, ϕ_u cannot be simultaneously measured at any time. Therefore δA cannot be computed. Moreover, Heisenberg's Principle of Uncertainty sets $\delta A \geq 0$, not identically equal to zero. However, Schwinger showed that

$$\delta\ (\phi_1\ ,\ t_1\ |\ \phi_2\ ,\ t_2) =\ i/h\ (\phi_1\ ,\ t_1\ \ |\ \delta A\ |\ \ \ \phi_2\ ,\ t_2) \qquad ...(7)$$

are the elements of transformation matrix wherein the necessity of vanishing of δA is removed. Nevertheless, even in eqn. (7), the ϕ_1 and ϕ_2 are not actual magnitudes but the measured observables subject to uncertainties of the Heisenberg Uncertainty Principle.

In Unified Theory's Principle of Null Action the ϕ and ϕ_u being objectively actual magnitudes, belong to the same eigenstate and hence commute.

Therefore, the Principle of Null Action can be applied and extended to the micro phenomena of Quantum Mechanics as below.

4. **Klein-Gorden Field Equations**

Let the Lagrangian density L (ϕ, ϕ_u) be a function of the scalar field ϕ (of mass m) and field gradient ϕ_u, without explicit dependence on space-time coordinates x_u, x_4 = ict, c being the light velocity in vacuum. Here,

$$F = L = \tfrac{1}{2}\,(\partial\phi/\partial x_u.\partial\phi/\partial x_u - m^2\phi^2),\ q_k = \phi,\ q_r = x_u\,,$$
$$q_{kr} = \partial\phi/\partial x_u, \qquad d/dq_r\,(\partial F/\partial q_{kr}) = \quad \phi\,,$$
$$=(\partial^2/\partial x_1^2 + \partial^2/\partial x_2^2 + \partial^2/\partial x_3^2 - 1/c^2.\partial^2/\partial t^2);$$
$$\partial F/\partial q_k = -m^2\ \phi\,, \qquad \partial F/\partial q_r = 0.$$

With these substitutions, eqn (4) leads to the Klein-Gorden eqn :

$$(\quad + m^2\,)\phi\ = 0.$$

5. **Schrodinger Wave Equation**

In Unified Theory, the kinetic energy E of a moving particle comprises an aggregate of 0-spin sharmons with an intrinsic electric-cum-magnetic dipole whose natural frequency ν is related to E by ν = E/h.

This induces electromagnetic dipoles of the same frequency ν in the ambient sharmon medium to generate the "sharmon ripple" tightly associated and moving with the moving particle at its velocity u. Its wavelength λ is related to the particle's momentum p by λ = h/p.

For a particle of mass m, moving with velocity u, momentum p, total energy T and potential energy V, $p^2 = m^2u^2 = 2m(T - V)$. This with the wave equation

$$\nabla^2\ \Psi + 4\pi^2/\lambda^2\ \Psi = 0,\ \ \nabla^2 = (\partial^2/\partial x^2 + \partial^2/\partial y^2 + \partial^2/\partial z^2)$$

gives the famous Schrodinger Wave Equation of Wave Mechanics

$$\nabla^2\Psi\ + (\ 8\pi^2 m/h^2)(\ T - V\ )\Psi\ = 0.$$

Lewis de Broglie was the first to give eqns. ν = E/h and λ = h/p in analogy with the Planck's similar equations for electromagnetic radiation. He called them "matter waves" since material particles exhibit their wave properties through them.

Because it was difficult to fix ideas about their physical nature, Max Born [5] considered them as "probability waves" which guide the moving particle. But Born's probabilistic interpretation could apply only to ensembles of large numbers of particles and could not explain the diffraction patterns produced by single individual particles and very low intensity light photons.

It is only now that a real physical significance is imparted to the de Broglie wave and Schrodinger wave function, and in fact to the Wave Mechanics. These energetic ripples in the sharmon medium, move tightly associated with the moving particle. The diffraction patterns for single particles are produced by Simple Harmonic variations in the phase and amplitude of these ripples. See detailed presentation in Ref. [2].

6. **Special and General Relativity**

The general covariance and invariance to Lorentz transformations of eqn. (3) of the Principle of Null Action follow from the fact that all terms in the expression for F in eqn. (3a) are canonically conjugate to parametric t, and subsequent operations of differentiation and integration

are themselves so invariant. Eqn. (4) can therefore be taken over to the theories of Special and General Relativity. Einstein [6] has deduced the equations of General Relativity from Hamilton's Principle, which is operationally equivalent to the Principle of Null Action, as above.

7. **Euler's Equations**

When the expression for F contains q_k & q_{kr} but not q_r , $\partial F/\partial q_r = 0$, then, eqn. (4) reduces to the Euler's equations :

$$d/dq_r \, (\partial F/\partial q_{kr}) - \partial F/\partial q_k = 0.$$

8. **Lagrange's Equations**

In eqn. (4), let F be identified with Lagrangian L, q_r with time t , and q_k with x, $q_{kr} = dx/dt = x'$. If in addition, the expression for F or L does not explicitly contain t, $\partial F/\partial q_r = 0$. Then eqn. (4) leads to the Lagrange's equations:

$$d/dt \, (\partial L/\partial x') - \partial L/\partial x = 0.$$

9. **Maxwell Equations for Electromagnetic Radiation**

The electromagnetic waves propagate in the sharmon medium via contiguous mechanisms, the mediator bosonic "photon" comprising an aggregate of the sharmons [2].

An electric field E induces an electric dipole $p_e = lq$ with arm l and charge $\pm q$ in the sharmon packet comprising +ve positrinos and -ve negatrinos. Since the deforming force qE is equal to the restoring force $q^2/e_o l^2$, we have $q = l^2 e_o E$, $p_e = l^3 e_o E$.

The l^3 in the p_e expression becomes the polarizability of the sharmon packet. The displacement charge per unit area of the sharmon packet is nearly $D = q/l^2 = e_o E$. And the displacement current density in the sharmon medium is $I = dD/dt = e_o dE/dt$.

Since this displacement current in the real sharmon medium is real and solenoidal, it gives rise to a real magnetic field H, so that

$$\text{curl } H = dD/dt = e_o dE/dt \ ,$$
$$\text{div } dD/dt = 0 = \text{div } I.$$

The other two Maxwell equations for the sharmon medium are

$$\text{div } H = 0 \ ,$$
$$\text{curl } E = -\mu_o \, dH/dt \ .$$

Maxwell did not question the 19th century views about vacuum as an "empty space". Therefore his displacement charge & displacement current and hence the electromagnetic waves were only mathematical constructs and exigencies. They all now acquire real physical significance in the context of the omnipresent sharmon medium filling all space.

10. **Newton's laws of motion**

For an isolated moving particle far removed from other influences, F identifies with its kinetic energy T, q_k with t, and q_r with x. Then equation (4), on using $dx/dt = x'$, gives

$$x' \, d/dt(\partial T/\partial x') = \partial T/\partial t$$

where $\partial T/\partial x'$ is the linear momentum.

For the particle starting from rest under the action of a constant force P, T equals the work done by P in moving the particle a distance x, or T = Px whose partial differentiation with time t gives

$$\partial T/\partial t = Px' .$$

This with eqn (4) gives on division by x', the Newton's Second Law of Motion

$$d/dt (\partial T/\partial x') = P.$$

The Newton's first and third laws of motion are derivable from the second law.

11. **A Thermodynamic Equation of State**

For a thermodynamic system, the F identifies with the Gibbs thermodynamic potential at constant pressure, F = (H - TS), where H = E + PV is the total heat content and S is the entropy; E is the internal energy, P the pressure and V the volume. Here the expression for F does not explicitly contain the mutual derivatives q_{kr}. Therefore, in eqn. 16.7, $d/d_{qr} (\partial F/\partial q_{kr}) = 0$.

Identifying q_k with V and q_r with T, eqn 16.7 gives

$$[(\partial H/\partial T)_V - T(\partial S/\partial T)_V](\partial T/\partial V)_P + (\partial H/\partial V)_T - T(\partial S/\partial V)_T = 0.$$

Since $C_v = (\partial H/\partial T)_V = T(\partial S/\partial T)_V$, the above eqn. reduces to

$$(\partial H/\partial V)_T - T(\partial S/\partial V)_T = 0.$$

Differentiation of H = E + PV with V at constant P gives

$$(\partial H/\partial V)_T = (\partial E/\partial V)_T + P.$$

It can also be shown that $(\partial S/\partial V)_T = (\partial P/\partial T)_V$. The last 3 eqns. give

$$(\partial E/\partial V)_T = T (\partial P/\partial T)_V - P.$$

This thermodynamical equation is applicable to all states of matter.

12. **Discharge of Capacitance through Inductance & Resistance**

If I is the instantaneous current in the circuit having capacitance C, inductance M, resistance R, and q the charge on C,

$$\delta F = \delta\int RI \, dt + \delta\int MI \, dI - \delta\int q/C \, dq.$$

Three terms on the right are instantaneous energies of R, M, C.
In eqns. (4), identifying q_k with q, q_r with t, q_{kr} with I = dq/dt, we have

$$Id/dt (\partial F/\partial I) - I(\partial F/\partial q) = \partial F/\partial t.$$

The above two equations with

$$\partial F/\partial I = \int 2RI \, dt + \int MI, \text{ etc lead to}$$

$$RI + MdI/dt + q/C = M\, d^2q/dt^2 + Rdq/dt + q/C = 0$$

the well known differential equation for this case.

Summing up remarks

The above deductions of established working equations in diverse phenomena and varied fields of Physics illustrate the universal versatility of the Unified Theory's new Principle of Null Action.

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UnifiedTheory-7: NATURE OF THE NON-EXPANDING UNIVERSE

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Since the cosmic redshifts are not observed to increase exponentially with time the universe is NOT expanding. In the non-expanding universe the total energy-mass content is eternally conserved with NO 'initial creation of matter from nothing' in a single big explosive event of the Big Bang theory or continuously of Steady State theory. The cosmic redshift is caused by depletion of photon energy during long passage through the sharmon medium due to non-Doppler effects of gravitational, electromagnetic & viscous losses. Observation on Ia type supernovae is explained which has amazed & horrified the astronomers.

This paper will mainly present the theory of the non-expanding & non-contracting universe under the Unified Theory [1]. A reappraisal of the Big Bang [2] and Steady State [3] theories of expanding universe will also be given. Outstanding problems of cosmology will be discussed in the light of the theories of expanding and non-expanding universe for their comparison.

1. **Cosmological red shift**

Astronomer Edwin Hubble was the first to observe in 1920s that the spectral lines in the light from distant galaxies are shifted towards the red end of the visible spectrum with an increment of their wavelength. If λ is the original wavelength and λ' ($>\lambda$) of the same spectral line in the light from the galaxy as received by an observer on earth, the red shift is $Z = (\lambda' - \lambda)/\lambda$. But since λ is connected with frequency ν to the light velocity $c = \lambda\nu$, we also have the red shift

$$Z = \Delta\lambda/\lambda = -\Delta\nu/\nu.$$

Hubble attributed this red shift to the Doppler effect due to recession of galaxies. But in Unified Theory's [1] non-expanding universe it is caused by the depletion of spectral photon energy ($E=h\nu=hc/\lambda$) during the long passage through the sharmon medium.

2. **The redshift in the non-expanding & non-contracting universe**

2.1. *The non-expanding & non-contracting universe*

The inward contracting pressure due to self-gravity of the total mass-energy content is counter balanced by the outward expanding pressure due to intra-universe kinetic motions. So the perceptible material universe remains non-expanding and non-contracting [1]. See also sec. 9 below.

2.2. *The red shift in non-expanding universe*

The combined non-Doppler effects of gravitational, electromagnetic (resistive plus inductive) and viscous losses cause the cosmological red shift. These losses deplete the energy $E = h\nu$ of the

sharmon-composed spectral light photon by $\Delta E = h.\Delta\nu$, thereby shifting the wavelength $\lambda = c/\nu$ by $\Delta\lambda$ towards red end of the spectrum. The red shift is given by

$$Z = +\Delta\lambda/\lambda = -\Delta\nu/\nu = \lambda.\Delta E/hc.$$

2.2.1 *Red shift due to gravitational losses*

First, if the light from a galaxy distant D passes through distances D_1, D_2, D_3, ..., D_n of n regions with +ve or -ve gravitational accelerations g_1, g_2, g_3, ..., g_n the gravitational depletion from the spectral energy quantum will be $\Delta E = (hn/c^2)\sum g_n D_n$ and the gravitational red shift

$$Z_g = \sum g_n D_n / c^2 = K_g D.$$

As the regions with +g and -g are crossed alternately on the way, net K_g is expected to be negligible. Finally, if U_2 is the gravitational potential around the distant source and U_1 for the observer on earth, the resultant red (increment of wavelength) or violet (decrement of the wavelength) shift would be $\pm (U_2 - U_1)/c^2$.

In Special Relativity the redshift results from time-dilatation. Gravity Probe A was therefore launched in 1976 to test the time dilatation. Its findings are consistent with Unified Theory [1].

2.2.2. *Red shift due to Electromagnetic losses*

Secondly, since propagation of electromagnetic wave in the sharmon medium involves real displacement currents, the resistive as well as the inductive (electric & magnetic) losses are proportional to the distance D. The electromagnetic red shift becomes

$$Z_{em} = K_{em} D.$$

But these too are insignificant losses because the electrical resistance of the sharmon medium is extremely high. Therefore, K_{em} like K_g is also very small.

2.2.3. *Red shift due to viscous losses*

Thirdly and most importantly, according to Stoke's law the sharmon aggregate of spectral energy quantum $h\nu$ of spherical radius r, in traveling a distance D through the sharmon medium of viscosity η [1] suffers a viscous loss $\Delta E = 6\pi r\eta Dc$. It produces a viscous red shift

$$Z_v = 6\pi\, r\, \eta\, D\, \lambda / h = K_v D.$$

Here the energy loss is reflected in the increase of wavelength λ because the velocity c of the photon remains unaffected. But, for the motion of a large body in a viscous fluid velocity v decreases to mark the loss of its kinetic energy $\frac{1}{2} mv^2$.

As an example, for the sodium yellow light $\lambda = 5890 \times 10^{-8}$ cm, the $h\nu$ quantum has $n_s = 3.6146 \times 10^{14}$ sharmons or $n_c = 2n_s$ cosminos each having a radius $r_c = 0.8078 \times 10^{-33}$ cm. Taking the photon as a sphere of closely packed cosminos its radius becomes $r = r_c.\ n_c^{1/3} = 7.24 \times 10^{-29}$ cm. With $\eta = 0.65 \times 10^{-22}$ dyne.sec/cm^2 [1],

$$K_v = 0.8344672 \times 10^{-27} \text{ cgs units.}$$

If the distance D consists of n sections D_1, D_2, ... , D_n having viscosity η_1, η_2, ..., η_n, then

$$Z_v = 6\pi\, r\, c / h \sum \eta_n D_n .$$

The total non-Doppler red shift in the non-expanding universe is Z = KD where the total

$$K = K_g + K_{em} + K_v$$

of which K_v, for the viscous loss, is the most prominent.

To these can be added the Doppler red (increment of wavelength) or violet (decrement of wavelength) shift $Z_D = \pm V/c$ of local origin, if any.

When a supernova explodes a burst of sharmons is showered into its ambient environment, which raises the viscosity η and the constant K_v of the light-propagating medium in its surroundings. The resultant rise in the observed redshift Z leads to overestimation of the source-distance D ($\propto$ Z) and of the expansion rate of the universe V/D=H ($\propto$ Z). But these rises in the cK_v = H etc. are *local effects* and do not signify any generalized property of the whole universe permeating space. See also below.

14.3 **Optical Doppler effect in expanding universe**

The Doppler redshift is basic to the theories of expanding universe. The relative motion between the observer and the source of light causes an apparent change in the wavelength, called "Doppler Effect". But the phase remains invariant to the Lorentz transformations. It can be shown [1] that the Doppler red shift for v < c is given by

$$Z = (\lambda' - \lambda)/\lambda = \Delta\lambda/\lambda = v/c.$$

4. **The Hubble's law**

Edwin Hubble had observed that "*fainter (more distant) the stellar source the more red-shifted light (of lower frequency and higher wavelength) it emits*" or the cosmological red shift Z increases directly with the distance D of the light-emitting galaxy. That is,

$$Z = ((\lambda' - \lambda)/\lambda) \propto D.$$

This with the above equation leads to the Hubble law

$$V = HD$$

wherein V is the velocity of receding galaxy. The Hubble constant H = V/D is a measure of the rate of expansion of the universe V/D. The intervening cosmic dust can scatter away the incoming light from the stellar source to decrease its brightness and make it fainter to appear distant.

4.1. *The Hubble constant*

The numerical value of the Hubble constant H comes to 1.8×10^{-4} when D is measured in light years and V in kilometers per second [2]. However, there is no general agreement on the precise value of H, which therefore is controversial.

In the theories of expanding universe, Doppler red shift Z = V/c and Hubble's law V = HD connect the receding velocity V of the galaxy with its red shift Z and distance D. This gives the constant cK_v (= H) = 1.84782×10^{-17} cgs units or 60.13 Km/s/ Mps in Unified Theory [1]. It can be

compared with the constant H = 1.9145×10^{-17} cgs units or 62.3 Km/s/Mps for Big Bang theory given by Gamow [2] and 58 - 73 Km/s/Mps as observed later [4].

The Hubble constant H loses its original meaning and significance in the new theory of non-expanding universe since there is now no receding velocity V for the Hubble's law V = HD.

The redshift Z can be used to estimate the distance of the light source D=Zc/H in expanding universe. For the non-expanding universe, however, D = Z/K, as below.

