

The Origin of Life as Interpreted by Model Mechanics

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Abstract

A new model of the current universe called Model Mechanics has been formulated. Model Mechanics proposes that all the forces and processes (including the processes of life) of nature are the results of absolute motions of objects in a stationary, elastic and structured light-conducting medium called the E-Matrix. The unique structure of Model Mechanics leads to the discovery of a new repulsive force between all objects in the universe. The CRE Force, in turn, leads to a new theory of gravity called Doppler Theory of Gravity (DTG) and unites gravity with the electromagnetic and nuclear forces naturally [1, 2]. Model Mechanics also leads to a complete theory of motion called IRT (Improved Relativity Theory) [3]. IRT includes SRT as a subset. However, unlike SRT, the equations of IRT are valid in all environments...including gravity. This Model Mechanical description of the current universe leads to a new interpretation on the origin of life on earth. This paper presents this interpretation.

The Current State of Our Universe

Model Mechanics supposes that a stationary substance, called the 'E-Matrix', occupies all of pure-space (void) in our Universe. Subsequently, we perceive the E-Matrix as space. The E-Matrix, in turn, is composed of 'E-Strings', which are very thin three-dimensional elastic objects, of diameter estimated at 10^{-33} cm. The length of an E-String is not defined. Away from matter, the E-Strings are oriented randomly in all directions. This means that a slice of the E-Matrix in any direction will look the same. Near matter, the E-Strings are more organized: some emanate from the matter, and the number of these passing through a unit area followed the well-known inverse square law of physics. The E-Strings repel each other. This means that there is an unknown outside force that is compacting them together. The repulsive force and the compacting force are in equilibrium. This state of the E-Matrix allows massive matter particles to move freely within it. The motion of a matter particle or particle system in the E-Matrix is called 'absolute motion'. The absolute motion of matter in the E-Matrix will distort the local E-Strings. The E-Strings will recover to the non-distorted state after the passage of the matter particles. Light consists of wave-packets in neighboring E-Strings. On its way toward its target, a wave-packet will follow the geometry of these neighboring E-Strings. This description of light embodies 'duality', *i.e.* light possessing properties of a mass-bearing particle as well as a wave packet.

With this description of the E-Matrix (space), the next relevant question is: What is matter? All stable and visible matter is made from three Basic Particles: the electrons, the up quarks, and the down quarks. The protons and neutrons in the nuclei of all the atoms are made from the up quarks and the down quarks. The electrons orbit around the nuclei to complete the picture of all the atoms. The three basic particles are, in turn, made from one truly fundamental mass-bearing particle, called the 'S-Particle'. An S-Particle is a three-dimensional spherical object. It is repulsive to the E-Strings surrounding it and therefore its motion in the E-Matrix is maintained. An S-Particle orbiting around an E-String in the helical counterclockwise direction is an electron. This motion of the S-Particle is the fastest in the E-Matrix, and it gives rise to one unit of negative electric charge. A down quark is also an S-Particle orbiting around an E-String in the helical counterclockwise direction. The speed of its orbiting motion is only 1/3 that of the electron, giving the down quark a

negative $1/3$ electric charge. An up quark is an S-Particle orbiting around an E-String in the helical clockwise direction at $2/3$ the speed of the electron, resulting a $2/3$ positive electric charge.

There is one more stable basic particle: the electron neutrino. An electron neutrino has no detectable electric charge, and therefore it does not interact with the other three charged basic particles. It is composed of an S-Particle orbiting around an E-String in the counterclockwise direction like the electron. However, it is moving in a corkscrew like motion away from the charged Basic Particles. This means that the distortion in the E-Matrix created by the absolute motion of the S-Particle of the electron neutrino will have already dissipated by the time the charged basic particles are ready to interact with it. This is the reason why the electron neutrino does not interact electromagnetically with the charged Basic Particles.

This simple description of all stable visible matter can answer the thorny question: What *is* the mass of a Basic Particle? The answer is: mass is the evidence of the orbiting diameter of its S-Particle. Those S-Particles that are not in a state of orbiting motion do not possess any electric charge and therefore they will not interact with the charged Basic Particles electrically. They will, however, interact with them gravitationally. They are the dark matters predicted by the astronomers.

