

VIVEKANANDA: AN INTUITIVE SCIENTIST

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Abstract

Swami Vivekananda was a multifaceted genius. While his spiritual eminence is well known, his insights in physical sciences are lesser known. He was well acquainted with the scientific thoughts of his time and was remarkably accurate in his observations and conclusions with regards to many scientific notions. The power of intuition is an important ingredient of creative thinking which leads to innovative discoveries – Eureka moment. Our sages did possess the intuitive power through concentration of mind doing meditation and have made lots of very significant contributions in science and mathematics. The concept of zero, infinity and the decimal number system were developed in India. Swamiji saw interrelationships among Sankhya philosophy, cosmology, gravity and relativity. He also pronounced that energy and matter are interchangeable in space and time domain. On his suggestion, Nikola Tesla, the mathematician and physicist tried to formulate a theory on the above. During his tour of the United States and Europe, Swamiji met many of the well-known scientists of the time. He met in New York Sir William Thomson, Lord Kelvin and Professor Helmholtz – leading representatives of science in the West. The mathematical proof of the principle that Swamiji was looking for did not come until about 10 years later, when Albert Einstein published his paper on relativity and his famous equation $E=mc^2$. This is what Swamiji was looking to get from Tesla.

Keywords: Eureka, scientist cosmology, relativity

1. Introduction

It all commenced way back in the year 1897. The extended and taxing expedition to the micro-world; and with concurrent investigation of macro-world as well started. Till then, atom was well thought-out not only to be the least unit of matter, but undividable as well. This legend was broken by J.J. Thomson after his unearthing of electron in experiments with the Cathode ray tube. He presented a plum pudding model, to elucidate the arrangement of the atom signifying negatively charged electrons to be interspersed like raisins in the pudding with the dough containing the positive charge.

But, this proposal of atomic configuration proved to be erroneous, when nearly 15 years later Thomson's disciple- Rutherford showed the positive charge to be restrained as a small impenetrable nucleus in the core of the atom, with negatively charged electrons adjoining it. Two years later in 1913, a student of Rutherford- Niel Bohr proposed a model of atomic structure which was ornate on the pattern of solar system, and his replica is termed planetary replica of atomic structure. In this model, electrons are orbiting around a positively charged central nucleus like the planets orbiting around the sun.

Bizarrely, an itinerant monk of India said of his idea, that the plan of the universe in material plane follows the identical prototype for both micro-world and the macro-world. He well-defined in early 1890's, that whether it is of the Earth, Sun, or the tiniest particle of matter- the plan followed is alike.³ Arousing from a reverie that followed his deep meditation below an old *Peppul* tree beside a watercourse near Almorah, he penned down his idea in a note book and wrote, "The plan of the universe of both micro-world and macro-world are built on the same plan-the whole universe exists in the atom".⁴ His idea was anti-science in that era, where the general faith was that atoms are the smallest particle of matter and they are undividable. But quarter century later it proved to be the accurate scientific reality

In the Bohr's planetary replica of the arrangement of atom, it is obligatory to add that Bohr's model was remodeled by Somerfield on the inquiry of the details, making rosette structure of the electronic trail and termed Bohr-Somerfield model. This model was also taken up a step advance by Schrodinger in 1926, introducing the quantum –mechanical model of atomic arrangement. He introduced the possibility notion in the

orbiting path of the electrons putting in the sub –energy levels of most feasible electronic clouds. In 1932, with Chadwick’s discovery of neutrons, the central nucleus became known containing both positively charged proton and neutral neutrons.

But the account of atom does not end here. Based on the recent discovery--- protons and neutrons are known to contain still minor particles like quarks, which are well thought-out to be the oscillatory chains of energy particles. Now in 21st century this twine based theory, termed as the theory of the whole thing, is trying to envisage the complete plan of the universe as an amalgamated field.

In the meantime Albert Einstein had formulated in 1905, that matter is nothing but the reduced form of energy, citing the quantitative connection between the two. Subsequently for the next 40 years Albert Einstein tried to find out one solitary principal form of energy, under whose sunshade could be said to compile all the energy systems, leading to both the micro world and macro world.

Bizarrely, that same wandering monk in his discourse in London daringly asserts, “When you look at the universe, keep in mind that you can lessen it to matter or to force (meaning energy). If we augment the velocity the mass decreases.”^{5,6}

Such daring declaration had to stay for another 9 years proving the inter convertibility of matter and energy, from Einstein’s equation in 1905. The same monk delivering a conversation on “The Absolute & manifestations” affirmed indifferently, as if a representative of the scientific society, that “Science nowadays is telling us that all things are but demonstration of one energy which is the totting up of the whole thing which exists”.⁷ Such one energy declaration that he said in 1896, is the matter of investigation in the 21st century. Scientists worldwide are yet functioning out even today, a century and half later, to reach that goal- recognition of single energy under whose realm all other forms can be incorporated.⁸

This itinerant monk is Swami Vivekananda and I would try to elucidate to what degree, contemporary discoveries of 21st century would seem to be echoes of Vedanta, as boldly declared by The Swami. The Swami is known as a spiritual leader with a glittering persona but his scientific bent of mind has principally been uncharted and this study will make an objective investigation of Swami Vivekananda as the scientist parting away all the touchy embellishments.