5. **Theories of Expanding Universe**

5.1. *The Big Bang Theory*

Abbe Georges Edouard Lemaitre during 1920s developed the hypothesis that the interpretation of the cosmological red shift as optical Doppler effect suggests an expanding universe, which began with a violent explosion or a "Big Bang" of the extremely dense and intensely hot substance. These ideas were further developed in 1940s by George Gamow [2]. He estimated the age of rocks, oceans, moon, sun, stars, Milky Way, etc. and always got nearly the same value: "a few billion (10^9) years"! He therefrom suggested that initial Big Bang occurred a few billion years ago and the various features of the "Expanding Universe" have since developed evolutionally.

5.2. *The Steady State Universe*

According to Hubble's law, every receding galaxy moves increasingly faster as it goes farther away. At a distance of 2×10^9 light years away on the cosmological horizon a galaxy recedes with a velocity of light c. When it crosses the cosmological horizon it would disappear since any signal from it to ever reach us has to move faster than light, which is prohibited by Relativity theory. So the observable universe would eventually end up as an empty space. The time for this to happen is about 10^{10} years, which is only about a fifth of the sun's remaining life. To save this unpalatable situation the Theory of Steady State Universe [3, 5] has been proposed. This is based on the Perfect Cosmological Principle (PCP) [5], which admits no preferred or singular position, direction, or epoch. The universe looks the same in all directions and at all positions steadily with time. It has been in the past and will in future look the same all round as it is now. It did not have a big bang like singular beginning and will not have a singular end.

Some authors [6, 7], have disproved the Big Bang model without establishing the Steady State version convincingly. On the other hand the Americans John C. Mather (NASA Goddard Space Flight Center in Greenbelt, Md.) and George F. Smoot (Lawrence Berkeley National Laboratory, Calif.) won the 2006 Nobel Prize in Physics on 3rd October, 2006 for supporting the Big Bang theory. This has created a sort of conceptual vacuum, which our new Theory of Non-expanding & Non-contracting Universe [1] fills. This author issued a Press Statement on 10th October 2006, contesting the basis of the 2006 Nobel award. It was followed by the interviews published in various News Papers like The Hindustan Times (Basis of Physics Nobel Contested: HT Chandigarh LIVE, page 4, Col.1-5, October 16, 2006), The Tribune (Chandigarh Tribune, p5, col 2-5, October 29, 2006).

6. **The decisive crucial test**

To test whether the universe is actually expanding, red shifts of individual galaxies need to be monitored. In theories of expanding universe redshift is Z=V/c and Hubble's law HD=V = dD/dt, gives $Z/Z_o = \exp(Ht)$, Z_o being starting value. So the redshift Z increases exponentially with time. But for a non-expanding universe Z= KD, D being constant, redshift Z does not change with time.

That is, the inter-galactic distances, the receding velocities of galaxies and the cosmological

red shifts should all increase exponentially with time if the universe is expanding according to the Big Bang [2] or Steady State [3] theory, but should remain unchanged in the non-expanding universe of Unified Theory [1]. However, since $c = \nu\lambda$, the spectral shift = $(+\Delta\lambda)/\lambda = -\Delta\nu)/\nu)$. In other words, the increase in wavelength will be found more marked for long wavelengths (red and infrared) and fall in frequency will be more pronounced at high frequencies (violet, X-rays).

Since the individual red shifts have never been found to increase exponentially with time galaxies are not flying away to generate an expansion of the universe. Actual observations therefore support Unified Theory's non-expanding universe.

In the nonexpanding universe some observations of higher than expected Hubble constants signify only *local effects* in the surrounding light medium due to bursts of sharmon showers from the exploding stars and NO *general property* of the whole universe permeating space is implied.

7. **The Cosmological Horizon**

In the expanding universe the intergalactic distances increase continuously like the separations among dots placed over the 2-D surface of an inflating rubber bladder. As a result the receding velocities of galaxies increase in proportion to the distance from the observer situated on any one of them. It can be shown from the Hubble's law equation that the galaxies distant $2x10^9$ light years away recede with a velocity of light c. This marks the Cosmological Horizon. Because the galaxies beyond it cannot be observed as the signals from them to reach us have to move faster than light, which is prohibited by Relativity Theories. Theory of non-expanding universe does not have a cosmological horizon or a 'horizon problem'.

8. **Initial creation of matter in expanding universe**

No cosmological theory can avoid a serious discussion of this basic issue. Gamow's [2] estimations yielded similar ages of a few billion years for atoms, rocks, oceans, stars, galaxies etc., suggesting that the matter in the universe is perhaps not infinitely old. This points to the period of occurrence of some major reorganization related to the initial '*creation of matter*'(from nothing) in the universe [2]. The Big Bang theory envisages creation of the entire matter in the whole of the universe in a single "big bang", which also created the 3-D space that has since been expanding exponentially with time.

According to the Steady State model, there is a continuous creation of matter all round, which keeps the cosmological scenario "steady" by compensating for the continuously disappearing galaxies beyond the cosmological horizon $2x10^9$ light years away. This requires the mean density of the background material (of unclear nature) to be maintained constant at about $3x10^{-31}$ gm/cm^3 through creation of matter [8] at a rate of about $1.5x10^{-48}$ gm/cm^3/sec. That is, of one new hydrogen atom per gallon of expanding space once in every 250 million (or $2.5x10^8$) years [3, 8].

Magnitudewise, this is not a big scale of creation but conceptually it is highly infirm. To the most vital question: "Where does the newly created matter come from?" Hoyle [3] replies: "It does not come from any where. Material simply appears; it is created. At one time atoms composing the material do not exist, and at a later time they do. This may seem a very strange idea, and I agree that it is. But in science it does not matter how strange an idea may seem so long as it works, that is to say, so long as the idea can be expressed in a precise form, and so long as its consequences are found in agreement with observations. …."

But this weakness of logic applies also to the Big Bang Theory [2]. That is why Hoyle [3] continues: "Some people have argued that continuous creation introduces a new assumption in science - and a very startling assumption at that. Now I do not agree. It only replaces a hypothesis that lies concealed in the assumption that the whole of the matter in the universe was created in one big bang at a particular time in the remote past. On scientific grounds, this big bang assumption is much the less palatable of the two. It is an irrational process that cannot be

described in scientific terms. Continuous creation on the other hand can be represented by precise (mathematical) equations whose consequences can be worked out and compared with observations. ...” *The Unified Theory [1] does not endorse this kind of unrealistic logic.*

9. **No initial creation of matter in Unified Theory’s non-expanding universe**

The unreality of Big Bang and Steady State theories of expanding universe has been brought out above. In String Theories the explosive Big Bang is caused by the collision of membranes of 11-dimensions and **zero** thickness, *which are non-existent*.

However, Unified Theory's argument remains that “*creation of matter from nothing*” is irrational and unrealistic whether it is a continuous process of the Steady State theory or one time single event of the Big Bang theory. Kapp’s hypothesis of the Symmetrical Impermanence of Matter [9] invokes and implies both, creation of matter from, and disappearance into, “nothing”. It also therefore is unrealistic.

According to Unified Theory the eternally conserved most basic total cosmic substance constitutes an eternally existing ‘primordial cosmic body’ herein named as the ‘**Megovum**’, meaning the ‘big egg’ for mega (extremely big) and ovum (egg) as it gives rise to all in the Cosmos including, but not limiting to, the perceptible material universe. The megovum does not originate or come from anywhere but has always existed in the entire past and will always exist in the entire future. In its ground energy state the cosmic substance of the resting megovum was composed solely of the 0-spin sharmons only. In this state there were no energies, no momenta and no cores or carriers of energy & momentum and there were no transfers, propagations or exchanges of energy. There were no motions and changes, no perceptions of ‘there, here, there’ and of ‘then, now, then’, no perceptible space or perceptible time. The absence of all motions is akin to the state of absolute zero temperature. But the zero-point thermal motions cannot be eliminated in the perceptible universe due to the Sharmon Medium’s nature as a kinetic gas.

It is a common experience that a part of pond water turns into solid ice in a severe winter and re-converts into liquid water on a rise in temperature. Similarly the actual perceptible universe is created from a part of the megovum and later can dissolve into the megovum. Conceptually, there is nothing against the existence of more than one Megovum and more than one non-expanding perceptible material universe to form the infinite Cosmos.

9.1 *Initial creation of radiation & material particles*

The cosmic substance composing the perceptible universe is neither created from ‘nothing’ when the universe is created out of the megovum nor does it disappear into ‘nothing’ when the universe dissolves into the megovum.

As the very first step for the creation of the material perceptible universe some dynamical instability became operational spontaneously in the Cosmos akin to the stresses and strains in a supersaturated vapour precipitating a phase change. Some scriptural philosophies ascribe this event to the wish of the all-intelligent & all-powerful megovum/megamind ***Brahm,*** to ‘*become many from one*’.

The opposed ½ -spins of the negatrinos and positrinos composing some 0-spin scalar sharmons in a part of the megovum became co-directional. This raised the sharmons into the 1-spin vector state, which then attracted the 0-spin sharmon aggregates to create 1-spin energized sharmons or ‘photons’. Some 1-spin energized sharmons created the 2-spin gravitons. On the other hand, the ½ -spin cosminos of some 0-spin sharmons separated and got attached to some other 0-spin sharmons or sharmon aggregates to create the energized cosminos i.e. energized +ve positrinos and energized –ve negatrinos. Thus the energized sharmons and energized cosminos were created. It marked the beginning of the 1-spin photons of the electromagnetic radiations and the ½ -spin Fermion material particles.

The 1-spin sharmons started propagating the 0-spin sharmon-composed electromagnetic wave energy in the sharmon medium to generate and evolve electromagnetic radiations. The nascent electromagnetic radiations had the wavelength $\lambda=h/mc = h/nm_sc$, where the quantum of the wave energy-mass $m = nm_s$, n being the number of constituent 0-spin sharmons and $m_s=5.19\times10^{-48}$ gm, the mass of a sharmon. The most primordial electromagnetic radiation had the wave energy equal to that of a single 0-spin sharmon (mass $m = m_s=5.19\times10^{-48}$ gm) and wavelength $\lambda=h/m_sc = 4.25 \times 10^{10}$ cm or 4.25×10^5 (hundred thousand or lac) Kilometers. This was followed by the evolution of higher and higher energy radiation and a rise in temperature. The wavelengths of the next higher energy radiations are 2.12×10^{10} cm, 1.42×10^{10} cm, 1.06×10^{10} cm, 0.85×10^{10} cm, etc corresponding to their wave energy m equal to the mass of n=2, 3, 4, 5 sharmons respectively.

The actual observations [10] do reveal and support the existence of electromagnetic radiations with wavelength extending up to a few hundred thousand (10^5) Kilometer. Bosonic condensations of sharmons, supported by close distance attractions among sharmon's oppositely charged constituent cosminos, impart gregarious properties to sharmons for aggregation to compose the wave-energy. The wave energy of the 7 cm cosmic background radiation mentioned in sec. 10 below is an aggregate of some 6 billion sharmons.

The lightest fermion, after cosminos, comprises a ½-spin ±ve cosmino attached to a 0-spin sharmon and has the mass of 7.788×10^{-48} gm. The 0.1 eV/c^2 mass of a muon-neutrino comprises 3.43×10^{13} sharmons. The details about various neutrinos and antineutrinos are given in Ref. [1].

The electron e^- is composed by $n_1=3.50\times10^{20}$ negatrinos plus $n_2=3.944\times10^{17}$ sharmons, the positron e^+ by n_1 positrinos plus n_2 sharmons, and 1-spin 1.022 MeV photon by $(n_1 + 2n_2)$ sharmons of which one has spin 1 and the rest spin 0. The photon of energy 1.022 MeV can create an electron-positron ($e^- e^+$) pair. The electron and positron co-annihilate to generate two 0.51 MeV photons moving away back to back. See details in Ref.[1].

The electrically neutral mass of the subatomic particles is composed by 0-spin sharmons and the electrically ±ve charged mass by the corresponding ±ve cosminos. It, however, is not clear why only some values of the extended mass spectrum are stable and others are not. For example the neutrino of mass 0.1 eV/c^2, the electron of mass $m_e = 9.109534 \times 10^{-28}$ gm or 0.511 MeV/c^2, proton of mass $m_p = 1.6726485 \times 10^{-24}$ gm or 938.26 MeV/c^2 and neutron of mass $m_n= 1.6749543 \times 10^{-24}$ gm or 939.55 MeV/c^2 are stable particles. The cosmino-sharmon composition of electron, proton & neutron is given in Ref. [1].

9.2. *The age of the universe*

The eternally conserved total mass-energy content of the primordial Megovum comprised of only 0-spin sharmons, which freed it of all motions and changes and made it imperceptible. The very first step for the creation of perceptible universe associated with all sorts of motions and changes made the ½-spins of some 0-spin sharmons co-directional, which then led to the creation and evolution of radiation during the cold 'pre-radiation era' and 'radiation era'.

The above "cold" beginnings were followed by the evolutions of higher and higher energy 1-spin sharmon aggregates or radiation quanta leading to the wide spread "hot regions". The evolution of subatomic particles, material atoms, molecules, etc. from the electromagnetic radiations, cosminos and sharmons may be worked out on the lines suggested by Gamow [2].

As mentioned above Gamow [2] estimated the age of rocks, oceans, moon, sun, stars, Milky Way, etc. and always got nearly the same value: "a few billion (10^9) years"! It was therefrom inferred that initial Big Bang, creating the entire matter of the universe in a single event, occurred ~ 15 billion years ago and the various features of the "Expanding Universe" have since developed through evolutionary processes.

The Unified Theory's theory of nonexpanding universe considers the whole of the matter as eternally conserved. However, its slower progressing 'pre-radiation' era and 'radiation' era of evolution had lasted longer than the Gamow's 'post-radiation' era. The total period of creative

evolution of the perceptible universe in the Unified Theory may therefore be taken to exceed that of the oldest star in Big Bang cosmology by the period of "cold" era comprising the 'pre-radiation' era plus the 'radiation' era described above. This total is about three times the 'age' of ~15 billion years suggested by Gamow [2] and comes to about 45-to-50 billion years for the Unified Theory.

9.3. *The dark matter & dark energy*

In modern Astronomy and Cosmology **dark matter** is that matter which does not emit or reflect enough electromagnetic radiation to be observed directly, but its presence can be inferred from gravitational effects on visible matter and **dark energy** permeates space. "The universe is made mostly of dark matter and dark energy," says Saul Perlmutter, leader of the Supernova Cosmology Project headquartered at Berkeley Lab, "and we don't know what either of them is."

According to Unified Theory all forms of mass and energy are composed by two elementary cosminos (+ive positrino and –ive negatrino) and the sharmon made of these two. The mass-energy content of the Megovum is eternally conserved. The perceptible material universe accounts for only a small fraction of the Megovum mass-energy content. Actually existing material universe contains not only the matter comprising atoms, molecules and mass-bodies like stars & galaxies composed by them and radiations but also the all-pervading Sharmon Medium and cosmino-sharmon aggregates scattered through out. The positrino, negatrino and sharmon being ~ 10^{-33} cm in size the 1-spin Sharmons (**dark energy**) and 0-spin sharmon and/or ±ive cosmino aggregates (**dark matter**) cannot be observed directly.

10. **Cosmic microwave background**

In 1955, Arno A. Penzias and Robert W. Wilson of the Bell Laboratories established that a microwave cosmic radiation at about 7 cm wavelength baths the earth almost uniformly from all directions. The Big Bang theory explains it as a remnant of the isotropic early era of "hot" radiation, but does not clarify as to how the "big" explosion could be so symmetrical as to impart isotropy to this radiation around the earth. In fact, it should have left significant turbulences and anisotropies, which are not actually traceable. Moreover, no evidence of the site of the big explosion is discernible. The Steady State theory has no hot era, hence no explanation of the cosmic background and its isotropy.

In Unified Theory, however, the existence as well as isotropy of the background cosmic radiation is very natural expectation because it is a residue of the isotropic evolutionary process during the creation of the material perceptible universe, which had a '**cool**' instead of a 'hot' beginning vide sec. 9.2 above.

Sec. 9.1 traces the evolution of radiation starting from the most primordial wave energy equal to that of a single 0-spin sharmon (mass $m = m_s = 5.196 \times 10^{-48}$ gm) and wavelength $\lambda = h/m_s c = 4.25 \times 10^{10}$ cm or 4.25×10^5 (hundred thousand or lac) Kilometers. This was followed by the evolution of higher and higher energy radiation and a rise in temperature. The wavelengths of the next higher energy radiations are 2.12×10^{10} cm, 1.42×10^{10} cm, 1.06×10^{10} cm, 0.85×10^{10} cm, etc corresponding to their wave energy m equal to the mass of n=2, 3, 4, 5 sharmons respectively.

The actual observations [10] do reveal and support the existence of electromagnetic radiations with wavelength extending up to a few hundred thousand (10^5) Kilometer. Bosonic condensations of sharmons, supported by close distance attractions among sharmon's oppositely charged constituent cosminos, impart gregarious properties to sharmons for aggregation to compose the wave-energy. The wave energy of the 7 cm cosmic background radiation mentioned above is an aggregate of some 6 billion sharmons. This shows that the background radiation has an extended wide spectrum and is not restricted to the 7 cm wavelength alone. This is consistent with actual observations [10].

11. **Observations on Type Ia supernovae**

For an expanding universe, the rate of expansion is given by the Hubble constant H or the ratio V/D of recession velocities-to-distances for the receding galaxies, V = Zc being estimated by the redshift Z and the distance D by the apparent intensity or faintness of the stellar source. The attractive gravitational force varies inversely as the square of the distance and curves the spacetime continuum. In the relativistic Big Bang theory, as developed by Friedmann, Einstein, De Sitter & Gamow [3], the expansion rate of the universe due to gravitational force should gradually slow down over time and stop eventually at an infinite time.

