Essay

The Weak Force as Manifestation of Anima Mundi: An Exploration

Iona Miller*

ABSTRACT

In quantum physics, there is no unambiguous description of consciousness and its role in the continuous creation and sustaining of matter. If it plays a fundamental role in existence we must look for it at the very root of all evolutionary processes in the fundamental forces of our universe which lead to the conditions that facilitate life as a potentially universal process. One such candidate for nature's fine-tuning system is the weak force, whose descriptors echo the traits of the pre-scientific and alchemical notion of the Anima Mundi, or World Soul, an embodiment of intrinsic vital connections among all life. The Jungian and archetypal worldview still recognizes such a living force within, attributing its life-sustaining energies to soul and the depth-dimension of our imaginal and perceptual experience. An enriching non-literal interpretation of such phenomenology may still be more than metaphorical. The weak force, only needs to be a tiny fraction of one of the myriad feedback loops to be the deciding difference due to the delicately balanced state that potentiates and fosters universal life, potentially originating in space (Hoyle, Wickramasinghe). In this sense, *Anima mundi* as manifested in weak force makes the Sun shine, creates water, and the "Goldilocks" zone of human habitation.

Further, is the observed strength of the weak force vital for the emergence of observers? Emergence is a possible order arising from chaos. Weak emergence describes new properties arising in systems as a result of the interactions at an elemental level. In weak emergence, the emergent property is reducible to its individual constituents. This is opposed to strong emergence, in which the emergent property is irreducible to its individual constituents. Causing systems to differentiate, weak emergence is the root of higher-order complexity, coalescing novel, coherent structures. Agents residing on one scale start producing behavior nested one scale above them, potentially including self-reflection. Humans become self-conscious and track their own evolution. Heeding the "inner voice" of the *Anima mundi*, can applied emergence help us work with the dynamics of emergent complexity to realize our intentions as life-serving outcomes?

Key Words: weak force, anima mundi, Jung, weak emergence, microbes, quantum information, hierarchy problem, Higgs field, renormalization, evolvability, anthropic principle, chirality, electroweak theory.

The last stage is reached when, in the highest tension and concentration, beholding in silence and utter forgetfulness of all things, it [the soul] is able as it were to lose itself. Then it may see God, the fountain of life, the source of being, the origin of all good, the root of the soul. In that moment it enjoys the highest indescribable bliss; it is as it were swallowed up of divinity, bathed in the light of eternity. Plotinus

* Correspondence: Iona Miller, Independent Researcher http://ionamiller.weebly.com E-Mail: iona_m@yahoo.com
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The imagination acts in a similar manner in the soul, and calls forms of life into existence. The spirit is the master, imagination the tool, and the body is the sculptural material. Paracelsus

[The World Soul] "illumines the universe and directs nature in producing her species in the right way." Giordano Bruno.

If medieval theology had removed God to a wholly transcendent sphere, to the Renaissance Platonists nature was permeated by life, divinity, and numinous mystery, a vital expression of the World Soul and the living powers of creation. In the words of Richard Tarnas, "The garden of the world was again enchanted, with magical powers and transcendent meaning implicit in every part of nature." David Fideler

INTRODUCTION

Our universe is a profound symphony of the forces of nature that govern its unfolding. Throughout history, mythic and imaginal descriptions of the forces of nature preceded more scientific models of reality. Even such scientific models retain their metaphorical nature and applications which enrich our perceptions of our place in the Universe. Corollary concepts bridge the soul and the material universe.

The Hierarchy Problem describes the vast discrepancy between aspects of gravity and the weak nuclear force, which has to do with the size of the non-zero Higgs field. The hierarchy problem is a result of the calculated effective rest mass of the electron being skewed by omission of half of the Dirac equation.

An analogous philosophical problem comes from thinking a transcendent divinity was the source of all creation, and humanity lived in exile from heaven in a state of sin. This doctrine created a split between matter and spirit, causing the world of nature to be seen as separate from its creator and humanity. Such a hierarchical worldview is a collective loss of soul.

Culture can be defined as the work of soul-making. Returning soul to the world not only attends to the world, it offers more opportunity to engage in the work of soul ourselves.

The World Soul is not a fixed or defined substance, but a living substance made out of the hopes, dreams, and deepest imaginings of humanity and of all creation. In the deepest sense, she is the universal wave function, the unmanifest ground of our being, spacetime and the radiant light of virtual photon fluctuation, which underlies all matter and manifestation. This is the home of creation's collective memories and the myths of humanity. What we used to describe in myths, we now explain in theories, which also retain their symbolic aspect.