2. Science and its Nature

As per the Oxford Dictionary science means: “knowledge about the arrangement and actions of the natural and physical world, based on essentials that you can confirm, for example by experiments”. The utterance scientist means: “a person who studies one or more of the natural science (=for example physics, chemistry, and biology)functioning in his lab”. Certainly, as per the above stated definition, The Swami was not a scientist and perhaps nor does Albert Einstein fit as scientist. Einstein’s hypothesis of relativity proposed in 1911 was deduced from the contemplation process of an amazing mind, based on theoretical doctrine only. The responsibility of its proof lay to Sir Arthur Eddington nearly a decade later than Einstein’s proposed theory. Eddington observed during solar eclipse in 1919, that the light from the stars certainly bent as it grazed the Sun, by the precise quantity of Einstein's predictions, making Einstein an icon.

In equivalence to it, “the comparison of the guiding belief in both micro-world and macro-world... the solar system & the atomic structure”, that The Swami envisioned at times in 1890, had to hang around for nearly two and half decades for its authentication from Bohr’s atomic structure propound in 1913.

It is also value mentioning that the wave-particle duality of electron (in analogy to light) propounded by De Broglie in 1923, was just a premise based on theoretical deliberation process from quantum mechanical advance. It had to hang around 4 years for its experimental evidence made by C.J. Davisson & L.H. Germer, showing diffraction of the electron comparable to wave’s diffractions alongside crystals.

To identify the accurate sphere of science as a methodical body of knowledge, investigations that are mostly confined to the physical universe become dime a dozen. Data, inference, hypothesis, predetermined ideas, verdict, phenomenon analysis, theory and laws become tremendously influential. As study advances and the margins of knowledge swell, disposing and rejecting the old theories in favor of newer ones is a authoritative way to applaud brilliance. Scientific study, in general, is a well –synchronized movement, a combined attempt of numerous scientists and not just a human being achievement. Its pragmatic application may supply human necessities and make life effortless.

Thus, it is contended to redefine a scientist, “who from investigational study or, simply from amazing contemplation process, can lift the great blanket of nature, at slightest a part of it”. Of course, it has to remain for its widespread recognition either, from confirmation by experiments and observations or, making postulate defining the principles using the tongue of science. We are to follow this description of scientist, when we try to review The Swami as a scientist.

2.1 Swami Vivekananda as Scientist

The significant question that arises is the inevitability of such individuality task of The Swami with science, which in his own precise has been commended as a religious messiah, the clairvoyant of the nuclear age. Predominantly when The Swami himself said over his hunt of the unconditional (Divinity-concept of The Swami), “Art, science & religion ...are the three diverse ways of expressing a solitary reality.” In this context it may not be out of place to quote from Albert Einstein, who also said, “The most beautiful and deepest experience a man can have is the sense of the mysterious. It is the fundamental opinion of religious conviction as well as the serious effort in art and science. He who never had this understanding seems to me, if not deceased but blind.”¹⁰

It could be noted from the study of The Swami’s works that he favored to use the words of science to clarify the perplexing philosophical thoughts on Vedanta, or his spiritual discourses. In order to differentiate between the eternal soul in a body and of the ubiquitous Divinity never-ending (distinguishing between *Jibatma&Pramatma*), the common allegory given by philosophers is that of a water-filled decanter immersed in the deep-sea, making the decanter water discernible from the ocean, though both are the same. The container decanter (the shroud of Maya) demarcates the decanter water from the ocean; till the pot is broken with the tool of *Jnan/Bhakti* etc. But such allegory identifying deep-sea with Divinity etc, lacks the perpetuity constituent of Divinity, since the deep-sea though gigantic, is bound.¹¹

Mention may be made of one more religious conversation of The Swami where he explained that non-violence can be called a desirable quality only for the strong and not for the weak and lethargic; with whom it is certainly not a desirable quality, but only fearfulness & transgression. He explains citing a occurrence of science, saying: “In all matters two limits are alike. The farthest positive and the farthest negatives are always alike. When the pulsation of light is too slow, we do not see them, or when they are too speedy. So with reverberation; when very small sound we do not hear it; when very elevated, we do not hear it either”.¹²

The Swami’s advance in relevance of scientific reality to explain religious puzzle may be understood from his advance in dissuading certain uncertainties of his follower HaripadaMitra. MrMitra had confusion on clashing attributes of Divinity, of delivering righteousness and at the same time be kind as well; which seemed to be a irony. As an alternative of giving a philosophical conversation explaining Divinity to be the congregation point of disagreement, judgment etc., The Swami cited the concurrent survival of two opposing forces of centripetal (acting towards the centre) and centrifugal (acting away from the centre) in material plane itself. So how can it be measured to be an absurdity as the opposing qualities concurrently offered over the all mighty Divinity.¹³

The Swami’s spiritual talk used to be in the words of science, illumined with the lucidity of a realistic scientist, than following the indistinct jargons of a mystical.¹⁴

Thus, based on the above background, it may be quite relatable to introspect the accomplishment of The Swami as a scientist, and of course not attribute designating The Swami to be the scientist.