But the Einstein's cosmological constant λ stands for a repulsive antigravity force un-curving the spacetime and varying in proportion to the distance. This universal repulsive force, whose physical nature is incomprehensible, tends to increase the expansion rate of the universe.

The observation [11] on some distant (old) type Ia supernovae as compared to those on nearby (young) ones have been made. These suggest that the expansion rate, during the past few billion years, has not only slowed down too little for the gravity to ever bring it to a stop but something is nudging the expansion along. It is the evidence for a cosmological constant and for a universal repulsive force permeating space. It is a "horrible" indication because as a consequence of the continued expansion the universe would/should gradually become more and more tenuous with time eventually ending up as an empty space.

So, these observations tend to precipitate a sort of conceptual crisis for or give a fatal blow to the relativistic Big Bang theory [2] because of the incomprehensible nature of the antigravity force. The *ad hoc* and arbitrary nature of the cosmological constant λ, which Einstein had put in the mathematical theory '*by hand*', make the relativistic Big Bang theory weak. Einstein himself regarded the introduction of λ as a blunder of his life because he lost the opportunity to predict an expansion of the universe.

Introduction of positive cosmological constant (λ) [12] is unacceptable because it stands for two unrealistic features: one, gravity-like non-gravity imaginary attractive force permeating space and two, creation of matter from nothing.

For Unified Theory's non-expanding & non-contracting universe, as in these observations [11], the K-constant and hence the redshift does not or need not gradually decrease to become zero at infinite time. It may however vary (decrease or even increase) if, where and when, the causative factors (viscous, gravitational, electromagnetic or Doppler) vary to get reflected in the observed variations. A supernova explosion showers a burst of sharmons in the ambient environment to raise the viscosity η and the constant K_v of the light-propagating medium. The resultant rise in the observed redshift Z leads to overestimation of the expansion rate of the universe V/D=H ($\propto$ Z). But these rises in the c K_v = H etc. are *local effects* and do not signify any generalized property of the whole universe permeating space. There is no antigravity force in existence or any likelihood for the universe becoming empty or collapsing ever in future.

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UnifiedTheory-8: SCIENCE OF HOMOEOPATHY IS BEYOND CONTEMPORARY SCIENCES

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Abstract: Homoeopathy's therapeutic art has stood the test of over two centuries but its science is beyond contemporary Sciences. Three new sciences of *Inductive Chemistry*, *Xenobiology* & *Inductoxenopathy* are proposed to elucidate its scientific bases. The efficacy of its high potency medicines having no molecule of the original drug in the patient dose is established by controlled drug trials on rats, mice and human patients, who served as their own controls and under the scientific Allopathy were diagnosed as incurable, difficult-to-cure even with long treatments, or required surgery. This removes the perennial conceptual impasse created by Avogadro's law and the Law of Mass Action. A new physical basis of the molecular chemical specificity is proposed. New scientific phenomenon of the induction of chemical specificity of the solute molecule into the molecules of diluent medium via physical agitations of the homoeopathic dynamizations is discovered. WHO-concepts of health & health-care are improved and cure of some incurable diseases demonstrated. The new unified therapeutics *Navayurveda*, comprising judicious combination of Homoeopathy, Allopathy/Ayurveda, Yoga is proposed. Potency considerations are rationalized. The critics of Homoeopathy, like this author, will take a U-turn in its support when they personally experience the clinical advantage of Homoeopathy over scientific Allopathy.

1. Introduction

Homoeopathy is wonderfully mysterious. On the one extreme, one has only to buy a cheap book like 'Quick Bedside Prescriber' to start treating patients. One the other extreme, however, even the most celebrated homoeopath cannot claim to understand clearly how homoeopathic medicines act. Double Blind Drug Trials conducted in the past in America could not establish the efficacy of homoeopathic drugs to the satisfaction of scientists and adherents of Scientific Medicine. The science-conscious American public therefore demanded and the Government imposed ban on its practice. Its permitted practice in some other countries reflects the public demand and not the official views on its scientificity. Patients come to a homoeopath not as the first choice, but as the last resort when the best and long allopathic treatment does not give adequate relief. When cured, the patient hesitates to admit publicly and the allopathic physician resents patient's unwise act because this 'natural remission' would have occurred even otherwise by doing nothing but now some undefined complications have been added. Prominent scientific journals are averse to publishing supportive research. The *Nature*, while publishing the work of French Prof. Benveniste's team [1] doubted and repudiated it by an accompanying editorial [2] in the same issue itself.

This roughly sums up the situation, which continues even over two centuries after Homoeopathy's discovery in 1790. Nay, some sporadic demands for ban on its practice keep on coming. Recently the website http://www.quackwatch.com/01QuackeryRelatedTopics/homeo.html titled "Homeopathy: The Ultimate Fake", by Stephen Barrett [3] was noticed. It has the support, among others, of (a) the Executive Director of the American Physical Society, which publishes several top class

research journals of Physics. (b) The former Commissioner of the American Food & Drug Administration (FDA), who when holding the post wanted to but did not ban the homoeodrugs only because he was not sure of the Congress support. (c) Forty-two prominent "critics of quackery & pseuduscience", who have petitioned the FDA against Homoeopathy.

But it is not the end of the perpetual basic criticism of Homoeopathy. For example, Dr. P. M. Bhargava, former Director of the Centre for Cellular and Molecular Biology at Hyderabad was reported (Dr. Shivang Swaminarayan's email of 9 July) to have stated in a press conference on Sunday the 6th July 2003 that **Homoeopathic Medicines are mere Placebos**. He urged the Government to immediately withdraw all support to Homoeopathy. Not only this but Practitioner Homoeopaths should not be allowed to prefix **"Dr."** before their name. They all hold that homoeoremedies being "placebo" cannot work and hence should be banned.

This paper will therefore establish the efficacy of the homoeomedicines with appropriate controlled drug trials. It will provide scientific explanation of the action of high potency homoeodrugs having no molecule of the original drug in the patient dose. It will thus show that Homoeopathy has so far been wrongly disregarded as 'unscientific & placebo therapy' largely because of the conceptual inadequacy of the contemporary sciences themselves. It will remove this inadequacy to make sciences also richer, making out a strong case for the scientific recognition of Homoeopathy.

2. **Science & Homoeopathy**

The scientists' criticism of Homoeopathy is natural though largely based on half-truths. Why? The Dalton's Atomic Theory was published in the year 1809 and the Avogadro's law in 1811. Hahnemann wrote the 6th and last edition of the 'Organon of Medicine' on the philosophy of Homoeopathy in 1842 without any reference to them.

According to Avogadro's law of Physics and Chemistry, a gram-mole (molecular weight in grams) of any substance contains $N= 6.022x10^{23}$ molecules. Therefore all homoeopotencies equal to or higher than the 12th on the centesimal scale or 24th on the decimal scale, representing a 10^{24} fold dilution, do not contain any trace molecule of the original drug in the patient dose. But the Law of Mass Action in Chemistry ordains that the biochemical medicinal effect of any drug is in proportion to its molar concentration, which is zero here. Hence the homoeopotencies of 30c, 200c, 1000c and higher on the centesimal scale, which are routinely employed in clinical practice, cannot have any chemical, biochemical or medicinal action to treat diseases of the patients!

The scientists' criticism, however, is largely based on half-truths because no serious efforts, with an open mind of a scientist, have ever been made to investigate and discover the new scientific phenomena underlying the homoeopathic art.

All sciences are based on the real facts of observation and on the cogency of their theoretical explanation. If and when there is a conflict between theory and observation, the former is revised to describe the latter faithfully. But if the theory is so well established that the new observations seem anomalous, the latter are again repeated in a different setting. If even then the observations get strengthened, there is a need for re-evaluation to discover new scientific phenomenon, which bypasses and yet is consistent with the old theory. This is exactly the challenge thrown up by the curative action of high potency homoeodrugs with no molecule of the original drug. The underlying new phenomenon is the induction of chemical specificity of the solute drug molecules into the molecules of solvent medium via dynamization processes of trituration and succussion, which are unique only to Homoeopathy. The contemporary sciences do not provide for it and

hence will be enriched by recognizing and investigating it further. But first, let us establish the efficacy of homoeodrugs.

3. **Efficacy of the homoeomedicines established**

How to establish the efficacy of the homoeomedicines and show that they do act curatively even when no molecule of the original drug is present in the dose, is the big question.

3.1 *Double Blind Drug Trials not applicable to Homoeopathy*

I first thought of the 'Double Blind Drug Trials' (DBDT), which every allopathic drug has to satisfy before coming to the market for public prescription. Herein the patients having the same organ/tissue pathology or designated disease are randomly divided into two groups. One is treated with the test medicine and the second with a similar-looking inert 'placebo'. Both the patient and the physician who administers the dose are kept unaware (blind) of the medicine code. Hence the term "double blind". This is done to keep the drug trials free from the subjective bias of the patient and the doctor. The effect of the medicine is evaluated through objective laboratory tests. The medicine code is revealed at the end of the trial and the conclusions are drawn after analyzing the results with statistical methods.

However, I found DBDT inapplicable to Homoeopathy. First, because patients with the same 'pathology' or 'designated disease' cannot be randomized into two groups for treatment with active homoeomedicine and placebo. Since different patients usually have different symptom-totality, calling for different curative homoeomedicines. Secondly, the homoeophysician cannot remain "blind" but must know total symptoms before and after every dose of the *known* medicine to ensure that the cure is progressing according to the Herring's laws, and the medicines and dose frequency adjusted to the changing need.

It is thus clear that the conventional Double Blind Drug Trials as routinely applied to allopathic medicines are NOT applicable and relevant to test the efficacy of potentized homoeomedicines. The drug trials done in America in the past were double blind and did not appreciate these basic constraints. That is why inconclusive and equivocal results were obtained. And the government imposed a ban on Homoeopathy practice.

3.2 *Treatment of cases serving as own controls*

I therefore got interested in those well worked out and firmly diagnosed cases, which served as their own controls. These, for the Modern Scientific Medicine are: (a) incurable/fatal, (b) difficult-to-cure even with long, some times life long, medication, (c) requiring surgery, (d) viral infections where Allopathy offers nothing, (e) baby/children diseases where placebo does not work.

The cases of Indian Childhood Cirrhosis were diagnosed on liver biopsy, liver function tests, clinical history and physical examination. And they were discharged from the referral hospital with hopeless prognosis, a week or ten days' survival and with a whisper advice to take the child quick lest he should die on the way. But all showed definite signs of improvement within three days of the start of homoeopathic treatment with Ars, Phos etc. Since ICC is known to occur with a high frequency in the siblings, it is interesting to report that the prophylactic treatment of the mother during pregnancy and then of the child after birth succeeded in three couples, one of whom had earlier lost five sons to ICC.

President Radhakrishnan's ADC, who had suffered migraine for over 20 years and resigned in disgust when he did not get relief even with the treatments in Germany & U.K., was cured with Lachesis.

A number of cases with confirmed diagnosis of psoriasis were homoeotreated satisfactorily. The MD in Pharmacology and Dean of Dharwar Medical College in Karnataka, after reading the book **Molecular Homoeopathy** [4] came all the way by air for treatment of psoriasis and experienced relief within an hour of the homoeodose of Psorinum-1M and "euphoria" on overnight crust shedding.

An army Colonel had to fly in non-pressurized aircraft during 1947-48 Indo-Pak war and developed labyrinth vertigo. Ever since he suffered giddiness & reeling sensation whenever he lay down in bed, turned on side or bent down. A number of E.N.T. experts were consulted and all sorts of tests were done without relief. He took Nat. Sulph 1M in August 1974 on a Friday and did headstand on Sunday.

A four-year girl child was treated in the advance institute of Scientific Medicine for acute Idiopathic Thrombocytopenic Purpura (ITP) in 1993 with 2mg/Kg body weight prednisolone and later with 9 gm/day for 5 days immunoglobulin Ig G, then with Chinese medicine. In April 1997 she again had an acute episode, with platelet count <5000/mm^3. Please note that ITP is so serious a disease that a patient can internally bleed and collapse while talking! The homoeo-treatment with *Lach* raised the platelet count gradually from <5000 through <10000 on third day and then 33000, 79000 to 120000 tested weekly, rising later to 140000. The second case of ITP had platelet count <5000 five days after receiving 1500 mg prednisolone over 3 days in a referral Institute (PGI, Chandigarh). But responded well to homoeotreatment with *Lachesis* starting 1 September 2001. The platelet count rose to 14000, 25000, 1.3 lac and 3.39 lac after 4, 10, 24 and 45 days' treatment.

A teacher in our Nursing College lost her fiancé in the 1971 Indo-Pak war and developed Thyrotoxicosis complicated with Exophthalmos and Amenorrhea. The treating endocrinologist advised her to learn to live with it. But after homoeocure with Thyroidinum she married and had two children.

Out of the several cases of arthritis and spondylosis the most striking one was that of general spondylosis threatening extremities and requiring urgent surgery. The homoeocure with Rhus and Calc carb gave her permanent relief.

A senior executive was admitted for surgical removal of a solitary thyroid nodule. On learning of the possible homoeocure he left the hospital and was actually cured with Calc carb. The prolapsed uterus in the third stage advised Thomson correction was rectified homoeopathically Lilium Trig. Several cases of renal stone and of viral hepatitis with jaundice were also homoeo-treated; the Australia antigen test undertaken in one case became negative after homoeotreatment. A case with confirmed diagnosis of active Idiopathic Ulcerative Procto-Colitis with ulcers in rectum and sigmoid colon and having passed blood with stools for years was cured with Phos and Merc. Earlier his sister had died in 1983 of ulcerative colitis and his family had given up hopes for his survival.

Among several cases of asthma, the most challenging was that of a young girl who had suffered for a decade with asthma, hives and remittent fever, occasionally spending the whole nights sitting. When Wysolone and Asthaline did not give adequate relief her treating allopathic physician sent her to me and she was cured with Ars, Ipec and Sepia. A case of Progressive

Systemic Sclerosis (PSS), two cases of Sarcoidosis and few cases of ESRD (end stage renal disease) were also treated homoeopathically. With homoeotreatment of PSS the 'progressive' disease process regressed, tongue could protrude and deformity of hands rectified. Known side effects of allopathic treatment of Sarcoidosis with Acticort (40mg OD) were told to the patient as hyperglycemia, hypertension, hyperacidity, renal failure etc., needing regular tests and treatment. Homoeotreatment of ESRD lowered the serum Creatinine and Urea to safe levels, avoiding dialysis.

On 20 Dec'96 a 44 year old lady from Bokaro came to me, as a last resort, with a News Paper clipping about my nomination for a Nobel Prize, given by the Professor of Gastroenterology, CMC Vellore. She was a known case of HBV cirrhosis (biopsy proven) with HBsAg +, HBeAg +, ascites +, grade II varices x 4 column, 2.5 cm hyperechoic lesion (? hepatocellular carcinoma), coagulopathy (not corrected by vit. K) preventing FNA, splenomegaly, irritated bowl syndrome, etc. With homoeopathic treatment she is still (August'03) alive and well. A case of HCV cirrhosis with HCV reactive and shrunken liver but HBsAg -ve, is under homoeotreatment for the past over two years since 14 April'01 and doing well.

Potencies used were 30c, 200c and 1000c, all far beyond the Avogadro's limit of 12c. But in my latest view [5] the 15c followed, if and when required to change the potency, by (14c+16c) mixture suffice for clinical use, unnecessitating all other potencies available in the market.

These my few but convincing personal observations corroborate the overwhelmingly huge mass of persuasive evidence collected by innumerable homoeopaths all over the world during the past over two centuries that homoeomedicines do cure even in high potencies with no molecule of the original drug in them. Clearly some molecules of diluent medium (lactose, water, and ethanol) act curatively, suggesting a new scientific phenomenon bypassing the Avogadro's law.

3.3 *Controlled animal experiments*

To allay the objections that the action of high potencies with no molecule of the original drug provides artificial sense of relief due to faith in the physician and is speculative, we conducted controlled animal experiments. This is because the animals do not respond to the placebo effects or to expert assurances.

3.3.1 *Alloxan induced diabetes in rats*

Diabetes mellitus was induced in Swiss Albino Wistar rats having 180 - 340 gm body weight, 80 - 120 mg/dl blood sugar and zero urine sugar with intra-peritoneal injection of 100 - 150 mg Alloxan per Kg body weight after over-night fast. The diabetic rats were divided into four groups of five each for treatment with: (a) 20m millesimal (equivalent to 30c centesimal) potency of Alloxan with 1000^{20} (equivalent to 100^{30}) fold dynamized dilution. (b) With 1000^{20} fold undynamized simple dilution of Alloxan. (c) Nothing, or 'sham' treatment with ethanol, since the first two dilutions were made in ethanol. Blood sugar in the rats of group (a), returned from the initial Mean ± S.D. 308 ± 129 mg/dl (range 179-501 mg/dl) to 90.1 ± 4.0 mg/dl in the normal range of 80-120 mg/dl after 44 days' treatment. It remained so without any further treatment up to 144 days of observation. In group (c) the Mean ± S.D. 276 ± 82.2 mg/dl (range 189-389) first rose to 344 ± 65.6 mg/dl, then showed a delayed slight fall but always remained significantly (t - test, $p < 0.001$) above the normal range. The (b) group showed no fall with 1000^{20} fold-undynamized simple dilution of Alloxan from day-7 to 25, or with 20m potency of Streptozotocin (another diabetogen) from day-28 to 55. But the treatment with 20m Alloxan potency from day-58 to 116 showed significant curative fall from 325 ± 148 mg/dl to 176 ± 51 mg/dl. Research

workers at the Central Council for Research in Homoeopathy, New Delhi [10] have confirmed and extended these observations.