A 2012 Gallup poll, described and critiqued in *Metanexus*, skews results by limiting options:

Here is how the question and choices currently are posed, with the 2012 percentages of Americans voicing each position represented in parentheses:

Which of the following statements comes closest to your views on the origin and development of human beings?

1. Human beings have developed over millions of years from less advanced forms of life, but God guided the process. (32 percent)

2. Human beings have developed over millions of years from less advanced forms of life, but God had no part in the process. (15 percent)

3. God created human beings pretty much in their present form at one time within the last 10,000 years or so. (46 percent)

All three options confuse mythic (meaningful) religious language with factual (measurable) scientific language. Sadly, for many people in America, such confusion is the norm—and priests and pastors in the pulpit are offering little help in sorting things out.

Even so, a growing number of thoughtful Americans have moved beyond the entrenched science vs. religion conflict. We go by many names and we find our homes both within and outside of church communities: religious naturalists, new theists, religious humanists, evolutionary humanists, emergentists. For us, we cannot say yes to any of the options Gallup offers.

It is thus time to evolve the Gallup poll on evolution. Simply add a fourth choice:

4. Human beings emerged naturally from a long process of physical and biological creativity that can be spoken of religiously as "God's creation" or scientifically as "evolution."

This proposed choice would enable a respondent to express a view of human origins fully grounded in mainstream science, while bridging to the mythic, interpretive language of religious tradition.

Joseph Campbell, Paul Tillich, Rudolf Bultmann, Huston Smith, Robert Bellah, Michael Shermer, Robert Wright, Pascal Boyer, and other scholars of comparative religion and evolutionary psychology remind us that we cannot understand religions and religious differences if we don't understand how the human mind instinctually and unconsciously relationalizes, or personifies, reality. More, there is no need for Americans today to give up the relational, to forgo meaningful connection and traditional language, even when we move beyond the supernatural belief systems of our ancestors. (Metanexus)

The Light of Being & Natural Wisdom

Jung suggested that the alchemists understood that there is a connection between the *anima mundi* and the soul or creative Source. The source of the wisdom and knowledge of the all-pervading essence of the *anima mundi* was “the innermost and most secret *numinosum* of man.” (*Collected Works*, vol. 14, para. 372.)

With the *lumen naturae*, inherent natural light, we can once again learn how to unlock the secrets of nature, so that we no longer have to attack and destroy the natural world in order to survive. *Lumen naturae* is the radiant basis of life. To the archetypal psychologist the world, too, is a patient in need of therapeutic attention. When our fantasy of the world deprives it of personality and soul, we tend to treat this "inanimate" world badly.

The world soul (Greek: ψυχή κόσμου, Latin: *Anima mundi*) is, according to several systems of thought, an intrinsic connection, a vital force, between all living things. The World Soul animated and formed nature according to divine proportions. The soul of the world in Platonism is the supposed spirit that permeates and animates all material nature. The "Soul of the World," is the same as *Alaya* of the Northern Buddhists; the divine Essence which pervades, permeates, animates, and informs all things, from the smallest atom of matter to man and god.

Anima mundi is the creative mystery of phenomenological resonance. In philosophy, *anima mundi* is a term denoting a universal spirit or soul that functions as an organizing principle. This divine spark in matter is the essence within creation, guiding the unfolding of life and the cosmos. It is the secret of the dynamic closeness of things. Perhaps the secret of the Universe is simply that it is alive.

Is the quantum superposition of "quantum information" alive in some sense, animating reality? If “universal consciousness” informs matter as QM suggests, all forces must in some way express that consciousness in dynamic action. *Anima Mundi* is the field of infinite meanings, created from metaphors of different points of view, different narratives. The material world is not set apart from ourselves. Quantum physics has revealed a fluid and unpredictable world, in which consciousness and matter are not separate. Whether a photon of light behaves as a particle or wave depends upon the consciousness of the observer.

Creative Potential

We can explore the imaginal aspects of matter and fundamental forces, but not at the expense of our intellectual vision, or understanding of quantum and celestial mechanics. Antimatter may be the missing ingredient in our understanding of the Big Picture. Jung’s anima, a unifying panpsychic life-principle, could be applied to all lifeforms and it would be indistinguishable from the weak nuclear force which, like the anima, always adjusts its emanation to preserve life.

A double-slit optical system tests the possible role of consciousness in the collapse of the quantum wavefunction. The results appear to be consistent with a consciousness-related interpretation of the quantum measurement problem. (Radin et al, 2012)

The electron rest mass (symbol: me) is the mass of a stationary electron. It is one of the fundamental constants of physics, and is also very important in chemistry. The mass of an electron is significantly less (at least 3 times less) than the mass of a proton or a neutron.