This makes us to bring to luminosity the following aspects from the being and works of The Swami, such as:

- His profundity of acquaintance & grab over the up to date material science.
- Any methodical experiments, if conducted by The Swami to get an insight into the material science or, even further than.
- To what extent he was in advance of his time in accepting environment, which might have got endorsement from potential studies, collectively with the points where he proved perfect and where he erred.
- His approach in illumination of the theology, nature & the social order with meticulousness of a passionate huntsman of the certainty, using scientific words and its authority over the scientific commune, if at all.

A brief investigation on the above four points is discussed beneath.

2.2 The Swami's Grasp over Contemporary Material Science

The Swami is said to have been an insatiable reader studying diverse subjects making an profound study on philosophy, history and literature. But his curiosity did not remain restricted to these topics on humanities only. Mathematics (popularly said to be the gateway of science), was one of the subjects which he had to study as his curriculum course till the graduation level 10; with particular interest in applied mathematics & astronomy. In this period he made a thorough study on Divinityfray's astronomy book.¹⁵ Naturally, even for making elementary study on astronomy one has to be thorough in optics to give details of eccentricity in positioning of the celestial bodies and has to study fundamentals of physics.

The Swami's scientific bent of mind and his acumen to grasp and accept scientific truth can be understood from his worry for his spiritual master Sri Ramakrishna's onset of throat pain sometimes in August 1885.¹⁶ It was The Swami, who first apprehended his guide & Guru Sri Ramakrishna's sore gullet symptoms to be an assail of the not curable Cancer, from studies of medical books in the medical college library; though the doctor examining him then, disposed it off to be clergy man's sore throat (Singer's nodule), caused from too much of lecturing.¹⁷ Later The Swami's apprehension proved right by subsequent specialist doctors. The Swami, who loved his Guru Sri Ramakrishna more than his own self, felt tremendously sad realizing the hard reality that this is incurable and fatal whilst other senior disciples of Sri Ramakrishna, out of their emotive cheerfulness, considered it to be just a passing phase and some miracle will cure this.

The Swami talked about Hinduism and Vedanta at the World Parliaments of Religions in Chicago in 1893 and the American audience was enraptured with his talk. He gave an equally notable converse on a totally profane topic at the request of American Social Science Association. The topic delivered on Sept 6, 1893 (prior to his address at the Parliament of religion), at the Town hall was, "The Uses of Silver in India" (the silver standard was a burning question at that time in American Politics).¹⁸

The Swami, stressed out upon the call for science institutions & research in India and Jamshedji Tata, the great entrepreneur, was so much overwhelmed speaking with him that he later on established a research institute, then known as the Tata Institute which later emerged as Tata Institute of fundamental research in Mumbai & Indian Institute of Science, in Bengaluru; and he wrote asking him to take charge of it. He wrote: "I am of assurance that if such a movement in chore of a straightforwardness of this kind were undertaken by a knowledgeable leader, it would greatly help grimness, science, and the good name of our run of the mill country; and I know not who would make a more appropriate General of such a movement than Vivekananda."¹⁹

Of course The Swami, who renounced the world for a superior root, refused the offer, in the same way as he refused the offer for the Harvard Chair of Eastern Philosophy in March, 1896.²⁰

It has been reported that The Swami spoke at least four times at the erudite scientific sessions in Chicago Parliament of religion ... the contents of which are however not available.²¹

It may not be inappropriate to spot out here that The Swami used to be reasonably at home in the company of the then much-admired scientists. The scientific luminary of that era like Lord Kelvin, Prof. Von. Helmholtz, Nicholas Tesla, all attended the scientific sessions of Chicago Parliament of religion in 1893 and heard The Swami's discussions attentively. They were so highly inundated from his further than belief knowledge on the grab of science that they met later to hear him in dinner parties, as quoted from the diary of Miss Cornelia Conger.²²

The Swami suggested that Prana is a term used in the scriptures & in Vedanta; basic description of which can be "explained as the comprehensive manifestation of force".^{23,24}

The Swami visited Tesla's laboratory to perceive his experimentations, though the responsibility of formative quantitative connection stuck between matter and energy lay to Albert Einstein the great, 9 years later in 1905.