In these experiments, we had knowingly put those diabetic rats in the treatment group (a) whose blood sugar was highest, so as to demonstrate the curative effect of the homoeopotency very strikingly. This, in a way, is an improvement over the Double Blind Drug Trials, wherein random selection is used for forming the various groups.

3.3.2 *DMBA induced toxicity & cancer in mice*

The Alloxan is a primary diabetogen since it itself affects the beta cells of the island of Langerhans in the pancreas. Unlike Alloxan, DMBA is not a primary pathogen since its metabolites, not itself, induce the basic pathology. Its incubate with microsomal enzymes of mouse liver, instead of DMBA itself, was therefore the starting material for preparing the test solutions of 20m potency and 1000^{20} - fold undynamized simple dilution.

The DMBA pathology in Swiss albino mice was induced by subcutaneous injection of 0.75 mg of it. The 50% survival period SP-50 (period for half the mice in the group to die and other half to survive) was 144 days for the group of 20 mice treated with dynamized 20m potency as against 36 days for the 20 mice group treated with undynamized 1000^{20} fold simple dilution. The 10% of mice in the latter group, but none in the former, also developed a fibrosarcoma at the site of DMBA sub-cutaneous injection.

3.4 *Which is miraculous homoeopathic cure or failure?*

Homoeopaths often feel elated and proudly claim a "miraculous cure" of some patient who did not get adequate relief with long allopathic treatments earlier. The above cases, however, show that once the symptom totality of a case fits well with a homoeopathic medicine the disease is cured irrespective how difficult-to-cure, complicated and incurable diagnosis or hopeless prognosis might be under the Modern Scientific Medicine. Therefore such homoeocures are only natural expectations, which should not surprise any one and hence need not be taken as a 'miracle'. The homoeophysician instead should be curious to know and investigate when a well indicated homoeomedicine fails.

4. **New scientific phenomenon discovered and Avogadro's law bypassed**

According to the modern Physics and Chemistry the mechanical processes of forceful agitation, like trituration, stirring or succussion should have no effect on the quality or chemical properties of the solution of a solute in a solvent. That is, the chemical properties of the final solution should remain identically the same whether it is prepared simply by swirling or by using forceful dynamization or agitation at each step of dilution.

These animal experiments, however, establish that the dynamized homoeomedicines do cure even in high potencies when no molecule of the original drug can be present in the dose but undynamized simple dilutions of the same extents have no curative effect. The inescapable conclusion is therefore thrust on us that the agitating mechanical dynamization processes of forceful triturations in lactose and impacted succussions in water and ethanol for preparing the homoeopotencies hold the key. These are unique only to Homoeopathy and have not been investigated by ortho-sciences like Physics and Chemistry.

The action of high potency homoeodrugs as established above by these animal experiments and homoeomedicinal cures of human patients, throws up a challenge and points to a new scientific phenomenon. The underlying new phenomenon is the induction of chemical specificity of the solute drug molecules into the molecules of solvent medium via dynamization processes.

Thus the molecules of the diluent solvent medium (lactose, water, ethanol) acquire and later mimic the chemical specificity of the solute drug molecule, to thereby themselves act as the therapeutic agent. The dose therefore contains plenty of medicinally active diluent molecules, removing for good the perennial conceptual impasse created by Avogadro's law [11]. Revision of the physical basis of the 'chemical specificity' of a molecule becomes necessary, however.

5. **Physical Bases of chemical specificity & recognition of molecules**

Molecule is the unit of chemical reaction. Among the given molecules, under the given conditions, the same chemical reaction occurs unmistakenly. Therefore every molecule has a characteristically unique 'chemical specificity' representing its chemical properties. What is the physical basis of the chemical specificity of a molecule and how does it recognize other molecule(s) without making mistakes?

Spectrophotometry identifies an atom/molecule by its electromagnetic spectrum because no two different atoms/molecules and no atom/molecule in no two different energy states can emit the same electromagnetic spectrum. This is because the energy quantum for every spectral line in the spectrum is uniquely characteristic of the atom/molecule and its energy state. But the same very outermost valency electrons produce both the electromagnetic spectrum as also the chemical bonds. Molecule is the unit of chemical reaction and chemically exchanged energy between two interacting molecules is uniquely characteristic of the molecule pair. Therefore chemically exchangeable energy-quantum is the new physical basis of the chemical specificity of a molecule.

The chemical and biochemical discriminatory mechanisms recognize a molecule in two steps: *first*, of physical bonding via complementary 3-dimensional structures and *second*, of exchanging the energy dE specifically characteristic of the recognizer-recognizee pair. The first step exercises a *negative recognition* and the second constitutes the *positive recognition*. The first step can be certain only to tell that the molecule not binding to the receptor for the molecule A is not A. But the second step identifies positively via the chemically exchanged energy dE particularly specific of the molecule A.

If a molecule B can be induced to carry the exchangeable energy of A, the discriminatory machinery can be fooled to treat B as A, as for example happens during the action of a homoeodrug here [11-13].

6. **Mechanism of the homoeodynamization processes**

The molecules of lactose, water and ethanol have one and only one thing in common, namely the -OH group radical. The oxygen atom in the -OH group, due to sp^3 hybridization, has four equivalent valency orbitals. Two of these have bond pair electrons and the other two unshared lone pair electrons. The latter having no definite higher energy levels, can be raised, in small steps, to any desired energy level and hence play the basic role here. The organic solvent DMSO (Dimethyl Sulphoxide) has lone pair electrons but no -OH group and does not serve as a diluent medium [11-13], emphasizing the role of the lone pair electrons of the -OH groups.

During forceful triturations and impacted succussions the outermost electron shell of the solute drug molecules comes repeatedly in close proximity with those of the diluent molecules. This induces *resonant promotion* of the lone pair electrons of the diluent -OH groups, in small steps, to energy levels of the chemically active electrons of drug molecules. The diluent molecules thus acquire the chemically exchangeable energy and hence the chemical specificity of the drug molecule to get "potentized" with the drug. During serial dilutions of potency preparation the original drug molecules get eliminated and the diluent molecules resonantly

promoted by them take over the resonant promotion of the unpromoted diluent molecules [4, 11-13]. These considerations have experimental support [14, 15].

6.1 *Supportive experimental evidence*

Smith & Boericke [14] studied the CH_3-, CH_2- and -OH peaks in the Nuclear Magnetic Resonance spectra of ethanol, unsuccussed and succussed dilutions of sulphur in ethanol. Only the -OH peak of only the succussed potency spreads and reduces in area under the curve. No modern science can explain this observation which in our theory however, follows from the resonant promotion of lone pair electrons of -OH groups in the potentized ethanol [14].

The Laser Raman Spectral peak [15] of diluent alcohol disappears in succussed dilution of Potassium Dichromate and reduces in height in that of Ammonium Nitrate but a new peak of the solute appears in both cases. These results cannot be explained by contemporary sciences, but follow easily from the resonant promotion of the lone pair electrons of -OH groups of the potentized alcohol [4, 11-13].

7. **Power of high potencies & bypassing of the Law of Mass Action**

The therapeutic action of potencies higher than the 12th centesimal is exercised by the diluent ethanol resonantly promoted with the original drug. These medicinally active alcohol molecules can easily cross the water and lipid channels in biological barriers like blood-brain barrier, placenta membrane, cell & nuclear membranes to produce profound therapeutic effects. Large crude drug molecules of the low potencies cannot easily cross these barriers. This may be the basis of the homoeopaths' empirical observation that higher potencies are more powerful. It could also explain why high potencies could cure even some of those conditions which for the modern Scientific Medicine were incurable, difficult-to-cure or requiring surgery (see above). This also bypasses the Law of Mass Action according to which the chemical or therapeutic activity of a drug is proportional to its molar concentration, and hence the high potencies with no drug molecule should have no therapeutic action

7.1 *Inert substances become homoeodrugs on dynamization*

We can now understand why Sodium Chloride, though already present in the blood and food, becomes a homoeomedicine *Natrum mur* on dynamization. In the blood it exists as Na^+ and Cl^- ions but the *Natrum mur* is prepared by initially triturating the unionized NaCl in lactose. Similarly some inert substances turn into dynamized active homoeodrugs like *Lycopodium*, *Graphites*, *Carbo veg* etc.

8. **Other explanations of dynamization not satisfactory**

Chapter-3 of the book **Molecular Homoeopathy** [4] presents a critical review of other explanations of dynamization along with their rebuttal. This includes Dutta's "microisotopes" theory [16]. In Physics the "isotopes of an atom" are the atoms, which have the same '**atomic number**' equal to the number of protons in the nucleus and hence occupy the same (*iso*-) position (*-topas*) in the Mendeleeff's " Periodic Table of Elements", as the given atom. But there is NO 'Periodic Table of Molecules'. Hence there can be NO isotopes or microisotopes of molecules, which Dutta's theory is based on. In fact his microisotopes are non-existent entities and the term is a misnomer. See ref. [17].

9. **Basis of the homoeopathic Law of Similars**

All biological functions and phenomena in health or sickness are mediated via molecular mechanisms. Disease, being a state of altered health, is caused by an *unnatural* substance or "xenobiotic" affecting the strategic target biomolecule in the target organs/tissues, thereby changing the rates and/or routes of biochemical reactions and producing unnatural biochemicals,

tissue changes and organ pathologies. A natural substance like glucose or a hormone can behave xenobiotically if its concentration crosses the "normal range", or itself mutates into an 'autoxenobiotic'. The chemical specificities/properties of the affecting xenobiotic and affected biomolecule together with the exact physiological role of the biomolecule in health, determine the totality of signs and symptoms and their modes of variation with modifying factors to provide the "portrait of primary disease". It can serve to identify the xenobiotic causing the disease, natural or artificial (as of homoeodrug proving). The symptoms, being effects of disease, coexist with it. The new science of ***Xenobiology*** studies the total biological response, including objective signs and subjective symptoms, of healthy subjects to xenobiotics [4, 11-13]. This comprehensive science of ***Xenobiology*** includes as its particulars the Toxicology, Parasitology, Immunology &c. It provides the Materia Medica to the new scienec of ***Inductoxenopathy,*** which uses "induced xenobiotics" beyond the Avogadro's limit of 12c as medicines working on the homoeopathic Law of Similars, *turning killers as saviours.*

Allopathy, Ayurveda, Unani, Sidha &c form a group operaing on the *Principle of Opposites* Their medicines oppose i.e. suppress, neutralize, block or remove the products, effects and results of the disease process. Homoeopathy alone is a group by itself, working on the *Law of Similars*. Here, a high potency of that drug is given whose large doses in healthy subjects creat symptom totality similar to the patient. For example, digitalis is known to lower the heart rate in healthy persons. Its large repeated doses are therefore used in Scientific Medicine to control tachycardia. However, potentized digitalis is a homoeomedicine for bradycardia.

The symptom totality of a disease, in fact, indicates the total biological response of the *healthy subject in the patient* to the causative xenobiotic. It has two components: activation of the defence mechanisms against the antigenic determinants on the xenobiotic molecule, and the pathophysiology of the affected biomolecules, cells, tissues & organs. The potentized homoeomedicine D_x, prepared by resonantly promoting the diluent molecules D with the crude drug molecules X, contains a mixture of diluent molecules resonantly promoted with the antigenic and pathogenic determinants of X. The xenobiotic X′, crude drug X and the homoeopotency D_x carry similar chemically exchangeable energies and chemical specificities, hence elicit similar symptom totality. The homoeocure has two pronged effect: one of stimulating the immune response, and second of dislodging X′ from the disease complex MX′ formed with the biomolecule M, through competitive chemical exchanges:

$$MX' + D_x \approx MD_x + X'$$
$$MD_x \approx M + D_x$$
$$X' \rightarrow \text{biodegraded/ bioeliminated}$$
$$D_x \rightarrow \text{depromoted to} \rightarrow D\text{, the diluent molecule} \rightarrow \text{metabolized .}$$

Competitive chemical exchanges between the pathogenic and curative xenobiotic molecules are thus basic to the homoeopathic drug action on the Law of Similars. That is why only a very minute quantity of the potentized homoeomedicine is needed in actual practice. Wurmser [18] found that dynamized potencies of Arsenic and Bismuth increased their elimination from animal tissues. I have treated Arsenic toxicity with *Arsenic album* 200c, Opium toxicity with *Opium* 1M and Belladonna toxicity with *Bell* 10M. The support is also provided by the control of Alloxan induced diabetes in rats with 20m (30c) Alloxan and of DMBA toxicity in mice with 20m (30c) DMBA, presented above.

10. **The sub-molecular nature & seat of disease, medicine & cure**

10.1 *The molecule and beyond*

The foregoing discussions show that (a) the chemically exchangeable energy-quantum associated with a molecule is the physical parameter basic to its chemical specificity, which determines its chemical properties. (b) The primary cause of disease at the sub-cellular or even sub-nuclear level is the change in the chemically exchangeable energy-quantum associated with the physiologically important target biomolecule(s), which set in the changes in rates and/or routes of biochemical reactions. These then lead to the generation of morbid signs and symptoms as manifestation of the disease. (c) A disease causing 'xenobiotic', which is alien and unnatural to the organism, causes the change in the chemically exchangeable energy of the target biomolecule. (d) The homoeopathic dynamization processes resonantly promote the molecules of the diluent medium (lactose, water, ethanol) to acquire the chemically exchangeable energy-quantum of the molecules of the original solute drug. These diluent molecules then act as the therapeutic agent and mimic the chemical specificity of the original drug during the curative action of the potentized homoeomedicine. (e) The molecule of the potentized ethanol, because of its tiny size, competitively exchanges with the disease causing xenobiotic molecule from the molecular disease-complex. (f) In this process the original difficult-to-cure natural disease-complex is replaced with the easy-to-cure artificial disease complex.

10.2 *The nature & seat of disease*

Under the Modern Scientific Medicine (Allopathy) the terms like 'arthritis', 'sinusitis', 'conjunctivitis' etc are quite diagnostic of the disease and suggestive of the treatment, assuming that inflammation (*-itis*) is *the disease*. In Homoeopathy inflammation is *only a symptom*, which together with other concomitant symptoms involving different organs & tissues portrays the 'whole disease' i.e. inflammation, like any other symptom, is 'an effect or a result of the disease' and NOT the disease in itself. A single homoeopathic medicine cures the 'whole disease' if its symptoms elicited in healthy subjects as recorded in the Materia Medica are 'similar' to those of the patient under treatment.

In Homoeopathy disease is a "miasm", acute or chronic, indicating a pre-disposition, tendency or susceptibility. The chronic miasms are three: *psora* (tissue-inflammation), *sycosis* (tissue-growth) and *syphilis* (tissue-destruction). In our theory, however, a trait, tendency or susceptibility is of genetic origin that sets in, with the formation of a molecular 'disease-complex', when a pathogenic xenobiotic affects the strategic target biomolecule(s) of physiological significance, like a nucleic acid molecule. This introduces a change in the 'chemical specificity' or 'chemically exchangeable energy quantum' of the target biomolecule giving rise to altered rates and/or routes of chemical reactions, which in turn lead to the signs and symptoms as results and effects of the disease. This explains why homoeopathic medicines can cure even genetic and hereditary diseases, susceptibilities underlying microbial infections and allergies and even emotional traits. For example in Asthma, the pathogenic xenobiotic creates susceptibility to the allergen(s), which in its turn causes inflammation, and then narrowing, of the airways. Allopathy treats the narrowing and inflammatory components leaving the susceptibility uncured. That is why life long treatments are required. Homoeopathy goes deeper to cure the susceptibility to allergen(s) to remove inflammation and constriction of the bronchial airways.. Allopathic antibiotics kill the bacteria 'causing' the tissue inflammation. Homoeopathy removes the susceptibility to bacteria and cures the inflammation without killing the causative bacteria. Homoeopathy cures viral inflammation by removing susceptibility to the causative virus but Allopathy cannot cure it because it lacks specific antiviral drugs. Therefore our theory's primary cause of disease, namely the change in the chemically exchangeable energy of the target biomolecule, is sub-molecular and hence is prior not only to the Allopathy's concept of disease, namely the tissue-inflammation but also to the homoeopathic miasms. Both inflammation and miasm are the results of the molecular disease-complex.

10.3 *Hahnemann's Vital Force updated*

In all the above steps and processes the primary role is played by the invisible 'chemically exchangeable energy-quantum' of a molecule, which determines its chemical specificity. That is why molecules undertake chemical reactions and positive recognitions intelligently without making mistakes. It may therefore be taken as basic to the '**molecular intelligence**'. These ideas have the merit for updating the Hahnemann's concept of Vital Force, which J.T. Kent called the Vital Substance [19, 20]. This is because Hahnemann talked of the invisible 'spirit like disease' and 'spirit like medicine ' and of the cure, taking place at the 'spiritual level'.

11. **Deficiencies in World Health Organisation's definition of health**

The Modern Scientific Medicine (Allopathy) accepts the World Health Organisation's definition: "Health is a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity". Here "absence of disease is NOT health"! This is an internal inconsistency or self-contradiction, confusing the notion of health as well as of disease. It arises because for diagnosis under the Scientific Medicine a disease has to be advanced enough to create laboratory detectable biochemical abnormalities and/or biopotential variations and/or pathologic tissue changes out side the "normal range". And there is no way of ascertaining the exact normal value of the diagnostic parameter for the particular patient before sickness to compare with its value in disease. In the pre- or sub-clinical stage, the clinical laboratories report N.A.D. (no abnormality detected or no appreciable disease) but the patient suffers and has some subjective/mental and physical symptoms on which a curative homoeomedicine can be given to nip or abort the disease. Therefore, Homoeopathy can serve as an effective Preventive Community Medicine. Its scope of preventing diseases from progressing further to advanced dangerous stages is all-inclusive.