How electrons (mass, charge and spin) move in certain structures can be described by relativistic quantum physics, modeling them as if they have no mass at all. The electron mass is known to be

sensitive to local fluctuations in the electromagnetic field, and undergoes a small shift in a thermal field.

When an electron moves to a lower orbit it gives off excess energy and finds itself in its 'desired' location. It does not physically travel from one shell to another. It disappears from one location and appears at the other location.

Likewise in the mindscape, the expulsion or rejection of the imagination or many possibilities leads to a new perspective from a new narrower location in the mindscape. If the mind is not happy with many possibilities it can only find happiness with fewer possibilities.

But in the model nothing has moved other than the perspective, which is to say mind. The facts (if there be any) remained the same but the mind narrowed the possibilities or un-factual via focus. Focus moves the mind into a range of narrower possibilities. Focus appears to be like an electron moving to lower and lower orbits in the shell.

The desire to reduce the virtual possibilities leads to physical collapse of the realities. From the narrower location in the mindscape, perhaps the particle waits for observation because the potential for observation provides the path of least resistance to the future.

If Anima Mundi is the essence of our being, what would we do without her? Clavelli and White explore such a possibility through modeling a weakless universe:

"*The fact that life has evolved in our universe constrains the laws of physics. The anthropic principle proposes that these constraints are sometimes very tight and can be used to explain in a sense the corresponding laws given that life exists on at least one planet. Recently it has been proposed that a universe without weak interactions, but with other parameters suitably tuned can nevertheless allow life to develop. If a universe with such different physics from ours can generate life, the scope of the anthropic principle is reduced. We point out, however, that on closer examination the proposed "weakless" universe strongly inhibits the development of life in several different ways. One of the most critical barriers is that a weakless universe is unlikely to produce enough oxygen to support life. Since oxygen is an essential element in both water, the universal solvent needed for life, and in each of the four bases forming the DNA code for known living beings, we strongly question the hypothesis that a universe without weak interactions could generate life*."

A force is that which causes mass to accelerate. There are four forces in the universe:

1) The gravitational force causes mass to attract other mass. It is weak but works over great distances.

2) The electromagnetic force exerts influence over charged particles in an electromagnetic field. Like charges repel, different charges attract. It is stronger than the gravitational force but works over much shorter distances.

3) The strong force is the strongest of all forces but only works over very, very tiny distances. It holds the nucleus together.

4) The weak force is...um...er, what?

It is a force that acts on particles which carry weak charge, which is more or less half of all particles. Although it is stronger than gravity, the weak force is only effective at very short distances (10-18 m). Technically, it is one of the strongest forces, but because the particles involved are so big, their travel is limited to the short distance. The force carriers (which are called W and Z bosons) are very massive, meaning the force is very short range. It is essentially zero outside atomic nuclei, which is why we never notice it in ordinary life. Neutrinos interact only through weak forces (and gravity) which is why they are so hard to detect.

The weak force, as one of these four fundamental forces of Nature, underlies some forms of radioactivity and certain interactions between subatomic particles. This is a fundamental interaction between elementary particles that is several orders of magnitude weaker than the electromagnetic interaction. A force between elementary particles causes certain processes that take place with low probability. It is dependent on a particle's electrical charge and weak isospin. This fundamental force of nature underlies some forms of radioactivity, governs the decay of unstable subatomic particles such as mesons, and initiates the nuclear fusion reaction that fuels the Sun and stars.

In equilibrium, there is zero net force by definition, but (balanced) forces may be present. The strong and weak forces act only at very short distances. The strong force is by far the strongest of the forces, followed by the electromagnetic force, the weak force, and finally the extremely feeble gravitational force. Like the Electromagnetic & Strong forces, the Weak force is also mediated by “force carriers”.

How strong is the weak force? When we say that the weak force is weak, it's because two particles that can only interact weakly with each other are, in fact, very unlikely to interact at all. The effectiveness of the weak force is confined to a distance range of 10 −17 metre, about 1 percent of the diameter of a typical atomic nucleus. The muon is the key to the strength of the weak force.

The weak force is responsible for radioactive decay and neutrino interactions. During beta decay a neutron disappears, replaced by a proton, an electron and a neutrino (anti-electron). A down quark disappears and an up quark is produced. The up quark eventually turns into the electron and neutrino. Although we hardly encounter processes governed by the weak force in our everyday life, it is still of crucial importance to life in all potential manifestations.

One of the main breakthroughs in our understanding of the subatomic world in the 1970s was the proof that the weak interaction and the electromagnetic interaction -- another of the four fundamental forces -- are, in fact, two aspects of one and the same interaction. It is called the electroweak interaction and its strength is determined by three parameters, the Fermi constant being one of them.