In these circumstances it may not be out of place to find out whether The Swami himself undertook some trialing over material science, or further than.

2.3 Scientific Experiments Undertaken by The Swami

The Swami, known as Narendranath in his premonastic days got overwhelmed at the effectiveness of gas, like, alighting the lane lights in Calcutta in late eighteen sixties. Narendranath, then a child tried his ground-breaking thoughts of its cohort by igniting straw at the complex of his residence along with his playmates, and tried to channelize it collecting some earthen pots and lead pipes etc. This is the only confirmation that we can quote of The Swami building some scientific experimentation, though this was during his early childhood days.²⁵

In later life The Swami made experiment in cerebral plane with Raj-Yoga, which can be termed to be the “science of human possibilities” or the science of attaining exactness. The Swami declares, “The science of Raj-Yoga proposes to put before humanity a realistic and systematically worked out method of reaching the reality”²⁶ The truth with assurance that we are the children of immortal bliss. The truth that declares “each man is only a means for the endless deep-sea of acquaintance and power that lies at the back of mankind”²⁷. The Swami not only himself earned such control from practice of Raj-Yoga, but kept on cross checking with experimental corroboration of its marvels, to be convinced of.²⁸

The Swami, like a scientist who cross checks and thoroughly verifies facts for his experiments over material objects, cross-checked and established delicate psychic power appearing in physical plane for his teacher and Guru Sri Ramakrishna before accepting them to be true.

Yogic powers and experiences are predisposed of by masses as further than the extent of human thoughtfulness. But The Swami, with a scientific bent of mind gave explanation of such evident marvels. He explained, “think of the cosmos -consisting of varying degrees of sensations under the action of *Prana*; sensations are less if they are away from the centre, but nearer to it they become faster and more rapidly. those of a certain state of pulsation will have the power of recognizing one another, but will not recognize those above them (their plane). Yet, just as by the optical instruments like telescope and the microscope we can amplify the compass of our visualization, similarly we can by Yoga bring ourselves to the state of pulsation of another plane, and thus enable ourselves to see what is going on in that world”²⁹. Thus with his scientific explanations the spirituality of Yogic marvels no longer remains unfathomable mysticism, but a provable scientific reality.

Now the question arises as to any other vision that The Swami might have had in lifting the veil of nature, which later on might have the confirmation from rigid scientific experimentations. Some of the vital ones thus proclaimed by The Swami are discussed below.

3. The Swami’s Proclamations in Elating the Blanket of Nature

It is to be appreciated when The Swami spoke of his visualization as early as in 1890, saying the plan of the cosmos of micro-world and macro-world to be similar, atomic arrangement to be indistinguishable with the solar system; he definitely did not state something on whether it was orbit or orbital structure or, electron cloud etc. They were left for the scientists to investigate, proving the details over the broad visions & opinion that The Swami had.

Speaking about *Prana* –The Swami quotes from Vedanta it signifies energy in contemporary vocabulary.³⁰ He did not say anything on the quantitative relationship between the two, which was left to the scientists (Albert Einstein to prove mathematically with the velocity of light). However, such talks forced & stimulated the renowned scientist like Tesla to such a degree that he wanted to prove it mathematically, and learnt Sanskrit to know more facts about the *Prana* that he heard from The Swami³¹.

The relatable question arises, on whether besides matter-energy exchangeable relationship, The Swami made any more forecast on the scientific truths, may be on largely broad principles.

The Swami’s world centered on Divinity and charity and his discourses were by and large limited to these topics. However with his scientific bent of mind and wisdom we find glimpses of scientific truths told in the course of such discourses, which had to wait for scientific substantiation for a number of years and there are yet some aspects which needs further investigation. Some of them may be quoted as follows:

1. Ecological balance.

2. Indeterminacy of nature.
3. Conception of the Cosmos.
4. Theory of Relativity
5. Theory of Unity

A brief resume of the above five topics as per The Swami's talk & successive scientific query on their authority, are discussed below.

3.1 Ecological Balance

Ecology has become subject of great interest since mid-twentieth century not only amongst scientists but also administrators. From this time on the significance of preservation of all genus have been realized and humans have implicit that due to the interdependence of species, in order to survive we must all survive together or we all perish. This has led to the much talked of topics like sustainable growth, environmental impact assessment (EIA), maintain eco-balance, restricting species extermination etc. These topics, measured tremendously relatable and of global concern today in the 21st century, were unknown in the late 19th century or, during The Swami's time.

But astoundingly we find The Swami talking about this interconnectedness of nature during a talk delivered in London in 1896. He says "...every particle in the cosmos ...is in relation to every other particle.Interdependence is the rule of the whole cosmos."³². He said more particularly at Los Angeles, in his talk "Hints on realistic spirituality", the exact mention of such topics relevant to modern ecology. He said, "The whole cosmos is one of perfect balance. I do not know that some day we may wake up to find that the meager caterpillar has something which balances our manhood..... equilibrium everywhere"³³. In fact, environmentalist today are alarmed on unbalanced growth of our industry /commerce with haphazard use of resources, not keeping in tune with Nature's equilibrium (of resources availability), over which The Swami's concern was practically a century in advance.