The other deficiency in WHO's definition is that it does not recognize the existence or achievability of the "supra mental health". No organized attempts have therefore been made under the Scientific Medicine based Health Care. However the Yoga practices of *pranayam* (breath control) and *dhyan* (meditation) have been shown to induce the rare abilities like intuition, self control on thought, assuming alpha and theta brain states at will, etc. Homoeopathy and *dhyan* help attenuate anxiety and other psychological components of disease.

12. **Unified holistic therapeutics *Navayurveda***

The 'similar medicines' of Homoeopathy working on the 'law of similars' and the 'opposite medicines' of Allopathy/Ayurveda &c administered according to the 'principle of opposites' can be given together inter-currently with advantage to the patient because their modes and planes of action are different. The Yogic pranayam and dhyan help control the psychological components of disease. A judicious combination of these three with other supplementary and complementary modalities of restoring and promoting health constitutes the new integrated holistic therapeutics ***Navayurveda***. Here allopathic medicines are given not to suppress the morbid symptoms but make the basic homoeocure comfortable by controlling the symptoms within the tolerable limits which varies from patient to patient. With the progress of homoeocure the allopathic drugs are tapered off. Thus the need or use of allopathic drugs is drastically reduced but the curative and preventive potential are greatly enlarged. The general quality of health is significantly improved by nipping the diseases in their early pre-clinical stages. The incidences of advanced, dangerous as also iatrogenic diseases are reduced, and so is the need for expensive centres for bypass and organ transplant surgeries. The national governments even with limited resources can well afford to assume the responsibility of public health under this cheapest yet most effective Homoeopathy based Health Care Delivery System. The rich advanced countries presently under the health care

of Allopathy or Scientific Medicine have to actually experience, to believe in, the better quality of health achievable via Homoeopathy and Navayurveda.

13. **Selecting the right potency for clinical use**

Every dynamized potency of a homoeopathic medicine is finally raised in ethanol (ethyl alcohol). Potencies higher than 24X, 12c or 8m comprise two types of alcohol molecules, the ones resonantly promoted with original drug molecule and the unpromoted normal molecules. The potencies lower than 12c, in addition, also contain some original drug molecules. The unpromoted normal alcohol molecules have no effect. The original drug molecule and the alcohol molecule resonantly promoted with it carry the same “chemically exchangeable energy” hence have similar chemical effect or behaviour. Both can be and have, in fact, been used for “drug proving” as well as for treating “similar” symptoms of natural diseases according to the Law of Similars.

But in actual practice the patient dose should not contain any molecule of the original drug because the toxic metabolites produced during its biodegradation are unsafe whereas those (water and carbon dioxide) of the resonantly promoted alcohol are safe. It is therefore logical to use only potencies higher than but nearest to the 12c. In actual practice one may start the treatment with 15c or 10m to be followed, if and when needed, with a mixture of (14c + 16c) or (9m + 11m) [5]. This is because the Nuclear Magnetic Resonance spectrum of a drug potentized in alcohol is not a sharp thin line but has a spread indicating the presence of promoted molecules with exchangeable energies higher as well as lower than the test drug molecule. Therefore when the utility of the molecules present in 15c or 10m is exhausted the (14c + 16c) or (9m + 11m) mixture offers a wider range for curative action.

At present a very large number of potencies is available in the market to confuse the practitioner. To start with, Hahnemann used the mother tinctures of original drugs but found them unsatisfactory and hence introduced potentized dilutions, first on the decimal (X), then centesimal (c) and later 50 millesimal scale using 3c as the starting base. This author has introduced and used the new millesimal (m) scale effecting 1000-fold dynamized dilution at every stage. And Kadiri Koya is reported [21] to have prepared "quadric" potencies by a method in all other ways similar to that of Hahnemann's 50 millesimal potencies. Instead of 3c he uses the 30c, 200c or higher up to CM potency as the starting base. The quadric potencies are denoted as Q30\1, Q200\6 etc.

The popular use of 15c and (14c+16c), or still better of 10m and (9m+11m) potencies, will drastically reduce the manufacturing cost of useful potencies in clinical practice and obviate the need of all other innumerable potencies higher or lower, including the 50 millesimal and quadric potencies.

As mentioned above the perennial criticism of Homeopathy by scientists is the use of potencies higher than the Avogadro's limit of 12c. The dilutions in Kadiri Koya's Quadric Potencies are higher than even the 50 millesimals. These will therefore only accentuate the scientists' criticism of Homoeopathy [22, 23].

14. **Clinical drug trials on new potencies**

Under the aegis and financial support of the "Association for Scientific Research in Homoeopathy", the Kerala State Homoeopathic Cooperative Pharmacy Ltd. has supplied the carefully prepared 14c, 15c & 16c potencies of six medicines: Arsenic album, Belladonna, Bryonia, Calcarea carb, Rhus tox, and Sulphur. These are now available from M/s Duggal Homoeo Store, SCO 2462, Sector 22C, Chandigarh-160022 in one-dram vials of 20 grade medicated globules free at the counter, with postal charges as applicable. Initial trials at multiple

centres so far have been consistent with expectations. But curious and interested readers are encouraged to get these medicines and use them in their clinical practice to satisfy themselves. The 14-16c or 9-11m potencies of other medicines can be arranged from the drug manufacturers. As already described [5], these potencies can also be easily prepared from the 6X potency readily available in the market.

15. **Summing up remarks**

i. The science of Homoeopathy is beyond the contemporary sciences. It has so far been disregarded as 'unscientific placebo therapy' largely because of the conceptual inadequacy of the sciences themselves to discover and negotiate the new scientific phenomena underlying its art.

ii. The WHO 's Alma Ata declaration for "Health for all by 2000" adopted in 1978 will never be achieved under the Allopathy based Health Care. Things will become worse after 2005 when, with GAT in place, prices of allopathic drugs will steeply rise beyond the reach of most people.

iii. With Homoeopathy based Health Care, however, even the poor developing countries with limited resources could provide health care for all.

iv. Homoeopathy provides for the best form of Preventive Community Medicine, nipping diseases in their pre- or sub-clinical stage when the allopathic clinical tests are negative.

v. With Homoeopathy based Health Care in place, there will be reduced number of cases with dangerously advanced diseases and of those requiring bypass surgery and organ transplants. The quality of health will appreciably improve even in rich countries, which has never been experienced before under Allopathy.

vi. Navayurveda offers the ideal form of combined therapeutics with advantage to the patient.

vii. The use of 15c and (14c+16c), or still better of 10m and (9m+11m) potencies may be popularized to simplify clinical practice of Homoeopathy.

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Unified Theory-9: SYMBIOSIS OF SCIENCE & PHILOSOPHY

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Abstract: The Einstein eqn. $E=mc^2$ compellingly needs Unified Theory's 'sharmon medium' as the *basic substance* to compose all forms of energy E & mass m otherwise E & m cannot interconvert. The all-composing sharmon medium pervades all space and all physical bodies in the universe because the sharmon with ~ 10^{-33} cm diameter can pass through the inter-atomic space even in the densest solid and between the orbital electrons of any atom. Sharmon comprises two elementary cosminos: +ve positrino & -ve negatrino. Sharmon has 0 or 1 spin and is a quantum of intelligent consciousness. The electric charge and mass of cosminos composing the sharmon relate to the manifestation of matter in the universe and the intelligent consciousness of Sharmon to that of mind and intellect. The eternally conserved most basic total cosmic substance constitutes an eternally existing 'primordial cosmic body', the '*Megovum*', meaning the 'big egg' for mega (extremely big) and ovum (egg) as it gives rise to all in the Cosmos including, but not limiting to, this perceptible material universe. The megovum, like the *Brahm* of Adwait scriptural philosophy, does not originate or come from anywhere but has always existed in the entire past and will always exist in future. Intelligent sharmons turn the Megovum as also the all-intelligent *Megamind* managing the Cosmos with inviolable basic laws, rejecting the Quantum Theory's Uncertainty Principle. The resting megovum comprises 0-spin sharmons only. So it is imperceptible and has no motions & changes while universe is perceptible and has all sorts of motions & changes. See many more interesting topics discussed below.

1. **Introduction**

The 'symbiosis' is a Biological milieu, wherein two different organisms exist together with mutual advantage. All through the ages Science and Philosophy have stood far apart as two different mutually exclusive and incompatible domains of knowledge. In this Chapter scientific logic is used to realistically review and rationalize the foundations of science & philosophy to make them mutually compatible and consistent, creating a Science-Philosophy Symbiosis for the first time.

According to the prevalent and generally accepted norms and definitions, confirmed and verified information is knowledge (*gyaan)*; and the rationalized, systematized, verified and verifiable knowledge is **science** (*vigyaan*). Also in the ancient philosophies the ***gyaan*** (knowledge) acquired through the senses, mind and *buddhi* (discriminatory intellect) becomes ***vigyaan*** i.e. *vishist gyaan* (special knowledge) when it is confirmed, verified and verifiable by *anubhooti* (experience).

The philosophies and science *should* ultimately seek after the same ultimate objective reality and therefore be mutually consistent and compatible. Their continuing incompatibility calls for an extensive review of their respective foundations so as to forge a symbiosis of the two. Most curious of the frequently asked questions, which has exercised in the past, and is still engaging, the minds of the philosophers and scientists alike is about the most basic substance, which composes all 'things and beings' in the universe. This Chapter therefore first considers the nature of the '**basic substance**' from the viewpoints of both the science and philosophy.

In this context, the Indian philosophies of *Ishopnishad, Saankhya Darshan, Adwait Vedaant* and *Gita* mark the heights of imagination or the depths of intuitive thought. The chapter will return to these philosophies later below.

Our Unified Theory presented in this book unifies physical concepts arising largely from the all-composing and all-pervading space-medium, the 'sharmon medium' as the 'basic substance'. It is composed by the new particle '**sharmon**', named after this author. The Sharmon also is the *quantum of intelligent consciousness*. Thereby Unified Theory unifies the animate and inanimate realities. Let us first develop science's point of view step by step as presented in the earlier Chapters of this book.

2. **The Einstein equation $E = mc^2$**

For a child there is no commonality between the solid ice and the gaseous steam. But with the growing years the child makes out that it is the same liquid water that can be turned into ice cubes on cooling in a fridge or into steam whistling out from a pressure cooker on heating. On further probing it is found that solid ice, liquid water and gaseous steam are inter-convertible because all the three are made of the same *invisible* water molecule H_2O comprising two atoms of Hydrogen (H) and one atom of Oxygen (O). The H_2O molecule is subtler than and common in ice, water and steam. Hence there is the composition continuity and inter-convertibility of the three. Let us push this analogy deeper.

Right up to the early twentieth century it was generally believed that matter and energy are entirely different and distinct, which could not be inter-converted. However, one form of energy was known to change into another form. As for example mechanical energy was known to convert into heat while rubbing the hands and into electric energy on running a turbine, but never into mass or vice versa.

In 1905, however, Einstein gave the thought provoking equation $E = mc^2$ (c squared, c being the velocity of light ~ $3x10^{10}$ cm/sec, 10^{10} = 1 followed by 10 zeros). It described and predicted the inter-conversion of energy E and mass m, one gram of mass generating about $9x10^{20}$ ergs of energy.

It explained the results of particle colliders and observations on the creation of the pair (e^-e^+) of the material particles, electron e^- and positron e^+, from, and annihilation into, the photon(s) of light energy. This equation also paved the way for the developments of the atomic and hydrogen bombs. It has since been repeatedly verified by experiments and found to be correct.

An intuitive consideration of the Einstein's equation further suggests the existence in Nature of some 'physical substance', which is subtler than and common in both energy and mass. It therefore composes all forms of energy E and mass m in the Cosmos. Otherwise various forms of energy among themselves and/or with mass could not inter-convert.

3. **The basic physical substance**

What is that 'basic physical substance, which composes mass and energy'? What is its nature? The modern Physics has no idea or clue. This is because Einstein stopped and with him other physicists also stopped fully satisfied at, and did not go beyond, the mathematical equation $E=mc^2$, to inquire into the physical nature of the basic substance. But let us proceed further.

3.1. *The physical basic unity*

The light or the radiant energy, being essentially an electromagnetic wave, is compositionally the same as the medium that propagates the electromagnetic wave. This is analogous to the water wave being composed by the same water on or in which it moves and which fills the pond. It follows that in the real objective Nature there are intrinsic unity and continuity in the compositions of all forms of mass, energy, radiation and the space medium, which propagates light. *Here the light medium in space emerges as the **basic substance** composing all physical entities in the Cosmos.*

Is this space medium continuous or discontinuous i.e. particulate? Actually, ours is the universe with ubiquitous granularity of compositions at all levels. And a particle cannot be composed by a continuum separate from it. Moreover a continuum, if existent, would retard, nay prevent the motion of heavenly bodies and even of photons through it, which has never been

actually observed. According to Unified Theory and the common sense, therefore, the new space medium also is composed by a new particle, say, **sharmon**, named after this author. It indicates that the '*sharmon medium*' is not the old classical ether, which had to be 'extremely more rigid than air' as it had to propagate light (wrongly assumed as longitudinal elastic wave like sound) much faster than sound.

4. **The space, time & spacetime continua**

Einstein, to develop theories of Relativity, had discarded the light propagating medium as superfluous and unnecessary for his mathematics and he introduced the 4-dimensional 'spacetime continuum' to propagate light and gravitation.

But an intuitive thought reveals that the concept of space evolves from the successive perceptions of "there, here, there" and that of time from those of "then, now, then" arising from the successive motions and changes of the objects in the surroundings. If a child were to grow with no motions and changes in the surroundings, he/she would therefore have no successive perceptions of "here, there; now, then" and hence no concepts of space and time.

The "time arrow" moves only forward and never backwards due to irreversibility of the natural processes of change generating the time concept. For example, all the animals always change from childhood through youth to old age and all the plants from seed through seedlings to trees. The day always changes from morning through noon to evening and the sun always moves from east to west. So on and so forth. These and all other natural processes proceed only in one natural direction and are never reversed.

The concepts of space and time, being so abstract and intangible, cannot fuse into any concrete tangible spacetime continuum to propagate light and gravitation.

Moreover a spacetime continuum, if existent, would retard, nay prevent the motion of terrestrial and heavenly bodies and even of photons to propagate light through or across it, which has never been actually observed. Therefore Einstein's 4-dimensional 'spacetime continuum' is unreal and non-existent. Similarly the 4, 5, 10, 11,….., 32 dimensional spacetime continua are mere mathematical constructs and theories based on them unrealistic.

5. **The nature of light**

In fact, Einstein was not clear about the real nature of light in 1905 when he formulated the theory of Special Relativity or gave the Nobel Prize winning explanation of the photoelectric effect and remained so unclear ever thereafter. This he admitted towards the end of his life in a letter dated 12 December 1951 to M. Besso thus: "*All these 50 years of conscious brooding have brought me no nearer to the answer to the question: What are light quanta*?"

But why did he miss the nature of light? Because the light wave, like any other 'wave', exists only in its propagating medium and that he had wrongly dismissed.

After discarding the light medium Einstein could not think properly about the wave-nature and inherent wave-quantum unity in radiation. The confusion created by the dismissal of the medium for light wave got confounded when Quantum Theory split the wave-quantum **unity** of radiation into wave-or-quantum **dualities** with the precarious support of the Principle of Complementarity. The following limerick aptly puts forth the fallacy of relativity theories:

"There was a fairy, named Miss Bright,
Who could travel much faster than light.
She departed one day, in an Einsteinian way,
And came back on the previous night"

According to Unified Theory, however, the electromagnetic wave energy quantum, after emission from the source is initially received by a sharmon in the medium, which rises to its 1-spin state and thus marks the effective '*origin*' of the electromagnetic wave. And the last 1-spin sharmon of the medium, which finally transfers the wave energy quantum as a 1-spin photon to the target and itself returns to the 0-spin state, marks the '*terminus*' of the wave.

From origin to the terminus, the 0-spin sharmon-packet energy quantum per unit frequency cycle is propagated along a transverse electromagnetic wave in the sharmon medium contiguously through 1-spin sharmons, which do not bodily move but provide a physical carrier.

Every 1-spin sharmon participating in the process of propagation returns to its 0-spin state on transferring the wave energy quantum to the contiguous neighbour in the medium or to the target finally. However, the transmission, always and throughout, is a '**wave-quantum UNITY**'. Only the photonic energy is propagated but this energy is of the propagating 1-spin sharmon, the two together constituting the 1-spin photon, which is an energized 1-spin sharmon. That is, after emission and before absorption it is an energized 1-spin sharmon always at any and every instant.

Since the spin of the emitter or absorber does not change, what is emitted or absorbed is NOT the 1-spin photon as a whole but only its energy comprising 0-spin sharmons. So only the photonic energy comprising 0-spin sharmons, and *not the 1-spin photon as such*, is emitted, propagated and/or absorbed.

6. **The basic elements**

Propagation of the transverse electromagnetic wave in the sharmon medium demands that the sharmon particle is polarizable and is composed by an electrically positive **positrino** and a negative **negatrino,** the two most basic non-composite elements. These constitute all entities in the Cosmos. Hence, are given their common name "**cosmino**". The 0-spin sharmon composes all forms of energy and neutral mass and the positively or negatively charged mass is composed by the respective positive or negative cosminos. A cosmino's diameter is 1.6×10^{-33} cm, mass 2.59×10^{-48} gm, electric charge $\pm 1.37 \times 10^{-30}$ esu and spin is half. Sharmon, comprising a positrino and a negatrino, has mass 5.19×10^{-48} gm and spin 0 or 1.

The 1990-Physics Nobel Prize was announced in October 1990 jointly for American Professors J.I.Friedman and H.W. Kendall with Canadian Prof. R.E.Taylor, for their 'revealing' quarks in proton, as the most basic, non-composite constituents of matter. This author contested their conclusions in a globally reported interview to the Press Trust of India (PTI) on 4 Nov'90; vide Appendix-4. This is because the book **Unified Physical Theory** (COSMO, New Delhi) already published in January 1990 had predicted quarks to be composite, non-elementary and irrevealable as intact isolated units even within a proton, which in Quarks Theory is composed by them.