Hierarchy problems are related to fine-tuning problems and problems of naturalness.

Studying the renormalization in hierarchy problems is difficult, because such quantum corrections are usually power-law divergent, which means that the shortest-distance physics are most important. Because we do not know the precise details of the shortest-distance theory of physics (quantum gravity), we cannot even address how this delicate cancellation between two large terms occurs. Therefore, researchers postulate new physical phenomena that resolve hierarchy problems without fine tuning (renormalization).

This has led to the search for the elusive Higgs particle, which models the subtle force that gives energy the resistence it needs to precipitate matter. So far, Higg's mass cannot be calculated.

In particle physics, the most important hierarchy problem is the question that asks why the weak force is 1032 times stronger than gravity. Both of these forces involve constants of nature, Fermi's constant for the weak force and Newton's constant for gravity. Furthermore if the Standard Model is used to calculate the quantum corrections to Fermi's constant, it appears that Fermi's constant is unnaturally large and should be closer to Newton's constant, unless there is a delicate cancellation between the bare value of Fermi's constant and the quantum corrections to it.

Cancellation of the Higgs boson quadratic mass renormalization between fermionic top quark loop and scalar stop squark tadpole Feynman diagrams in a supersymmetric extension of the Standard Model.

More technically, the question is why the Higgs boson is so much lighter than the Planck mass (or the grand unification energy, or a heavy neutrino mass scale): one would expect that the large quantum contributions to the square of the Higgs boson mass would inevitably make the mass huge, comparable to the scale at which new physics appears, unless there is an incredible fine-tuning cancellation between the quadratic radiative corrections and the bare mass. (Wiki, Hierarchy Problem)

Anima Mundi & Panspermia

John Gribbin and Martin Rees (1989) point out that the so-called "weak force" that governs radioactive decay must be extremely fine-tuned in order for stars to shed matter in great quantities during supernova explosions. Our bodies are composed of elements that were forged in the interior of stars and then released in supernova explosions. Even such a weak force could have huge effects on a cosmic distance scale.

We can summarize the presently accepted view of the origin of life in three stages: the cosmic stage; the prebiotic chemical stage; and the biological stage. The cosmic stage concerns itself with the early history of the universe where the electroweak made a phase transition into two forces, electromagnetic and weak, 10 ~12 secs after the universe was born. The temperature was then 250 GeV and the carriers of the neutral weak force - the ZQ particle - acquired mass. In the matrix of embedded hierarchies, amplification of this electroweak advantage over the course of time by repetitive steps converted the 20 amino acids which make up proteins. (Salam).

In 2012 researchers announced the universe is potentially teeming with life. Life and (near-life) in the form of bacteria and viruses (together called microbes) pervade the universe in the interior of comets, meteorites and clouds of interstellar dust. Humans have nearly 60 bacteria species in their guts, harmful and beneficial. We have 10 times the number of bacterial cells in our bodies than human cells, and 100 times more bacterial genes than our own. So we are pretty much walking bacteria farms.

The human body contains about 100 trillion cells, but only maybe one in 10 of those cells is actually — human. The rest are from bacteria, viruses and other microorganisms. Scientists identified some 10,000 species of microbes, including many never seen before, according to the first wave of results, which are being published in 16 papers in the journals *Nature* and *PLoS*. Those 10,000 or so species have more than 8 million genes, over 300 times the number of humangenes. (Ackerman)

Before Chandra Wickremesinghe scientists thought that ice particles made up huge obscuring clouds in deep space like the horse head nebula. But his untiring research showed the particles were mainly made of carbon -- a form of a substance connected with life -- a freeze dried dormant bacteria. Wickramasinghe calls them our genetic ancestors or cosmic ancestry. Thus, the science of astrobiology was born.

According to William Lane Craig (Strobel 2000, p. 77), P. C. W. Davies concluded that the odds against the initial conditions being suitable for the formation of stars is a one followed by at least a thousand billion billion zeroes. Davies also estimated that if the strength of gravity or of the weak force were changed by only one part in a ten followed by a hundred zeroes, life could never have developed (ibid.). ...fine tuning is distributed across enormous ranges makes it even more amazing that they should be found in just the right proportions.