3.2 Indeterminacy of Nature

In his talk on the topic of "Unlimited and Manifestation" delivered at London in 1896 The Swami talks of the indeterminacy of the Absolute when viewed through the prism of time, space & causation, which is the "WHY" aspect. Using his precise words, "How has the endless, the unconditional, become the restricted?This Absolute (a), has become the cosmos (b), coming through time, space and causation..... what we describe causation begins afterthe deterioration of the Absolute to exceptional, and not before; in the categorical there is neither time, space, nor causation. It is all one.it is only something that has become restricted by our mind,, if the unconditional becomes scarce by our mind it is no more unconditional. It has become restricted. Everything inadequate by our mind becomes restricted. Therefore to know the supreme is again a disagreement in terms"³⁴. He further said, "Unconditional is manifesting itself as many through the blanket of moment, gap and causation. ...Time is exclusively a reliant existence; it alters with every transform of our mind. ...So is with space. ...it can't exist split from anything else. So is with causation."³⁵

Three decades later The Swami's indeterminacy clause in understanding of the supreme opened up a new perspective of Physics, initiating debates amongst the greatest scientists over this indeterminacy or, vagueness in Nature, when measured in the minor balance of nature³⁶. It all started with Werner Heisenberg, in 1927 termed indeterminacy belief or, the more popular term uncertainty opinion; stating that " the position and the velocity of an object can't both be calculated exactly, simultaneously, even in hypothesis. The incredible concepts of accurate position and correct speed in concert, have no denotation in natural world. The more precisely we know one of these standards, the less precisely we know the other"³⁷.

But the challenge continued for quite a long time with Einstein not influenced of such doubts. Albert Einstein refused to be acquainted with quantum indeterminism and sought after to reveal that the standard of indeterminacy could be desecrated, indicative of original deliberation experiments, and known as Einstein box, countering such embedded qualms in nature. Neil Bohr could later on show the erroneous belief in this Box trial (thought process) from Einstein's own gravitational theory, caused with respect to the measure of time³⁸. Science has thus embarked from Newtonian mechanics with lucid cut rules, to the probabilistic quantum mechanics with rooted uncertainties viewed through the prism of time, space & causation.

3.3 Creation of the Cosmos

Lord Kelvin (1824-1907), the scientific celebrity of Swamji's era, and an aficionado of The Swami with reciprocated deference for each other, resolute the age of the earth to be 100 million years, from Newton's laws of cooling. It was consequent to be of much higher value, around 4.5 billion years from radioactive dating method, revealed much after^{ward}. As regards the age of the Cosmos is alarmed, NASA's study, estimates it to be around 14 billion years⁴⁰.

Since late twentieth century, scientists around the sphere are trying to resolve the beginning of the Cosmos and came out with the fact that the cosmos in the primeval stage was infinitesimally diminutive, substantially hot, a great deal dense, somewhat – termed in singularity state. There was no luminosity, no space, no time and all these came subsequently. According to NASA when the cosmos from Singularity state, experienced an unbelievable rupture of expansion, (termed Big Bang) it reached from subatomic size to golf-ball size in just 10-34 sec.^{41,42,43,44}

In this extended voyage of science unscrambling the conception of the cosmos, starting from nineteenth century luminaries like, Lord Kelvin, to 20th century stalwarts like, Edwin Hubble, Steven Hawking, George Ellis, Roger Penrose, Arno Penzias, Robert Wilson, etc. and of the team of 21st century NASA scientists; where does The Swami (1863-1902) of nineteenth century locate, with His story of conception of the cosmos?

Citing 6000 years old verse of Rig-Veda, printed in a lyrical speech in Sanskrit, The Swami translated in English and said, "When there was neither aught nor zero, when dimness was undulating over dimness, what existed?It then existed without pulsation. The *Prana* existed then without pulsation ... The *Prana* existed then but there was no action in it. *Anidavatam* (unpulsing), means existed without pulsation. ...Then when *Kalpa* (conception) begins, after an enormous hiatus, *Anidavatam* commences to pulsate and blow after blow is given to *Prana* by *Akasha*. The atoms turn out to be reduced, and as they get reduced disparate rudiments are produced"⁴⁵. (Apparently *vatam* stands for *vayu* or air; so *Anidavatam* stands for no air. But with the implication of Sanskrit language it means firm properties of air causing pulsation, so *Anidavatam* means –no pulsation, no movement, all stationary).