Interestingly, the UPT's predicted compositeness of quarks got first experimental support in the early 1991itself from quarks' compressibility revealed in the measurements of electric and magnetic polarizabilities of proton and neutron. Later reports in 1995 & 1996 on the proton-antiproton collisions conducted in the American Fermi laboratory by D-Zero & CDF collaborations of over 400 globally chosen scientists each showed that some quarks could be transiently created. But in UPT these were assembled from cosminos and sharmons composing the kinetic energy of the colliding particles.

A quark, being thus compressible and assembleable, cannot be the non-composite element, which according to definition "composes other particles but it itself is non-composite". The Quarks Theory was, in fact, formulated to bring order in, but it itself led to over hundred, elementary particles, making the term "element" meaningless. The Supersymmetry doubles this number of elements by adding a super partner to every one of the above more than hundred of them. ***Interestingly, none of the over 200 particles of the Modern Standard Model satisfies the definition of an element.*** In contrast, the UPT has only two basic elements, the positive and negative cosminos.

The elements (*tattwa*) of *Adwait* philosophy emerge as five states of aggregation of the sharmon medium thus: *Aakaash* (space, sharmon medium), *Agni* (fire, sharmon-composed energy), *Vaayu* (air, cosmino-composed molecular gases), *Jal* (water, cosmino-composed molecular liquids), *Prithvi* (earth, cosmino-sharmon composed molecular solids). In *Adwait* every one of the five Great Elements (*Mahaabhute*-s) is a union of the 'same-named' subtle *tanmaatraa*-s (*tad* = that + *maatra* = alone). For example, *Aakaash mahaabhute* = 1/2 *Aakaash* + 1/8 *Agni* + 1/8 *Vaayu* + 1/8 *Jal* + 1/8 *Prithvi tanmaatraa*.

The Sanskrit term *tattwa* is equivalent to English 'essence'. Hence there is no term or concept equivalent to scientific term 'element', which connotes the entity composing other entities but it itself being noncomposite. The '*Brahm*' of *Adwait* philosophy, curiously, satisfies the scientific definition of an element because it composes all in the universe and is itself non-composite.

7. **The all-composing & all-pervading basic substance**

Two cosminos and the sharmon composed by them compose all forms of mass, energy, energy quanta and particles of matter and antimatter. Sec. 8 below shows that Sharmon is also the quantum of intelligent consciousness.

The all-composing sharmon medium pervades all space and all physical bodies in the universe because its composing ~ 10^{-33} cm sharmon is so small that it can pass through the inter-atomic space even in the densest solid and between the orbital electrons of any atom or molecule.

Due to its nature as a kinetic gas, the sharmon medium approximates as a 'kinetic continuum' effectively obliterating the interstices between randomly moving constituent sharmons in fleeting contacts. It fills all space leaving no 'vacuous space' with 'nothing inside' and rules out the existence of absolute vacuum for any significant period of time. Its time-averaged inter-sharmon distance of ~ 10^{-5} cm compares with the Mean Free Path for the real gasses (e.g. for Hydrogen 1.12x 10^{-5} cm, Oxygen 0.64x 10^{-5} cm, Nitrogen 0.595x10^{-5} cm). The sharmon medium contains ~ 10^{15} sharmons per cm^3. And its average mass density is 0.519 x10^{-33} $gm.cm^{-3}$, vis-a-vis 3x10^{-31} $gm.cm^{-3}$ for the Steady State Cosmology and 1.293x10^{-3} gm cm^{-3} for air.

The Unified Theory cosmology comes near to that of the *Adwait* philosophy wherein only *Brahm* is the all-composing and all-pervading single entity. In *Ishopnishad* every particle in the universe is inhabited by *Isha*, suggesting a second to compose the inhabited particles. But in *Adwait*, like UPT & Unified Theory, the composing and inhabiting entity is one and the same.

The *dwait* (dualism), *vishishtaadwait* (particular or qualified monism) and the *adwait* (monism) philosophies are three different ways of looking at the same reality. For the composition of the ocean by water molecules we can have three equally valid descriptions. The water in the vast ocean and its composing water molecules can be regarded as two different entities (*dwait*, dualism). We can see a continuity of composition from the ocean water to the individual molecules (*adwait*, monism). We can also note that the compositional unity of ocean water and composing molecules also retains the particular individualities of the two: the ocean water and water molecule within the inherent ocean-to-molecule continuity (*vishishtaadwait*, particular monism).

But the fact always remains that even the smallest 'sample' of the vast ocean retains and manifests the basic characteristic properties. Like the all composing and all pervading universal *Brahm* the individual *aham* or i-ism (*Aatmaa*) of *jiva* has the basic nature of *sat-cit-aanand* (blissful awareness of self-existence), although the *Brahm* is unlimited and *jiva* is limited.

8. **The Molecular Intelligence & Consciousness**

Molecule is a unit of chemical reaction. The chemical and biological discriminatory machineries recognize molecules without mistake. And a molecule makes no mistake in its own chemical behavior and in recognizing, or in being recognized by, other molecules.

The process of molecular recognition occurs in two steps. In the first step there is a physical fit in the three dimensional structures of the recognizer and recognizee molecules. The second step exchanges the energy quantum, which is uniquely specific for the recognizer-recognizee pair. The first step gives a negative recognition, since the molecule not binding to the receptor for A can be 'Not-A' definitely. Second step gives the positive recognition. Among the various molecules binding to the A-receptor to varying extents only 'the A' exchanges the energy quantum specific to A. This points to the existence of atomic and molecular intelligence whose physical basis is the energy-quantum composed by 0-spin sharmons exchanged between the recognizer and recognized pair. Since intelligence is an essential attribute of consciousness, the atoms and molecules are associated with basic intelligent consciousness, and sharmon is the '***quantum of intelligent consciousness***'. The sharmon unites into itself the ultimate primal knower and known and hence is the **primal knowledge** or ***Brahm*** (Megamind), consistent with the profound commandment '***pragyaanam brahm'*** of *Aatreya Upanishad* (3/3).

9. **The Megovum and Megamind**

Relying on the Quantum Theory's Uncertainty Principle current theories of expanding universe invoke initial creation of matter in the universe from nothing, Big Bang theory in a single big explosion and Steady State theory in a continuous manner. In Unified Theory's Non-expanding Universe there is no initial creation of matter from "nothing" anywhere in the Cosmos, localized or universal.

The eternally conserved most basic total cosmic substance constitutes an eternally existing 'primordial cosmic body', the '**Megovum**', meaning the 'big egg' for mega (extremely big) and ovum (egg) as it gives rise to all in the Cosmos including, but not limiting to, the perceptible material universe. The **megovum**, like the ***Brahm*** of scriptural philosophies, does not originate or come from anywhere but has always existed in the entire past and will always exist in the entire future.

In its ground energy state the cosmic substance of the resting megovum was composed solely of the 0-spin sharmons only. In this state there were no energies, no momenta and no cores or carriers of energy & momentum and there were no transfers, propagations or exchanges of energy. As in the ***Brahm*** there were no motions and changes, no perceptions of 'there, here, there' and of 'then, now, then', no perceptible space or perceptible time. The absence of all motions is akin to the state of absolute zero temperature. But the zero-point thermal motions cannot be eliminated in the perceptible universe due to the Sharmon Medium's nature as a kinetic gas and non-zero spin cosminos and 1-spin sharmons.

For doing and creating any thing, adequate knowledge and enough power are needed. Therefore the 'all-capable' omnipresent *Brahm*, with extremely great intelligence, is omniscient and omnipotent. Since sharmon is the basic quantum of energy, neutral mass and of the intelligent consciousness the **Megovum** (extremely big egg) containing the eternally conserved 0-spin sharmon composed cosmic substance (sec. 14.9) is also the *purn* (complete) **Megamind** (extremely great intelligence) managing the entire Cosmos. The *jiva* is extremely limited in all respects. A glimpse of His (*Brahm*'s) extreme intelligence can be had from any of the minutest creation like a cell, a hair or a leaf.

10. **Creation of the universe from the Megovum**

It is a common experience that a part of pond water turns into solid ice in a severe winter and re-converts into liquid water on a rise in temperature. Similarly the actual perceptible universe is created from a part of the imperceptible megovum and later can dissolve into it. The cosmic substance composing the perceptible universe is neither created from 'nothing' when the universe is created out of the megovum nor does it disappear into 'nothing' when the universe dissolves into the megovum.

As the very first step for the creation of the material perceptible universe some dynamical instability became operational spontaneously in the Cosmos akin to the stresses and strains in a supersaturated vapour precipitating a phase change. Some scriptural philosophies ascribe this event to the wish of the all-intelligent & all-powerful megovum/megamind ***Brahm,*** to '*become many from one*'.

The opposed ½ -spins of the negatrinos and positrinos composing some 0-spin scalar sharmons in a part of the megovum became co-directional. This raised the sharmons into the 1-spin vector state, which then attracted the 0-spin sharmon aggregates to create 1-spin energized sharmons or 'photons'. Some 1-spin energized sharmons created the 2-spin gravitons. On the other hand, the ½ -spin cosminos of some 0-spin sharmons separated and got attached to some 0-spin sharmons or sharmon aggregates to create energized +ve positrinos and energized –ve negatrinos. It marked the beginning of the 1-spin Boson photons of the electromagnetic radiations and the ½ -spin Fermion material particles. Various physical entities of the real universe evolved through the 'quantity, composition & dynamic organization' of these Boson & Fermion units.

10.1. *The universe (jagat) is real, not an illusion*

The primal megovum/megamind *Brahm* is imperceptible and free from any motion or change but the universe (*jagat*) is perceptible and has all sorts of motions and changes. During the creation of the perceptible, real universe (*jagat*) the real imperceptible Megovum (*Brahm*) undergoes *real* processes of conversion or transformation. See also sections 14.9 & 14.9.1 .

This (*idam*) actual perceptible universe (*jagat*) is a part of that (*adah*) complete (*purn*) *Brahm*, in its gross cosmic form, functionally complete and self-sufficient. The remnant (*avshist*) unmanifested, intelligent *Brahm* (Megovum) left after creation of this (*idam*) universe is also functionally complete (*purn*) and self-sufficient (*Ishopanishad*). That and remnant *Brahm* comprising 0-spin sharmons are imperceptible and free from all changes, motions and activities but the universe (*jagat)* is perceptible with all sorts of changes & motions, emotions, pleasures &

pains. Since *Aatmaa,* and *Parmaatmaa Brahm* are *sat-cit-Aanand*, they have the bosonic 0-spin sharmon core. The entities of the *jagat* have fermionic 1/2-spin cosmino core as in electron, proton, neutron etc.

The classical description of the universe (*jagat*) as an unreal illusion like a mirage or the snake-in-rope is invalid. Analogies of *jagat* as 'wave on ocean', 'pots from mud' and 'ornaments from gold' also do not apply since the basic substance (water, mud, gold) in all these remains un-changed but that part of the imperceptible never-changing *Brahm* becomes perceptible ever-changing from which the ever-changing perceptible universe (*jagat*) is created..

Lord Krishna, the knower and experiencer of all these three and other aspects of *Brahm* could act and speak with ease from any of the planes as annunciated in the various chapters of *Gita*. For example, in Chaps 7 & 8 Krishna speaks as that (*adah*) total *Brahm* (Megovum-cum-Megamind). In Chap-11 He exhibits this (*idam*) cosmic (*viraat*) form as the '*viraat purush*' (cosmic person). In Chaps 4 & 9 He is the remnant (*avshist*) *Brahm.*

11. **The unity & continuity of living and nonliving**

11.1. *The unity of matter & mind*

The 'matter' and 'mind' unite and unify as manifestations of the corresponding innate and inseparable attributes of the sharmon. The electric charge and mass of Sharmon relate to the manifestation of matter in the universe and the intelligent consciousness of Sharmon to that of mind and intellect.

11.2. *The unity of living & non-living*

The intelligence & consciousness are the necessary attributes of a living entity. The innate properties of mass (inert) and intelligent consciousnesss are inseparable from the sharmon. Likewise the *aparaa* (inert) and *paraa* (conscious) *prakriti*-s (Natures) (Gita **7**/4,5 and **13**/5,6) are in fact the innate natures (*swabhaav*) of Brahm (0-spin sharmon composed **Megovum/ Megamind**) and hence inseparable from it. *Hence the living and nonliving division in the universe falls, because all is living-nonliving unification.*

In this context, the *Purush* and *Prakriti* (Nature) of the *Saankhya* philosophy are similar respectively to the *paraa* and *aparaa prakriti* of Gita. The *Prakriti* (Nature) of *Saankhya* is not a *swabhaav* (nature) of any *Brahm*-like entity. In fact *Saankhya* regards the *Purush* and *Prakriti* as independent entities.

The *paraa* and *aparaa prakriti-s* are the two particularly conditioned manifested appearances of the *Brahm* itself, into which they inseparably unite and co-exist with it. The same *Brahm*, in one unit of cosmino-sharmon composition & dynamic organization exhibits the conscious (*paraa*) properties and in other system it appears inert (*aparaa*) due to masking or intra-neutralization of the *paraa*.

Likewise Unified Theory holds that the mass (gravitational) and electric charge of a cosmino unite and unify inseparably into the cosmino itself and are its particular properties or appearances manifested through the gravitational and electromagnetic field or force respectively. This is because an "element", to remain non-composite, has to be homogenous and have only one kind of property throughout. The Unified Theory's sharmon presents the co-existent *paraa-aparaa* unity, which is basic to, and appears as, the living-nonliving unified multiplicity in the universe. In those entities and bodies, which appear and behave as nonliving, the intelligent consciousness of the constituent atoms and molecules has been masked or mutually compensated or remains unmanifested, waiting for conditions favouring manifestation. The profound commandment *sarvam khalu idam Brahm* (certainly all this is *Brahm*) from *Chaandogya Upnishad* (3/14/1) thus supports and is supported by Unified Theory Cosmology.

From the *paraaa prakriti* of that (*adah*) extremely large and extremely great intelligent 'universal I-ism' or conscious complete (*purn*) *Brahm* (Megamind) develop the individualized *ahamkaar* (i-ism), *buddhi* (discretion) and *man* (mind). The two *paraa* & *aparaa prakriti*-s also hold the potential and function-seeds of the senses of action and perception. Since both *prakriti-s* coexist with and pervade every sharmon of the entire Megovum-cum-Megamind the jiva considers the body, mind, *buddhi* and *ahamkaar* as 'mine' or even as 'I'.

11.3. U*nity of aatmaa, sarvaatmaa & parmaatmaa*

The water in multiple containers is basically the same. Similarly *aatmaa* (soul) in various *jivas* is basically the same *sarvaatmaa* (totality of all souls). The *Brahm* (0-spin sharmons in Megovum-Megamind) is *parmaatmaa* (absolute soul). That is how *aatmaa* (soul), *sarvaatmaa* and *parmaatmaa* are one.

Vedantic scriptures describe this grandest unity through the following profound commandments. '***pragyaanam brahm'*** *(the primal knowledge/consciousness is Brahm,* the *Rig Veda, Aatreya Upanishad,*3/3), ***tat twam asi*** (*guru* to the disciple: that (*Brahm*) you are, *Chaandogya Upnishad*, 6/14/3), ***ayam aatmaa Brahm*** (disciple: my this soul is *Brahm*, *Maandukya Upnishad*, 1/2), ***sarvam khalu idam Brahm*** (surely all this (universe) is *Brahm*, *Chaandogya Upnishad,* 3/14/1), ***aham brahmaasmi*** (realised one: I am *Brahm*, *Brahad Aaranyak Upnishad*, 1/4/10).

The *jiva* is both the doer (*kartaa*) and the experiencer (*bhoktaa*). The good and bad, right and wrong are decided by the *buddhi* and the pain and pleasure, hot and cold are felt by the *jiva* through the mediation of *buddhi* (intellect), *man* (mind) and senses. The five *kleshas* [*avidyaa* (ignorance), *asmitaa* (identification), *raag* (attachment), *dwesh* (repulsion), *abhinivesh* (fear of death)] are of the *buddhi-man* (discretion, mind) *antahakaran* (inner instruments). *Adwait* takes the world as '*mitthyaa*' (real-unreal) and the *karm* (action) as binding. So it advocates renunciation of *kaamya karm* (action with desire) and the world. But *Gita* is pragmatic and ordains dutiful actions without obsession for the result (Cf. **2/**47, 48, 55).

12. **Life can neither be created nor destroyed**

In the actual world there are different types of living beings and manifested life. These are basically determined by the quantity, composition and dynamic organization of the intelligent-conscious molecules. In those entities and bodies, which appear and behave as nonliving, the intelligent consciousness in the constituent atoms and molecules has been neutralized, masked or compensated mutually among themselves or remains un-manifested, waiting for conditions favouring manifestation.

The Unified Theory presented in this book unifies concepts arising largely from the all-composing and all-pervading space-medium, the 'sharmon medium' as the 'basic substance'. It is composed by the new particle 'sharmon', which is made of the micromost two elementary *cosminos*, the electrically positive '*positrino*' and negative '*negatrino*'. The two cosminos compose all forms of energy, mass, energy quanta and particles of matter and antimatter. The sharmon is also the 'quantum of intelligent consciousness'. The intelligence & consciousness are the necessary and sufficient attributes of 'life' in a living entity. The total cosmino content of the whole universe is eternally conserved and preserved and so are the total mass-energy content and the 'life content'. *The cosminos and sharmon and hence the matter and life can neither be created from, nor dissolved into, nothing. Birth and death are of the living beings, not of 'life'.* The sharmons composing an inert or dead body/tissue are as intelligent and conscious as in a living being. The biological living functions cease with the collapse of the dynamic organizations at vital levels. ***Heisenberg's Uncertainty Principle is therefore rejected by Unified Theory as invalid since it invokes matter's creation from, and dissolution into, nothing.*** See also sec. 16.1 below.