Discovery of microbes in space has shifted theories of the "seeds of life" origin on Earth to the well-accepted idea that organic polymers in space are abundant and may be necessary for life. Hoyle and Wickramasinghe were originally ridiculed for detecting dried, frozen bacteria in interstellar space, but it remains plausible that extraterrestrial *microorganisms* have continued to reach the surface during the entire existence of the planet Earth. The same effect might seed other planets with universal lifeforms. Wickramasinghe even contends microorganisms from the upper cloud layers of Venus may have been driven to Earth by the solar winds during the 2012 transit of Venus. (Jayawardhana)

Habitable planets may be in orbit around billions of stars in the Milky Way, a long-term study has suggested. Astronomers came to this stunning conclusion after a six-year star survey which suggests planets on which humans could live are commonplace in our galaxy. Scientists estimate as many as 10 billion stars in the Milky Way may host planets in the habitable - or 'Goldilocks' - zone. (Allen)

All amino acids in proteins are ‘left-handed’, while all sugars in DNA and RNA, and in the metabolic pathways, are ‘right-handed’. A wrong-handed amino acid disrupts the stabilizing α-helix in proteins. DNA could not be stabilized in a helix if even a single wrong-handed monomer

were present, so it could not form long chains. This means it could not store much information, so it could not support life.

When primitive organisms completed their experiments with direct interaction with electromagnetism (photosynthesis) they moved on to EMs closest sibling, the weak nuclear force. This resulted (in the present majority view) in homochirality - (nominally) right-handed DNA from left-handed amino acids. This direct interaction with weak force was evolutionarily successful.

β-decay is one form of radioactive decay, and it is governed by the *weak force*. This force has a slight handedness, called *parity violation*, so some theorists thought β-decay could account for the chirality in living organisms. However, the weak force is aptly named—the effect is minuscule—a long way from producing the required 100 % homochirality. Prebiotic conditions may or may not have favored asymmetric β-radiolysis as the selector of the exclusive signature of optical activity in living nature.

The beginning of life remains nature's greatest mystery. We still do not know what distinguishes organic from inorganic matter. The nature of matter is informed by the Weak Force of physics and the genius of Creation. The domain of Anima Mundi is not limited to Earth but extends from the subquantal domain to that of astrophysics, as an essential component and dynamic of all matter.

Animated Creativity

Every major scientific breakthrough in the history of the human race has a correlation in the human Soul. To make hidden things that are invisible appear and to manifest is the power of the imagination and the will. There is no greater power in man than these two combined forces. Imagination is the power to create images; it is the active evocation of inner images. This is an authentic feat of thought and idea, and this is how inventions are realized, and how all works of art, music, science and all great things are created.

By imagination the alchemist does not mean the spinning of aimless or groundless fantasies. He or she does not just play with its objects but tries to grasp the inner facts and tries to see them in images true to their nature. This activity is an *opus*, a work, and it is an art and a development.

The alchemist Ruland says that imagination is the star in man. *Astrum* is a term invented by Paracelsus. He said that the power to visualize belonged to something astral in man. He meant that it belonged to an intellect above the lower material man and that it was a divine intelligence belonging to the spiritual man, something like the *quintessence* in man. It is the mediator between man and the divine. Imagination is a concentrated psychophysical extract of the life forces.

Man has a visible and invisible workshop. The visible one is his body, the invisible one his imagination. The imagination is a sun in the soul of man acting in its own sphere, as the sun in our system acts on the earth. Wherever the latter shines, germs planted in the soil grow and vegetation springs up.

Quantum physics suggests consciousness is connected to matter at the quantum level. However, we are still unaware how to describe the nature of such universal consciousness, much less its interaction with matter, other than through the observations of the Standard Model.

Jung's anima is a sort of constrained version of a similar but universal "force". The World Soul has agents, those who will heed Her voice and bring forth, synchronistically, knowledge that is important to the world at a particular time in history. Simultaneously, because of the principle of correspondence, this knowledge has corollary relevance for the human Soul. "As above, so below".

"...It turns out that this "electron mass" hierarchy problem is exactly analogous to what is more commonly known as The Hierarchy Problem. This is the question of why the Higgs mass is so small...." It is because Dirac's negative mass is ignored; weak force is all tangled up with Higgs blunting effect.

Independent researcher, Ken Thomas didn't intend to solve the hierarchy problem. He was looking for a gauge for determining the strength of the {outrageously misnamed) weak force. The relative strengths of electromagnetism, weak force, and gravity *is* the gauge. Right now, the weak force is unusually strong (that's the basis of the hierarchy problem) and that presages problems related to species survival.

In astrophysics and cosmology, the anthropic principle is the philosophical consideration that observations of the physical Universe must be compatible with the conscious life that observes it. Some proponents of the anthropic principle reason that it explains why the Universe has the age and the fundamental physical constants necessary to accommodate conscious life. As a result, some believe the fact unremarkable. The universe's fundamental constants happen to fall within the narrow range thought to be compatible with life.