In modern vocabulary, ANIDAVATAM may be said to be corresponding to Singularity from which sprang forward time & space and energy and all of conception, which in The Swami's language were all there but remained motionless which became lively, when blow after blow (impact in modern terminology) is given to *Prana* by *Akasha*. This Sanskrit language *Prana*, *Akasha* and *Kalpa* have their special connotation, of which The Swami himself explains saying, "Every demonstration of authority ...is the *Prana*...every substance manifestation is *Akasha*. When this cycle will end all will dissolve back into original *Akasha*.all will make your mind up into original *Prana*. Then this cycle is said to slumber for a period to throw out ...all these forms. .the whole period will collapse again. Thus this process of creation is going down, coming up, oscillating backwards and frontwards... it is becoming stationary during one period (*Kalpa*) and during another period, becoming lively ...this alteration goes on for perpetuity"⁴⁶

Explaining more unequivocally the implication of the expression *Prana*, The Swami said, "The totting up of all forces in the cosmos, mental or physical, when resolute back to their distinctive state is termed as *Prana*"⁴⁷ The adage "force" as The Swami used, would in contemporary tongue be said to be matching to "energy". Meaning of the term *Akasha*, as per the Vedas means the gigantic gap, where all thoughts remain in the abridged state, which the Rishis can only see as the unblemished Mantras; from which spring forth everything in the cosmos. The Swami while stating on conception from *Akasha* says, "At the end of a cycle the energies in the cosmos quiet down and become potential. At the commencement of the next cycle they start up, thump the *Akasha* and out of the *Akasha* develop these a variety of forms"⁴⁸ (of creation). This *Akasha* thus in modern language could be considered to be the same, as Quantum Vacuum & the cycles that Swamiji referred to, are the "*Kalpas*", which goes on for perpetuity; one subsequent the other.

About the age of the cosmos The Swami said, "The sum total of the energies in the cosmos is the same all through.Energy toned down and reassured and next gets manifested. This developing and linking goes on through eternity"⁴⁹ Modern science however is soundless on what existed before singularity and fixes up the age of the cosmos to be of 14 billion years, and not of alternating big bang and big crunch, going on for perpetuity, as per The Swami; which is one cycle or *kalpa* following the other.

Did Swamji say anything about the spreading out of the cosmos when it got manifested? In some other milieu The Swami said, "In the material physical world expansion is life, and contraction is death. Whatever ceases to swell ceases to live"⁵⁰. The whole thing in nature has a sway tendency to stretch out for existence and diminution for bereavement"⁵¹.

Being himself a learner of mathematics, The Swami also said, "...the sum total of the energy that is displayed in the cosmos is the same all through. You can't take away one particle of matter or one newton of force"⁵². So in *Anidavatam*, which may be said to be the same as modern language of Singularity, everything remained integral but not manifested.

Thus we do find that The Swami's story of the "creation of the cosmos;" resonates moderately sound with the 21st century big bang theory, although it does be at variance over the inquiry of particulars. Science does not accept perpetuity of cycle; it is soundless over the state before singularity. It also admits that dark energy & dark matter, which taken together constitute nearly 96% of the cosmos, remains an unresolved mystery in the 21st century science.

3.4 Swami Vivekananda on the Theory of Relativity

During the 19th century, scientists made momentous advancement on the laws pervading the natural world. The most convincing, advanced and amazing contribution was made by Newton. This led to the founding of the premise of gravitation, its ultimate function in cosmology and planetary systems. On the other hand, it could not resolve the communiqué and symbiosis of chief earthly parameters viz., space, time, matter and energy. Also, the hypothesis lacked adequate expounding influence with regards to how the gathering of a given entity could be transmitted throughout the space. At this significant stage, Swami Vivekananda came to the West and categorically proclaimed the unison and individuality of energy and matter. He conceptualized that the never-ending and the total, as perceived through the coordinates of mind, time, space and causation, is not anything but the limited and the comparative world. From this, it can be contentedly deduced that the above parameters are not only unified, but also that matter and energy are consistent and harmonized in the space time sphere of influence. It is a ground-breaking idea and no mathematical formulation was accessible at that time. Swami Vivekananda was familiar with the well-known mathematician Tesla and requested him to devise the obligatory hypothesis related to energy, matter and their inter-convertibility.

Swami Vivekananda wrote: "Mr. Tesla thinks he can reveal that force and matter can be condensed into energy. I am to go and see him next week to get the new mathematical revelation. In that case, the Vedantic cosmology will be placed on an resolute basis. I am working a good arrangement now upon the cosmology and eschatology of the Vedanta. I undoubtedly see that ideal blending in the modern science and the illumination of the one will be followed by the other." Eschatology is a branch of religious studies that is alarmed with the final events in the past of the world of mankind. On another juncture, he said: "We have matter and force. We don't know how the matter disappears into force and force into matter. Consequently, there must be something else, which is neither force nor matter, as these may not vanish into each other. This is what we call the complete mind. It is ubiquity at its finest."⁵³ However, sadly, Tesla couldn't arrive at a principle that equates matter and energy.