13. **The genome is not randomized**

As mentioned in Appendix-5 the 'genome organization' seems to follow two guiding principles. The '**gene inclusion principle**' decides on the inclusion of permanent genes, which determine and specify various species. These are the 'central' or fixed genes, which every one and all members of a species have in fixed positions unchangeably. According to the '**gene exclusion principle**', however, no two of the billions of members of a species can have the same identical 'gene group' in the given position(s). These genes differentiate the nose of one individual from that of the other. The difference also exists in the expression of these nonspecific 'peripheral' genes. Bases of the gene inclusion and gene exclusion are not clear. At the present stage of knowledge the two principles cannot be stated inductively. The required information will be extracted deductively from the genomes of numerous species taken together when deciphered.

The actual composition of the genome of any individual is decidedly set through the operation of the gene inclusion and gene exclusion principles at the point of time when the female egg is fertilized by the male sperm. It is not clear what decides and controls this process and how. Does the offspring choose and decide the parents or the parents decided the offspring? Has the previous life of the offspring any thing to do in the decision of the parents and the resultant actual genome?

14. **Vitalism in Science**

Hahnemann founded the theory and philosophy of Homoeopathy on the concept of Vital Force because it was then prevalent even in exact sciences.

In ancient times, the concept of vital force had played a very dominant role even in science. The division of Chemistry into Inorganic Chemistry and Organic Chemistry was based on it, and still continues as a relic thereof. Inorganic compounds were believed to be obtained from non-organic mineral sources and the organic ones coming from the living organisms (animals & plants). Strength of this classification made the chemists believe that organic compounds *must* have their origin only in living organisms, and could not be synthesized from inorganic material.

The plants are and were even then known to convert the inorganic compounds into organic ones. 'Biochemistry of the plant root' will further identify the specific catalyzing enzymes and the genetic code to clarify. But when the German chemist Friedrich Wohler, for the first time in 1828, synthesized the essentially organic compound *'urea*' from inorganic ammonium cyanide, quite an excitement was created but the impact was not strong enough to break the tradition. Some chemists still hoped and believed that some new thing of the status and importance of "cell theory" would be discovered to distinguish the living from the non-living.

This belief has continued right up to the late 1940s or early 1950s when J.D. Watson and F.H.C. Crick announced the helical structure of Deoxyribonucleic Acid (DNA) composing the genes and chromosomes. The DNA, as storehouse of all biological and hereditary information, determines the anatomical structures and physiological functions of the organisms. Others worked out the molecular structures of some enzyme proteins, which as biological catalysts mediate all biochemical reactions. These researches came under the backdrop of the 1927-Copenhagen interpretation of the Quantum Theory, which asserted that this "complete theory" deals in *what can be known or observed, and not in what there actually is, in the micro cosmos*.

Further researches in Molecular Biology and Molecular Biophysics created the confidence that all biological phenomena and functions of the living organisms can be understood via molecular mechanisms without invoking the concept of Vital Force, which is imperceptible, imponderable and beyond observation. Thereafter all the sciences discarded the Vital Force as a mark of the real beginning of *Scientific Medicine*. And this author wrote the book **Molecular Homoeopathy** (COSMO, New Delhi, 1984) in this backdrop.

But the above new concept of the atomic and molecular intelligence based on the chemically exchangeable energy composed by 0-spin sharmon, as the quantum of intelligent consciousness is a turning point. It has revived the views of the spiritual philosophies that the living (*cetan) Brahm*, with its inseparably co-existent *paraa* (conscious) and *aparaa* (inert) *prakriti*-s (Natures), is the ultimate basic constituent of all the living and nonliving entities in the universe. The Hahnemann's *Vital Force* stands updated accordingly in sec. 17.10.3.

15. **The origin of life on earth not extra-terrestrial**

The foregoing discussion shows that the atomic intelligent consciousness gives rise to the molecular consciousness, which in turn generates that of the various living entities & organisms. Therefore any place or even the most sterile desert on earth, nay in the entire Cosmos, has the potential to be swarmed with life or living entities and organisms if and when sufficient and necessary physical and material environmental conditions become available. *So, the answer once for all to the perennially controversial question is that the life on earth does not or need not have any extra-terrestrial origin.* Even if some form of extra-terrestrial life is discovered it need not be the original precursor or the result of life on earth. The two can exist independently.

16. **Basic laws are inviolable**

The *Ritam* (natural laws), besides *Satyam* (basic substance) is very basic in Indian philosophy. That is, like Unified Theory/ UPT, nothing happens against and/or in violation of the basic natural laws. And the "free will" is not completely free because every event, howsoever small, has all-round effects. *This basic certainty behind all apparent uncertainties manifests as miracles, so frequently observed.* With limited free will and freedom of action man is responsible for all vices, violence, corruption etc.

16.1. *Quantum Theory's Uncertainty Principle Untenable*

Above considerations are against modern Quantum Theory's Uncertainty Principle, which connotes anti-causality 'objective indeterminism'. The "creation of matter from nothing' in quantity and for the duration within the set limits as introduced and validated by the Heisenberg relations of the Uncertainty Principle and invoked by the Big Bang and Steady State Theories of Expanding Universe is ruled out in UPT and Unified Theory. That is why UPT/UT proposes a new Theory of Non-expanding and non-contracting universe wherein the total mass-energy content of the universe is eternally conserved as a part of the big primordial cosmic body the '**megovum**', meaning the 'big egg'. See also sec. 18.9 above and secs. 14.9 & 14.9.1 of Chap-14.

17. **Multiple planes of consciousness**

The human Central Nervous System (spinal cord plus brain) has some broad levels of functional organization (P.D. MacLean, 1970: **Triune brain**; R.R. Sharma, 1988: **Quintune brain**). The autonomous reflexes are mediated by the spinal cord. Mainly the brain stem mediates the instincts of sex, aggression, deception, possessiveness etc. The limbic system is for emotions and motives. The cerebral cortex carries out the functions of thinking, analysis, language, etc. Higher neuronal circuits in the cortex mediate the supramental traits like control over thought, intuition, bliss, altruism, forgiveness, *samaadhi*, realization of self and *Brahm*, etc.

17.1. *Brain, mind & thought*

A neuron function involves neurotransmitter or neuro-active molecule, variation in the trans-membrane potential and exchange of energy. *So a thought is an electrochemical ergic event in the cerebral cortex.* We can recall the action of some well-known neuro-active molecules like adrenaline (fight or flight), dopamine (elation), serotonin (fear) and the influence of sex hormones on thinking and behaviour is too well known.

But the actual or real natures of thought and 'thought wave' (? in the sharmon medium) are not so clear yet as to explain telepathy, 'mind-reading', extrasensory perception (ESP), precognition (PC), psychokinesis (PK), etc.

But the discretionary intellect (*buddhi)* and thought flow or mind (*man*) are inseparable functional attributes of the brain.

18. **The relevance of mental yoga**

The man by nature and tradition tends to live far within the limits and utilizes only a small fraction of the intellectual abilities. One cannot keep the unwanted thoughts out and the wanted thought in. This befogs 'decisions' and affects the creativity. But mental yoga, particularly Aanand Yoga (Appendix-7), helps.

However, over-activity of the lower levels of the central nervous system tends to inhibit the higher ones. For example, reflexive removal of the foot away from a hot object instantly suspends not only analytic thinking but also the emotive acts of anger and sex, and a sway of anger suspends rational thinking. Hard/anxious thinking interferes with intuition. The observed continuous progress shows that the vast treasure of yet-unknown but knowable knowledge is inside, which is tapped or downloaded bit-by-bit by the external, known bit(s) of knowledge. G*reat thoughts and solutions to difficult problems often "flash" during the state of thoughtless thinking or when not thinking about the subject*.

In a vast majority of persons the 'rational' and 'intuitive' neuronal circuits in the cerebral cortex remain inhibited or even un-commissioned due to repeated energization of the lower

instinctive and/or emotive circuits. These de-humanization processes, in the long run, create liar, cheat, criminal, immoral, anti-social, and terrorist persons and so on. The commissioning and operation of the higher circuits, for humanization or re-humanization, become facile when the lower circuits are 'quiet' and 'tranquil'. This underlines the relevance of 'mental' and 'supramental' *Dhyaan Yoga, Aanand Yoga and 'jap saadhanaa'* of the *Bhagti Yoga* wherein even the normal thinking is deliberately inhibited. *Such mind-mastering techniques make a 'master-mind'.*

The meditation can raise the consciousness level from the limited individualized i-ism to the unlimited 'universal *aham*' and help develop the *ritambharaa pragyaa* to which untrue, unholy and aberrant thoughts do not occur. *So Yogi is a higher evolved person in oneself.*

We have to 'catch the children young' in the preadolescent age for starting the yoga practices so that future generations could expect better intellectuals, composed personalities, refined values and reduced crimes.

Daily practice of meditation like Aanand yoga can help, in the long run, to control the baser traits of anger, sex, corruption, and even terrorism. *The collection of information, which seems to be the main aim of present-day education, would then become easy and facile.*

The state of Yoga ecstasy is said to be very much more pleasant than even the sex experience in the prime of youth. It suggests release of some yet unknown hormone or neuromediator via the activation of some new 'gland' or the expression of some new genes.

19. **Personal experience in yoga**

I (this author) have been practising *aasan, praanaayaam*, and *dhyaan* since July 1945. And could assume alpha and theta brain wave states at will as tested and confirmed by Dr. Elmer Green, Director, Menninger Foundation, Topeka, USA. Dr. Green, in his letter dated 30 December 1987 to Dr. Victor B. Eichler, Director, Fetzer Foundation, Kalamazoo, USA, wrote:

"… We first met Sharma in 1973 during our three-month yoga research trip to India. …. To our surprise, he proceeded to turn theta on-off-on-off, whenever he pleased and whenever I asked him to, filling theta-off periods with alpha. This was hard to believe. No one had ever been able to do this, even those of our voluntary controls group who had practiced most. …."

N.B. Various brain waves and their frequency bands as recorded on the Electroencephalographs (EEG) are: delta (0.5 to 3.0 Hertz), theta (4 to 7 Hz), alpha (8 to 13 Hz) and beta (14 to 30 Hz). The alpha state refers to the tranquility of mind and theta state is associated with creativity.

I (this author) have been benefited by the yoga practice. I passed the II & III and VII & VIII classes in one year and in VII class I found the formula n(n+1)/2 for the sum of first n natural numbers, which was later taught in XI class.

I completed the work and writing of the Ph.D. thesis of the London University in seven months (June through December 1968) after approval of the thesis plan. The supervisor of my Ph.D. thesis, Professor J.F. Fowler of R.P.M.S., London certified: "…. During this work he showed himself to be exceptional in his intellectual power and ability to understand the basis of, and make original contributions to, the field. His contributions to the subject of quantitative radio-isotope scanning are original, important and represent several steps forward in the subject. He also demonstrated an enormous capacity for hard work, and the ability to argue scientific cases cogently and energetically. He is definitely one of the brightest physicists working in medical physics anywhere in the world.

I am sure he will continue to make positive contributions to this field of work, or indeed to any that he takes up.

It was a pleasure and a privilege to have him working in my department."

20. **The need & relevance of '*Universal Dharm*'**

A 'religion', as the term means and signifies, aims at re-uniting individual souls with the universal God. But actually nothing has disunited the society more than the politics of religion. History is replete with the narrations of bloody wars fought and the violence and terrorism unleashed in the name of religion. Let us therefore develop, evolve and recognise '*universal dharm*' as a mandatory basic part of every religion.

It is based on virtuous moral values (no-fear, purity & control of mind & senses, patience, tolerance, forgiveness, equanimity, altruism, no-lust, no-anger, no-greed, no-animosity, no-stealing, no-violence, no-hatred, no-pride, truth, honesty, duty with no obsession for result, contentment, &c as detailed in Gita) and the Yoga (*aasan, praanaayaam, dhyaan*). Gita (**16/**21) regards *kaama* (lust), *krodha* (anger) and *lobha* (greed) as the three gateways to hell and therefore advises to forsake the three. It may be pointed out that no English term is equivalent to '*dharm*', which actually means the basic nature *(swabhaav*) of the *dharmi*. For example, to burn is the *dharm* not the religion of fire and the *dharm* of ice is to cool. The proposed '*universal dharm'* stands for the real unpolluted nature *(swabhaav*) of man.

Both virtues and vices are behavioral properties of man, which can be modified. The virtues arise from the feelings of oneness and love and promote harmony and cooperative order in the society, whereas feelings of otherness and hatred give rise to vices and create disharmony, injustice, exploitation, domination, violence and chaos. The observance of '*dharm*' inculcates virtues and inhibits vices. Making *dharm* as a strictly implemented essential tenet of all religions will promote inter-religion tolerance and secularism.

21. **Aanand Yoga**

Further see newly proposed Aanand Yoga below. If you practice it daily you will remain tension free and be able to solve your problems easily and unwaveringly. You might also taste the unity or identity of *Aatmaa & Parmaatmaa*.

Unified Theory-10: NON-DARWINIAN INTRASPECIES EVOLUTION

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ABSTRACT: The 'genome organization' is not random but follows two guiding principles. The 'gene inclusion principle' decides on the inclusion of permanent genes, which determine and specify various species. These are the 'central' genes, which every one and all members of a species have in fixed positions unchangeably. According to the 'gene exclusion principle', however, no two of the billions of members of a species can have the same identical 'gene group' in the given position(s). The vestigial organs arose from the corresponding *normal* genetic expressions rather than from the lack of their use or utility. Man never had a tail and will never lose the unutilized pubic & axillary hairs because his genome so provides. The present man has not descended from the ape through Darwinian interspecies evolution but from primitive man himself through intraspecies evolution.

Here we present the '**intraspecies evolution'** as against the conventional Charles Darwin's '**interspecies evolution**' given in his book, ***The Origin of Species by Natural Selection or the Preservation of Favoured Races in the Struggle for Life*** (London: John Murray, 1859). Particularly to retrieve the human dignity and grace we herein restore the descendance of man away from ape to man him self.

For outlining this new scheme of the Non-Darwinian Intraspecies Evolution we take up the thread from the article on RNA (ribonucleic acid) by Jame E. Darnell Jr. in the October 1985 issue of Scientific American vol. **253**.

At some primitive stage of the evolving environment, formation of short RNA chains was followed, in the absence of enzyme proteins, by uncatalyzed splicing, cleaving and translation of RNA chains into proteins, including enzymes. Then came the enzyme catalyzed reverse transcriptions of RNA into DNA (deoxyribonucleic acid) chains. These steps initiated the process(s) culminating in the generation of multitudinous self-organizing DNA-RNA-protein biopolymer systems, which further developed and organized into non-nucleated prokaryotic cells of many kinds. Fusion of two or more types of prokaryotic cells generated nucleated eukaryotic of numerous kinds, which later on acquired the mitochondrion or, in the case of photosynthetic cells, the chloroplast. The primitive germ cells produced the initial primitive generation(s) of multicellular organisms. There has also been a continuous change in the ambient temperature and the evolving environment, from the initial highly reducing to the present oxidizing properties. The changing needs of the organisms for survival and their attempts for adaptive fit by expressing latent genes resulted in the adaptive changes in the morphological, physiological and behavioural traits, that is in their 'intraspecies evolution' up to the respective period of extinction.

The RNA and DNA molecules are not static but dynamic and intelligent. Basic to their intelligence is the sharmon-composed energy, which they chemically exchange during their organizational actions and reactions. We therefore here ask but cannot answer the questions of how and why of these self and nonself organizations and about the nature and functioning of the basic organizing machineries. But we cannot suppress the curiosity about the organizational machinery prior and basic to the genomic determination and organization, which ultimately generate various organisms and species and also specify the anatomy, morphology and physiology of the organs, tissues and cells. Thus, genes and genome are not the bottom end of biological organization, we have to look for organizers basic and prior to these genomic organizers.

Every one has a nose but no two of the billions of noses are exactly alike. No two fingerprints of any two different persons completely match. Out of the billions of males and billions of

females in any species any male can mate to reproduce with any female. But the male and female of different species cannot reproduce viably. We cannot resist curiosity about the organization and the organizer behind the vast diversity in unity in the first case, behind the unity in immense diversity in the second case and behind the total dissimilarity in the apparent similarity in the third case. This query is important because all animate and inanimate entities with unique and different parts in the universe are made from only two unchangeable elementary cosminos, the positrino and the negatrino. Multiple principles of inclusion and exclusion suggest themselves to operate at different levels of organization.

The 'genome organization' seems to follow two guiding principles. The '**gene inclusion principle**' decides on the inclusion of permanent genes, which determine and specify various species. These are the 'central' genes, which every one and all members of a species have in fixed positions unchangeably. According to the '**gene exclusion principle**', however, no two of the billions of members of a species can have the same identical 'gene group' in the given position(s). These genes differentiate one nose or finger print from the other in the first example of the previous para. The difference also exists in the expression of these nonspecific 'peripheral' genes. Bases of the gene inclusion and gene exclusion are not clear. At the present stage of knowledge the two principles cannot be stated inductively. The required information will be extracted deductively from the genomes of numerous species taken together when deciphered.

The actual composition of the genome of any individual is decidedly set through the operation of the gene inclusion and gene exclusion principles at the point of time when the female egg is fertilized by the male sperm. It is not clear what decides and controls this process and how? Does the offspring choose and decide the parents or the parents decide the offspring? Has the previous life of the offspring any thing to do in the decision of the parents and the resultant actual genome?