Yet, resonance energy transfer (RET)-Induced intermolecular pairing force is a tunable weak interaction. Passive and active tunable control of interactions enables phase transitions and switchable functionality. Dipoles and liquid crystals are tunable with magnetic fields and resonance. Energy transfer systems are characterized by tunability. Biological organisms ranging from bacteria to humans are assumed to be continuously *tunable* through choice.

Some structures are more suitable for self-organization. Such evolutionary adaptability (or evolvability) can itself evolve through variation and selection. Organizations that are complex in terms of numbers of components and interactions are more likely to meet peak-climbing conditions, but less likely to meet stability conditions. Biological structures that are characterized by a high degree of component redundancy and multiple weak interactions satisfy these conflicting pressures. Functional redundancy appears in many forms in biological systems.

Weak interactions are another form of redundancy, but one that occurs at the interconnection level. A weak interaction has a small informational effect. Redundancy through multiple weak interactions allows a system to have many components and interactions (and therefore a high degree of genetic control) while limiting the impact of any particular component or

interaction. A system with weak interactions is highly controllable at the genetic level, and suggests why weak interactions are a key component of many evolvable structures seen in biology. The benefit of weak interactions can also be seen in the context of enhancing evolvability in non-biological systems.

"Weak interactions occur extensively in regulatory pathways. Regulatory pathways, in turn, are thought to have been of considerable importance to the evolution of complex multi-cellular organisms [Kirschner and Gerhart, 1998]. Examples of multiple weak interactions are the calcium ions whose concentration controls the secretion of neurotransmitters in the brain; and the interactions between the binding site, enzymes, enhancers, and control signals that lead to the formation of a transcription complex in eukaryotes. In each of these cases it is the net effect of all of the interactions that controls the activation level. Because of this, the strength of activation can be varied gradually through the addition and removal of components and interactions, and can respond flexibly to new sources of regulation. The effect of redundancy is to increase the tunability of evolution such that most mutations lead to small or neutral changes to an organism's fitness.*"*

"*Evolvability is the relative capacity for organismal lineages to become better adapted to their environment as a consequence of natural selection acting upon essentially random genetic variation. Biological systems are believed to be organized in a way that promotes evolvability. Important sources of evolvability include redundancy, compartmentalization, exploratory mechanisms, and epigenetic and ecological processes. Redundancy in particular is though to support neutral evolution: a conceptually powerful mode of evolutionary exploration. Whilst it is not known how these sources of evolvability evolved, it has been speculated that this is due both to re-use of mechanisms evolved for other purposes and to lineage selection.*" (Lones)

DISCUSSION

At the birth of our very tiny universe we would have seen the emergence of a glorious, symmetrical transition of physics. This was followed by the separation of the strong nuclear force from the unified electro-weak force. This led to an inflationary state where the universe expanded from infinitesimal size (.00000000000000000000000000001 cm) to about the size of a marble or larger in a very small fraction of time – far less than a single second. The separation of the weak force from the electromagnetic force was a phase transition leading to the emergence of quarks, and then to hydrogen and helium nuclei. From them came stars which produced the other elements.

Weak nuclear forces are responsible for radioactivity and also for exhibiting some peculiar symmetry features not seen with the other forces. In contrast to electromagnetic and strong forces, the strength of the weak force is different for particles and anti-particles (Charge Violation), for a scattering process and its mirror image (Parity Violation), and for a scattering process and the time reversal of that scattering process (Time Violation). The weak force drives radioactive decays that:

- help generate sunlight (hydrogen fusion),

- enable advanced medical diagnosis and treatment,
- help determine the age of organic materials from carbon isotope abundances,
- help determine the age of the earth from uranium isotope abundances
- provide heating for the Earth and an energy source for plate tectonics, through the decays of Uranium, Thorium and Potassium.

The strong anthropic principle (SAP) as explained by Barrow and Tipler (see variants) states that this is all the case because the Universe is compelled, in some sense, toward the eventual emergence of conscious life. Douglas Adams used the metaphor of a living puddle examining its own shape, since, to those living creatures, the universe may appear to fit them perfectly (while in fact, they simply fit the universe perfectly). Critics of the SAP argue in favor of a weak anthropic principle (WAP) similar to the one defined by Brandon Carter, which states that the universe's ostensible fine tuning is the result of selection bias: i.e., only in a universe capable of eventually supporting life will there be living beings capable of observing any such fine tuning, while a universe less compatible with life will go unbeheld.

Clavelli and White conclude tenatively that a weakless universe would not be likely to support life but that much more work would have to be done to know for sure. They are solid on pro-life side but are very mainstream and are not intelligent designers or creationists.