In February 1895, The Swami wrote a perceptive commentary on Ether, which got published in the New York Medical Times, an exceptional scientific journal. In the said commentary, he wrote: "Thus, we are forced to find that the ether can't clarify space because we can't but think of ether as in space. And consequently, if there is anything which will elucidate space thus, it must be amazing that comprehends in its endless space itself."⁵⁴ In this relationship, it is to be noted that Swami Vivekananda was the first to rebuff the "Ether Theory" before Einstein stating that the "Ether theory" could not dynamically clarify science. The Swami's argument is in absolute compliance with the modern science. Later, Michelson Morley's interferometric test convincingly proved the nothingness of ether.

3.5 Swami Vivekananda on Theory of Unity

Swami Vivekananda spoke on the theme of unison on quite a lot of occasions. At least, a few of those utterances should be looked in the luminosity of today's contemporary science: "Science is not anything but the pronouncement of unison. As soon as science would reach ideal unison, a state of utter ecstasy, it would discontinue from further advancement, because it would arrive at the objective. Physics would discontinue when it would be able to accomplish its services in discovering one energy of which all others are but ideal manifestations. The maxim and the quintessence have been the cohesion of all life. One particle in this cosmos can't move without dragging the entire globe along with it. One man contains the entire cosmos. One particle of matter has all the energy of the cosmos at the black. This mind is coupled with alternate mind. Where on earth it is located, it is in actual communiqué with the whole world."⁵⁵

This exactly echoes the instinctive scientific visualization, the holistic method of investigating nature of scientists. Conceivably now, it is utterly essential to bring to mind Swami Vivekananda's proclamation and emphatic vision that "one man contains the entire cosmos; one particle of matter has all the energy".⁵⁶ This obviously signifies the reality that man can't segregate himself from the cosmos. And these thoughtful, perceptive and precious statements are coming closer to the conclusions being interpreted by the present day scientists.

There is something more in the armory of Swami Vivekananda. While The Swami concurred with Darwin's theory of evolution to a great degree, he recommended that the thought of involution must be incorporated into it, to make it inclusive. This steadily laid the pathway to "continued existence of the fittest" hypothesis. It is ultimately the early idea of agreement of survival that opened up many other gifted ideas.

"Follow veracity where on earth it may steer you; carry belief to their furthest away articulate wrapping up. Capture your last breath to the fight. A thousand times salutation demise. Be not disheartened. There is no flee. This holistic world is as inexplicable as the other" ———Swami Vivekananda⁵⁷

4. Language of Science that The Swami Used in His Discourses on Metaphysics

In his talk in unifying the distinctiveness of Divinity with His conception, The Swami said, "Conception and originator are two lines without commencement and without end, running analogous to each other.Divinity...from whose authority systems after systems are evolved out of commotion, made to run for a time and again shattered.the sun and moons, created like the sun and moons of previous cycles....."⁵⁸ Also Swamiji in his talk on "Real & evident Man" starts asking question after some foreword as regards, "...whether the cumulative of the material we call the body is the source of the expression of the force we call spirit, thinking etc, or whether it is the thinking that manifests the body"⁵⁹ Based on this reservation The Swami in his conversation proves like an Euclidian Geometry theorem, saying ".....the actual man as a result is one and never-ending, an ubiquitous strength. And the perceptible man is only a restriction of the actual man."⁶⁰

Swamiji said of his wrapping up somewhere else saying, "In its very spirit it (the soul) is free, liberated, holy, clean, and ideal. But one way or another it finds itself coupled behind to substance.Why should the liberated ideal being be therefore under the thralldom of substance.....How can the ideal spirit be deluded into the faith that it is flawed?It is a fact that everybody's realization that one thinks of oneself as the body.The answer that "it is the will of Divinity" is no elucidation. This is nothing more than(saying), "I do not know".⁶¹ This language of guileless admittance "I do not know" is not the speech of metaphysics, but the speech of science, which only states essentials and refuses to respond every "Why"; conceitedly and unabashedly declaring, "I do not make out yet, but I will find out".

The Swami in enunciating the core of Raj-Yoga, asserts it to be class of another science subject, involved which in its agreed methods, one and all can have straight understanding (of spirituality), like the investigational results obtained from the different branches of science following their individual methods and not to consider anything unless the results are achieved. The Swami emphatically denies the common mistaken discernment of its non-universal submission at the current day, which says it to be archaic now and practiced previously only by few founders of religious conviction. The Swami says, "This I totally deny. it completely follows that that this practice has been likely million times prior to, and will be repeated everlastingly. Standardization is the meticulous law of nature. What once happened can occur forever. If there is a Divinity, we have got to see Him, if there is a essence we must distinguish it; otherwise it is better not to deem. It is always enhanced to be a candid disbeliever rather than being a swindler"⁶²

Citing on the appropriately guided influence of thought to the inner illuminating us, he says, "The powers of intellect are like the waves of light dissolute; when they are concerted they light up"⁶³

All these are a small number of illustration as to how The Swami's talks and discourses in metaphysics straightforwardly illuminated with judiciousness, and he spoke in the tongue more of a scientist than that of perplexing philosophical judgment with jargons of a spiritualist.