The geologists have studied fossils of the microbes, plants and animals living in different periods of geological evolution. The molecular biologists have analyzed the sequence of bases in the DNA and of the amino acids in the proteins of these multitudinous species. Darwin and other biologists, working on the whole organisms, as well as their supporter molecular biologists, have wrongly over-interpreted this information to suggest and support '**interspecies evolution**' as against the '**intraspecies evolution**' outlined above. The information and data presented by Allen C. Wilson (Scientific American, **253**, 148-157, October 1985) also support the herein-proposed scheme of intraspecies evolution better than Darwin's interspecies evolution. Other articles in the Oct'85 issue of Scientific American are also relevant.

The following important points can also be made:

(i) The basic building bricks of DNA-RNA-protein biopolymer from which the composite genomes of all the species eventually emerged were created during one and the same period.

(ii) The content and complexity of the genomes of higher organisms grew at some later period(s) through splicing and fusion, without or with (minor) cleavages, of the genomes of lower or simpler organisms.

(iii) In the initial stages, only few species could and did develop and survive. The self-organizing germ units of other species matured into definite organisms later at different periods in fitness with the evolving environment. All species have evolved *continuously* in parallel with one another and with the evolving environment. But Darwin's theory implies *discontinuous* and *abrupt* **interspecies** step-evolution mediated by mutation of gene(s), which has never been observed. Different genes occupying the same position in different species differed from the very beginning and did NOT arise due to later mutation(s).

(iv) The initial germ units and cells and thence the initial zygote (fertilized ovum) for the multi-cellular primitive generations of all species, including the highest vertebrates like man, were created without the uterus. The perennial debate: "Who came first, the egg or the hen?" thus ends in favour of the egg !

(v) The species found at any later period(s) did not evolve or transform from the few initial species, vide para (iii) above, through Darwin's interspecies evolution. But these could be divided into three categories:

(a). Evolved to full evolving capacity but already extinct or getting extinct due to unfitting environment.

(b). Fully evolved within their own evolving capacities themselves and adapted with the obtaining environment.

(c). Partly evolved and further evolving adaptively with the changing environment, through only intraspecies evolution.

(vi) The theory of mutations in the genome of the developed species cannot explain the *ordered* phenomena of molecular clocks, molecular trees and branches because the mutation is essentially of a random nature. But these very phenomena follow naturally, and can be expected, from the new scheme of genome cleavage, splicing and fusion encompassing both the vertical and horizontal lineage.

(vii) The theory of random mutations cannot, but the new scheme of intraspecies evolution can, explain the observation that the pattern of molecular evolution of the DNAs and proteins is ubiquitous in the microbes, plants and animals.

(viii) The new scheme of the assembly and development of the genome of various species through splicing and fusion without or with some cleavages of the genomes of lower species can explain the fact that "the molecular evolution depends more on the years than on generations". But the theory of random mutations of the genomes of already developed species cannot explain this observation. In the intraspecies evolution, the term "years" refers to the geological period(s) conducive for the maturation of the preformed self organizing germ units into species adaptively fitting the then obtaining ambient environment, rather than to the time of accumulation of the random mutations in the genomes of pre-developed species.

(ix) The organismic and molecular differences in the species were not caused by random mutations in the genomes of pre-developed organisms but resulted naturally from the regular genomic differences in the germ units, which later developed into definite organisms.

(x) The vestigial organs arose from the corresponding *normal* genetic expressions rather than from the lack of their use or utility. Darwin's theory tries to explain the loss of tail by man, which his ancestor ape had, because man discontinued using it. But it cannot explain the continuity of pubic, axillary and facial hairs, which man not only does not utilize, but also continually shaves. It means that man never had a tail and will never lose these unutilized hairs because his genome so provides.

(xi) The present man has not descended from the African ape through Darwinian interspecies evolution. Instead he has evolved from the primitive man himself through intraspecies evolution. However, the form of the 'primitive man' has continuously evolved from the self organizing molecular DNA-RNA-protein system to germ cell to zygote to multi-cellular clump and so on. If man had evolved from the ape then the species of apes would have been replaced or supplemented, at least in part, by some species intermediate between the ape and man. But this has not happened.

To sum up, all evolutions are and have been intraspecies and no interspecies evolution is possible. Various species pre-existed and no new species were created from other(s).

Unified Theory-11: AANAND YOGA : The Immanent Meditation for all

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Abstract: This author has been practicing Aasan, Praanaayaam and Meditation since 1945 and can assume alpha and theta brain wave states at will as testified by Dr. Elmer Green, Director, Menninger Foundation, USA. With this Yoga ability he solved three outstanding problems and completed the work and writing of his PhD(London) thesis in 7 months after plan approval. For the benefit of others a simple yet effective mode of meditation, the Aanand Yoga, is described, which combines the merits of 5 popular techniques, namely the Gita Yoga of Lord Krishna, Vipashyanaa Yoga of Lord Buddha, Vishvaas Yoga of Swami Vishvaas, Transcendental Meditation (TM) of Maharishi Mahesh Yogi and ancient Paatanjali Yoga.

Historical: On a winter morning in 1973 Dr. C. Giri, the then incharge of the Yoga Centre in Chandigarh met me and said that a team of scientists led by Dr. Elmer Green, Director, Menninger Foundation, Topeka, USA is visiting Yoga Institutions in India to study Yogis. On my (Giri's) suggestion they want to do some experiments on you. I agreed. At the Yoga Centre, Dr. Green took me into a small room and put electrodes on my head. They were interested to see whether I could assume alpha brain wave state and how long could I stay in alpha state. Further if I could also assume theta wave state. Light and sound signals were there also to tell me the state which I was in. They were to monitor from the adjoining room. After explaining all this he started moving out very softly. I asked him to stay till I practice going into alpha, beta and also theta states. As I was doing this all other scientists from the monitoring room came in to watch me with surprise and said. "It is unbelievable and very unusual. There must be some other unusual feats and achievements in your life." I told that I could complete the work and writing of my PhD (London) thesis in seven months after approval of the thesis plan because the solutions to three outstanding problems flashed across my mind on which my thesis was based. They were not surprised to hear this.

Dr. Green, in his letter dated 30 December 1987 to Dr. Victor B. Eichler, Director, Fetzer Foundation, Kalamazoo, USA, wrote:

"… We first met Sharma in 1973 during our three-month yoga research trip to India. …. To our surprise, he proceeded to turn theta on-off-on-off, whenever he pleased and whenever I asked him to, filling theta-off periods with alpha. This was hard to believe. No one had ever been able to do this, even those of our voluntary controls group who had practiced most. …."

N.B. Various brain waves and their frequency bands as recorded on the Electroencephalographs (EEG) are: delta (0.5 to 3.0 Hertz), theta (4 to 7 Hz), alpha (8 to 13 Hz) and beta (14 to 30 Hz). The alpha state refers to the tranquility of mind and theta state is associated with creativity.

For the benefit of others I describe below an improved version of the Yoga practice I have been doing since 1945.

The Technique:

The newly proposed 'Aanand Yoga' (AY) was first briefly described in the article "Universal Dharm" published in the Souvenir of the Senior Citizens' Council, Panchkula, which was released on 10 April 2002. It integrates the essential merits of Gita Yoga of Lord Krishna, Vipashyanaa Yoga of Lord Buddha, Vishvaas Yoga of Swami Vishvaas, Transcendental Meditation (TM) of Maharishi Mahesh Yogi and ancient Paatanjali Yoga.

The ultimate goal and destination of all spiritual practices (*saadhanaa-s*) and hence of the Aanand Yoga is defined by the profound statement of the *Chhaandogya Upanishad*, viz. *Sarvam khalu idam Brahm* (surely all this is Brahm). The realization of Brahm is not possible without the mind nor with the mind. The pole-vaulter cannot cross the horizontal bar without the pole nor with the pole. The pole helps attain the height of the horizontal bar but thereafter it obstructs the crossing and so the pole is left behind. Likewise mind does help initially in figuring out and visualising the goal but it itself obstructs further progress because thoughts interfere in realizing the 'infinite Brham', which composes and pervades all inanimate and animate existence. Aanand Yoga helps to control thinking and thoughts without injuring the mind and brain.

Ordinarily the human mind has a multicentric tendency. It keeps on moving from one centre of attention to another. Our five senses of perception keep on sending information about the external world to the mind, which as a result keeps on shifting its attention. So the first step towards meditation is to minimize the number of interfering senses by focusing the mind on one sense object, say light, sound or thought.

In Gita Yoga (Gita **6**/13) one concentrates on the tip of the nose and in Vipashyanaa Yoga on the breath (coming in & going out) near the nose tip. In Vishvaas Yoga one watches the thought and in Transcendental Meditation attenuates thought. The Paatanjali Yoga has eight organs of yogic practice: *yam* (don'ts for social harmony), *niyam* (do's for personal discipline), *aasan* (easy, stable posture), *praanaayaam* (breath control), *pratyaahaar* (withdrawal of the senses from their objects), *dhaarnaa* (attention), *dhyaan* (meditation) & *samaadhi* (continued single point meditation on the object with the awareness of the self fading away).

The Gita Yoga, Vipashyanaa Yoga, Vishvaas Yoga, Transcendental Meditation and Paatanjali Yoga stop at providing guidelines, leaving the *saadhak* in unfamiliar terrain to find, reach and recognize the 'unknown' destination.

However, the scriptures describe both the individual *aatmaa* (i) and the universal *parmaatmaa* or *Brahm* (I, *adwait*) as *sat-cit-aanand* (blissful awareness of existence). Basically all the Yoga-s aim at uniting and identifying the *saadhak*'s *aatmaa* with the *parmaatmaa* or *Brahm*.

The Paatanjali Yoga is to restrain thought (*cittavritti nirodhah)* i.e. to follow single thought-stream, since the 'seer' then said to stay in its own nature. So, in Aanand Yoga the **first** object of *exclusive* meditation is the transcendental experience of the pure consciousness or the only 'am-feeling', by fading away **both** the 'i' of 'i am' feeling and the awareness of any object, sound or light. Further destinations would be to realize or recognize the individualized self, then the immanent universal self (*parmaatmaa* or *Brahm*).

The Paatanjali Yoga emphasizes that for success in concentration (*dhaarnaa, dhyaan*) the decentration or withdrawal is an important help. That is one should practise *pratyaahaar* and be able to withdraw the senses from their objects. Since thought mediates perception and mind is the master sense, thoughtlessness is the most effective and best form of *pratyaahaar*. The Gita Yoga, Vipashyanaa Yoga, Transcendental Meditation and Paatanjali Yoga follow a single thought stream. The Vishvaas Yoga watches the thought and Transcendental Meditation attenuates it. *Praanaayaam* (in Paatanjali Yoga) controls breathing. Since thinking and breathing are inter-related, breathlessness and single-thought state mutually help. The Aanand Yoga therefore, incorporates into itself, all these operationally essential concepts and merits of all the above five Yoga-s.

For practice of Aanand Yoga, sit in a comfortable and stable *aasan* (Paatanjali Yoga), aligning back, neck and head (Gita Yoga). Close the eyes and mouth. Breathe through the nose. Relax the body by mentally scanning and de-tensing the muscles of head, forehead, eyes, cheeks, neck, chest, arms, legs and feet. Go back relaxing from feet to head. Repeat this process twice.

Take three rounds of *bhraamari Praanaayaam.* For this take a deep breath, exhale slowly producing at the same time an audible humming sound as of a bumble bee.

Now empty the mind of all thoughts (as with *pratyaahaar* in Paatanjali Yoga). After gently inhaling, exhale slowly while producing an inaudible feeble mental sound. Gradually slow down exhalation and attenuate this mental 'sound' but keep the attention on it. As soon as one starts exhaling and concentrating on the inner feeble mental sound the mind purges all thoughts instantly and effortlessly. This, in Paatanjali Yoga is the *dhaarnaa* stage leading to the *dhyaan* stage.

This will take and keep the 'i- consciousness' interiorized inwards. In Paatanjali Yoga, this state is achieved by *aasan, praanaayaam, dhaarnaa & dhyaan.* The Vishvaas Yoga also takes to

the same state. Now, like Transcendental Meditation, continue attenuating the mental sound. Try not to hear but to watch and see the mental sound attenuating and fading it away. When this mental 'sound thought' disappears only the 'infinite vacuum' remains in which consciousness of the self appears.

Merge the remnant 'i am' consciousness with the infinite 'I-expanse' (*dwait-to-vishistaadwait*), which is the unlimited *Brahm* consciousness. The all-exclusive but effortless concentration in this 'i/I am' state will fade out the 'i/I' from the 'infinite i/I am' and bring in the blissful (*aanand*) and wakeful experience of only 'am' i.e. of *sat-cit-aanand*.

Because a thought has two associated attributes, the image and the sound, this will then take to the state of seeing no mental images and hearing no mental voices i.e. of 'no thinking'. Continuation of this experienced state will bring in the effortless no-breathing i.e. neither inhaling nor exhaling (*kewal kumbhak* in Paatanjali Yoga), to be detected by the deep inhalation on coming out of the state. *One then observes that the self-conscious life principle i.e. soul (aatmaa) for existence does not need the breath or the body*. Repeat these steps again and again.

The interiorized feeble sound for meditation in Aanand Yoga can be produced in different ways. First, by mentally reciting *aum*. Secondly, it can be a humming nasal sound. Thirdly, it is the subtle inaudible mental sound.

As mentioned above when one starts exhaling and concentrating on the inner feeble mental sound the mind purges all thoughts instantly and effortlessly. This, in effect, instantly combines the stages of *Praanaayaam, Pratyaahaar and Dhaarnaa* leading to the *dhyaan* stage of the Paatanjali Yoga. This state is similar to the concentration on the object of meditation in Gita Yoga, Vipashyanaa Yoga, Vishvaas Yoga & Transcendental Meditation.

With the gradual and continued attenuation of the feeble mental sound to feebler to feeblest state the sound ultimately disappears to transcend thought and mind as in Transcendental Meditation. Then follows the experience of the consciousness, the *saadhak's* own self-consciousness, separate from and beyond the mind. Then it merges with *sat-cit-aanand* (blissful awareness of universal consciousness).

During the practice of Aanand Yoga the *saadhak* (practioner) passes through the states of the *kewalya* state of Paatanjali Yoga. That is, with single point awareness of the object of meditation and that of the self faded away. It then transcends mind/thought/feeling (*bhaav*) as in Transcendental Meditation.

Finally the *saadhak* reaches the blissful realization of the individualized self (*aatmaa*) and thence to that of the immanent universal self (*parmaatmaa*) or all-self (*sarvaatmaa)*. Therefore Aanand Yoga, in effect is an IMMANENT MEDITATION (IM).

Traditionally, single thought stream (*cittavrittinirodhah*, Paatanjali Yoga) itself is Yoga. In Aanand Yoga mind becomes thoughtless (*aanandyoge cittanirvrittah*) but it does not stop there. It continues with the thoughtfree 'infinite vacuum' till the *saadhak*'s *aatmaa* unites with the all-self (*parmaatmaa*) and *buddhi-aatmaa* experiences their common nature of *blissful 'awareness of existence*' (*sat-cit-aanand*).

The mind (*man-buddhi*), in this state and even after coming out of this lofty experience, has *aanand*, tranquility, peace, purity and freedom from desires (Gita **2**/55), *raag-dwesh*, *yog-kshem, duand* (dualities) and three *gunaas* (Gita **2**/45). Aanand Yoga thus helps purify and stabilize *buddhi* and attain the *brahmi*-state (Gita **2**/71, 72). The *saadhak* can now intuit and visualize original ideas. Great thoughts and solutions to great problems, spiritual, scientific or mundane, can now flash freely through it. Concentrating on, understanding and learning, new ideas and texts become now easy and facile. The unwanted thoughts do not disturb any more. Full mental and intellectual capabilities open up and become available for ready use. Continued practice of Aanand Yoga weakens the habitual forces of lust, anger, greed and other aberrant tendencies. One does no longer 'only want to be' but actually becomes and remains happy habitually.

Since Aanand Yoga follows the individual *saadhak's* own single stream of mental sound as a form of thought, it has an all-time universal appeal irrespective of gender, religion, caste, nation, region etc. It therefore is 'the Yoga for all'.

One can do light mind-tranquilizing Aanand Yoga even while sitting in a chair or traveling. It can also be done in a lying position before going to sleep. Nay it relaxes and helps inducing sleep. It attenuates anxiety and promotes mental peace. One can do it while waiting or while doing nothing otherwise.

But deep practice of high stage should be done in a secluded place regularly with great respect and faith to develop the right biological rhythm.

Its soothing effect is pleasing and full of joy (*aanand*). With daily practice of this simple but effective Yoga one can remain tension free and solve problems easily and unwaveringly.

Its continued practice gives the taste of Spirituality and it itself becomes a way of life when its under-current goes on imperceptibly with and beneath other activities.

Serious and regular practice of Aanand Yoga has the potential to bestow the combined benefits of *Gyaan* (knowledge) *yoga*, *Nishkam Karma* (desireless action) *yoga* and *Bhakti* (devotion) *yoga* as envisaged under the *Sanyukta yoga* (Integral Yoga) of Sri Aurobindo

In the above form of Aanand yoga the infinite Brahm is the ultimate object of meditation. In the second version of the Aanand yoga (mentioned in sec. 18.8.2) *Aatmaa-Buddhi* is the first object of meditation, which leads to the meditation on the infinite Brahm and then to the realization of *Aatmaa-Parmaatmaa* unity or identity.

The yogi mentally scans the brain and locates the site of 'i-am' consciousness within it (the brain). Meditation on this site with the consciously attempted feeling of self Aatmaa merging with the infinite all-composing and all-pervading '*sat-cit-aanand*' Brahm generates the 'experienced knowledge' i.e. the *vigyaan* of *Aatmaa-Parmaatmaa* unity or identity.