"*If there are many hospitable alternative universes, the anthropic principle based on observer selection would no longer be a useful guide to understanding the properties of our world except for the smallness of the cosmological constant. Faced with a plethora of life supporting alternative universes, the string landscape ideas would also lose whatever predictive power they might have unless the weakless universe or other alternatives could be shown not to be among the local minima of string theory. Obviously, however, much further theoretical analysis would be necessary to confirm that a universe without weak interactions would, indeed, allow the evolution of life. The nuclear reactions proposed by the authors of ref. [1] as an alternate mechanism for stellar nucleosynthesis would need to be studied in greater detail. In addition to such open questions, however, we have proposed that a serious problem in a weakless universe from the point of view of generating life is the difficulty of distributing oxygen through the universe in anywhere near the required abundance. Such a universe would be extremely deficient in oxygen and life would, in effect, have been frustrated at an early stage. Our observations reduce the probability of generating life.*"

The Weak Force

The strength of the weak force between interacting quarks and leptons can be characterized by their weak charge (distinct from their electric charge). The weak charges of quarks and leptons are comparable to their electromagnetic charges, a manifestation of how electromagnetism and the weak force are components of a unified electroweak force.

It is termed weak because its typical field strength is several orders of magnitude less than that of both electromagnetism and the strong nuclear force. Most particles will decay by a weak interaction over time. It has one unique property – namely quark flavor changing – that does not

occur in any other interaction. In addition, it also breaks parity-symmetry and CP-symmetry. Quark flavor changing allows for quarks to swap their 'flavor', one of six, for another.

Weak interactions are most noticeable when particles undergo beta decay, and in the production of deuterium and then helium from hydrogen that powers the sun's thermonuclear process. Such decay also makes radiocarbon dating possible, as carbon-14 decays through the weak interaction to nitrogen-14. It can also create radioluminescence, commonly used in tritium illumination, and in the related field of betavoltaics. It is responsible for the radioactive decay of subatomic particles and initiates the process known as hydrogen fusion in stars. Weak interactions affect all known fermions; that is, particles whose spin (a property of all particles) is a half-integer.

The weak nuclear force controls the speed of nuclear reactions in the sun. "It is just weak enough so that the hydrogen in the sun burns at a slow and steady rate," explains physicist Freeman Dyson. Many other examples could be given to show how our life depends on the delicately balanced laws and conditions found in the universe. Science writer Professor Paul Davies compared these universal laws and conditions to a set of knobs and stated: "It seems as if the different knobs have to be fine-tuned to enormous precision if the universe is to be such that life will flourish." (Theoretical Physicist Matt Strassler)

Thomas speculates that the weak force self adjusts - in various epochs - to maintain conditions for life potential. Just possibly, distress or other strong signals from living things could be a tiny part of the feedback loop. The “screams of the damned” could be any non-zero feedback, no matter how small. He admits, naturally, that can’t be proven yet and doesn’t need to be; it is a plausible consequence of solving hierarchy.

The hypothesis is that the weak force consistently acts to push things toward an environment that life can survive in. Maybe all those bacteria, bugs, toads and everything are affecting it by psychokinesis, he boldly suggests.

IF the universe really is teeming with life as some recent evidence suggests, you could take Jung’s anima and apply it to all genders and all lifeforms and it would be indistinguishable from the weak nuclear force which, like the anima, always adjusts its emanation so as to preserve life.

The weak force has the following effects:

- That EM & *Weak forces* unify at high energies (1015K) has been verified in a particle accelerator.
- Some postulate that the weak force in beta decay might exert a selection preference.
- Exchange of identity between protons and neutrons is mediated by weak force decay; neutrinos only feel the *weak force*, which could explain their small mass. (King).
- The most basic manifestation of handedness in nature comes from the weak force (King)
- Although the electromagnetic force has chiral symmetry, the electron also interacts via the neutral weak force when close to the nucleus; the chiral weak force may provide a symmetry-breaking perturbation. (King).
- Makes it possible for some stars, like the sun, to have a long steady middle age conducive to life.

- The *weak force* plays a crucial role in the explosion of massive stars such as supernovae, which distribute the elements necessary for the formation of life.
- The weak force is the source of WATER, by hindering somewhat the forces that would have bypassed water early on.
- There is strong evidence that microbes have virtuoso capacity to manipulate weak force on small scale it is not unreasonable to wonder about the collective effect on a larger scale; particle-particle and *microbe*-particle *interactions*.
- We have all the equipment to interact with weak force because we are finely tuned to its first cousin, electromagnetism.

"....unless there is an incredible fine-tuning cancellation between the quadratic radiative corrections and the bare mass...."