5. CONCLUSION

Holistic science is an intermingle of science and theology. While science is prevalently well thought-out "Vijnana", theology is deemed "Jnana". To a considerable extent, science and theology can be seen to have

a universal aspire i.e., to make known the eventual fact for the endorsement of human morals and for the opulence of mankind. Just as impartial curiosity for the unidentified marks scientific temper, a ardent proclivity for "Truth" often happens to be the strongest impetus for a spiritual seeker.⁶⁴

Spiritual seeker is a holistic scientist who continuously grapples with perpetual questions. A passionate push for unravelling the mysteries of life and demise is innate. For him, life is not ridiculous or just the consequence of an catastrophe. He is concerned with truth as the ultimate source, the secret of secrets, the Holy Grail to all maladies. Holistic Science may be described as incredible that concerns itself with the meticulous and incorporated employment of the full capacities of the human consciousness to build up a participative connection with the nature that is away from the vagaries of existence. Mainstream science has the grand ideal of absolute supremacy and be in command of nature. It firmly believes that we can expand consistent information of the world only through investigative mathematical analysis. In this characteristic, holistic science differs from mainstream science. The mainstream scientific group of people is tremendously commanding and has yielded volumes of precious information, but, desolately, the great ground-breaking scientific geniuses focused only on quantities and observed the cosmos, and certainly any occurrence, as not anything more than a machine which could only be unspoken by plummeting it down to its vital cornerstone.⁶⁵ Logical deductions, analogies and analyses have been the anchoring rudiments of science throughout the past four centuries. Well, there is not anything dreadfully incorrect with these anchoring elements. But, by combing away all the other ways of cognizance that come to us through instinct, perception and thinking, they have given us a twisted, unbalanced view of the world. More frequently than not, typical science has overlooked traits such as the nature of inner-man, because there seems to be no way to work out these aspects. In holistic science, we progress conscientious methodologies to conquest over these handcuffs, and in this course, we comprehend that we put back jointly and restore both the world and ourselves.⁶⁶ There are well known scientists and ultimate saintly masters, but we hardly ever come across one with adroitness in both the fields. Swami Vivekananda belongs to this rarest of rare frontage of holistic science. He is an epoch-making persona, and exclusive experimentalist in theology, is the one who has fathomed the deep-sea of theology with fervent voyage and realized the ultimate authenticity.

Swami Vivekananda is one of the most illustrious in the sequence of astonishing persona. He was a child phenomenon, optimistically intrepid youth, mutinous and radical for some of his friends, a creative thinker for some and an stirring leader for others. Sri Ramakrishna, the master craftsmen of men, freckled and formed Narendranath Dutta- the pre-monastic name of Swami Vivekananda into a doyen of unequalled qualities, manifold facet and rousing ideology.⁶⁷ Outfitted with in-depth acquaintance of early Indian culture and Vedanta, and educated in western style of teaching, Naren represented a sole concoction of the best of Eastern as well as Western mind-sets at a very youthful age. He laid an undisputable path to holistic science.⁶⁸ Through his introspection; he experimented with and experienced the unconditional truth. With that knowledge, he enunciated and envisioned the hypothesis pertaining to the comparative truths that oversee the physical world by amplification them in the light of utter truth. He is a great persona gifted with a contemplative and strenuous mind.

What scientists are arriving at during conducting tests and investigations, The Swami arrived at the same finale much earlier in time, and much more with fervor through innate contemplation.

In making conclusion it may be pertinent to make The Swami's celebrated quote, "In Buddha we had a great widespread heart and endless fortitude making religion pragmatic and bringing it to everyone's door".⁶⁹ In Shankaracharya we saw incredible intellectual influence, throwing the illumined beam upon all. We want at the moment that dazzling sun of intellectuality coupled with the compassion of a Buddha, the superlative endless compassion of kindness. This amalgamation will give us the utmost philosophy. Science and Philosophy will congregate and shake hands".⁷⁰

In The Swami's discourse and discussions we find both of Buddha's endless heart of compassion & Shankaracharya's incredible academic power throwing illumined luminosity upon the whole thing, being uttered in the language of science, today science and religion are shaking hands rousing both the humanitarians and scientists of the sphere in a similar way.

Thus Swami Vivekananda, the diviner of the nuclear age, emerged as a yogi and further like a scientist, who explained scientifically the deeper tenets of Vedanta, making them to be the realistic scientific truths, rather than mysterious superstitious thoughts expressed with jargons of a mystical.

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