Thomas suggests a vase analogy using facts as established by orthodoxy:

The non-zero Higgs field has a size of about 250 GeV, and that gives us the W and Z particles with masses of about 100 GeV. But it turns out that quantum mechanics would lead us to expect that this size of a Higgs field is unstable, something like (warning: imperfect analogy ahead) a vase balanced precariously on the edge of a table. With the physics we know about so far, the tendency of quantum mechanics to jostle — those quantum fluctuations I've mentioned elsewhere — would seem to imply that there are two natural values for the Higgs field — in analogy to the two natural places for the vase, firmly placed on the table or smashed on the floor. Naively, the Higgs field should either be zero, or it should be as big as the Planck Energy, 10,000,000,000,000,000 times larger than it is observed to be. Why is it at a value that is non-zero and tiny, a value that seems, at least naively, so unnatural? (Of Particular Significance. Prof Strassler of Rutgers University)

This is the hierarchy problem.

- the weak force, by its "handedness" has acted to keep the vase just balanced at the very edge of the table from supposed "big bang" till now
- this has to be through a feedback loop
- it seems impossible that vase could stay just balanced - as it is now- to both GR and QM.
- QM says the vase must crash. GR says the vase has to be safe at center of table. BOTH agree on present and past position of vase at very edge of crashing
- the size of putative Higgs is determined by weak force
- the size of Higgs should be very big according to QM
- the weak force dictates something that doesn't fit
- the vase doesn't crash because weak force is "wrong size" doesn't fit either QM or GR

CONCLUSIONS

Anima mundi only needs to be a tiny fraction of one of the myriad feedback loops to be the *deciding* difference due to the unbelievably delicately balanced state of the vase--

which *should* be crashed by random quantum fluctuations -- *but never is*. And that solves the hierarchy problem retroactively.

Thomas also contends - from other valid data- that the "vote" from biological signals is THE DECIDING VOTE, but that is impossible to explain in brief --AND DOESNT NEED TO BE. The deciding “bio vote” is NOT IM-POSSIBLE. That’s all that needs to be shown, the rest being detail work, rather than conceptual.

Electroweak Theory

The Standard Model of particle physics describes the electromagnetic interaction and the weak interaction as two different aspects of a single electroweak interaction, the theory of which was developed around 1968 by Sheldon Glashow, Abdus Salam and Steven Weinberg. They were awarded the 1979 Nobel Prize in Physics for their work. The Higgs mechanism provides an explanation for the presence of three massive gauge bosons (the three carriers of the weak interaction) and the massless photon of the electromagnetic interaction.

According to the electroweak theory, at very high energies, the universe has four massless gauge boson fields similar to the photon and a complex scalar Higgs field doublet. However, at low energies, gauge symmetry is spontaneously broken down to the U(1) symmetry of electromagnetism (one of the Higgs fields acquires a vacuum expectation value). This symmetry breaking would produce three massless bosons, but they become integrated by three photon-like fields (through the Higgs mechanism) giving them mass. These three fields become the W+, W−and Z bosons of the weak interaction, while the fourth gauge field which remains massless is the photon of electromagnetism.

Although this theory has made a number of predictions, including a prediction of the masses of the Z and W bosons before their discovery, the Higgs boson itself has never been observed. Producing Higgs bosons is a major goal of the Large Hadron Collider at CERN and the Higgs boson has just been “found”.

Weak Emergence: Absolute Existence Becoming Experience

Is the observed strength of the *weak force* vital for the *emergence* of observers? Emergence is a possible order arising from chaos. Weak emergence describes new properties arising in systems as a result of the *interactions* at an elemental level. Weak emergence is a type of emergence in which the emergent property is reducible to its individual constituents. This is opposed to strong emergence, in which the emergent property is irreducible to its individual constituents.

Causing systems to differentiate, weak emergence is the root of higher-order complexity, coalescing novel, coherent structures. Agents residing on one scale start producing behavior that lies one scale above them, potentially including self-reflection. Humans become self-conscious and track their own evolution.

Open systems extract information and order out of their environment. They bring coherence to increasingly complex forms. Systems theory uses feedback loops to help us map how

interactions influence each other. It names two types of feedback loops: reinforcing and balancing loops. Heeding the inner voice of the *Anima mundi*, can applied emergence help us work with the dynamics of emergent complexity to realize our intentions as life-serving outcomes?

Can we come together to fulfill our potential for responding to critical needs? Cognitive modifiability and revolutionary developments in brain sciences support the theory and belief that basic human behaviors and functions can be modified toward more sustainable outcomes. In this critical period, consciousness studies is at the frontier of this knowledge.

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