The next relevant question is: what are the processes that give rise to all the forces between matter particles? The proposed answers to this question are as follows:

- 1) All the processes of Nature are the result of Basic Particles or Basic Particle systems reacting to the geometries of the E-Strings (*i.e.* distortions or waves) to which they are confined because of their orbiting motions around these E-Strings.
- 2) Absolute motions of two objects in the same direction in the E-Matrix will cause the objects to converge to each other--an attractive force. Absolute motions of two objects in the opposite directions in the E-Matrix will cause the objects to diverge from each other--a repulsive force.

This completes the Model Mechanical description of our current universe. All the particles, all the forces and all the processes of nature can be derived from this one description. Model Mechanics replaces the math constructs of space-time and field/virtual particle with the E-Matrix and the distortions or waves in the E-Matrix. This enables us to use the math of Quantum Field Theory (QFT) in combination with the interpretations of Model Mechanics to explain all the processes of nature.

Model Mechanics gives rise to the following postulates:

- 1) The E-Matrix is a stationary, structured and elastic light-conducting medium. It occupies all of pure space (pure void). It is comprised of very thin and elastic E-Strings and these E-Strings are repulsive to each other. There is an unknown compacting force that compresses these E-Strings together to form the E-Matrix.
- 2) The S-Particle is the only truly fundamental particle exists in our universe. The different orbiting motions of the S-Particles around the E-String(s) give rise to all the visible and stable particles in our universe.
- 3) All the processes of nature are the results of absolute motions of S-Particles or S-Particle systems in the E-Matrix.
- 4) All the forces of nature are the results of the S-Particle or S-Particle systems reacting to the distortions or waves in the E-Strings to which they are confined. The distortions or waves in the E-Strings, in turn, are the results of the absolute motions of the interacting S-Particles or S-Particle systems in the E-Matrix.
- 5) All the stable and visible matters are the results of orbiting motions of the S-Particles around specific E-Strings.

These postulates eliminate all the infinity problems that plagued both GRT and QM. It has the same mechanism for all the forces of nature and thus it unites all the forces of nature. It gives an explanation why the force of gravity is capable of acting at a distance. It explains the provisions of the Uncertainty Principle. It explains the weird results of all quantum experiments [3]. It eliminates the need for the undetectable force messengers in QM. It eliminates the need for the hypothetical and undetected Higgs particle. It explains the mass of a particle. It explains the charge of a particle. It leads to the discovery of the CRE force, which, in turn leads to a new theory of gravity. In short, Model Mechanics gives us a unique way to achieve the elusive goal of unifying all of physics.

Forces Based on Absolute Motions

The idea that absolute motion of interacting particles in the same direction gives rise to an attractive force, while absolute motion of interacting particles in the opposite directions gives rise to a repulsive force, is derived from the familiar electric current experiments in parallel wires. These experiments show that when electric currents are flowing in the wires in the same direction, the wires are attracted to each other, and when the currents are flowing in the opposite direction, the wires repel each other. Figs. 1 and 2 illustrate these experiments graphically. The absolute motions of the electrons in the same direction cause a distortion in the E-Matrix that pulls the wires together—an attractive force. Conversely, the directions of absolute motion of the electrons in the opposite directions will cause a distortion in the E-Matrix that pulls the wires apart—a repulsive force.

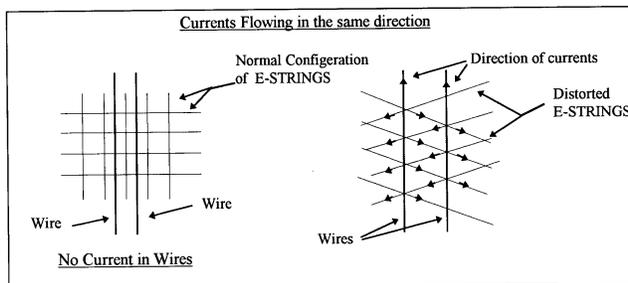


Figure 1. Currents (electrons) in the wires are flowing in the same direction, and therefore the force between the electrons is attractive. The right diagram that shows that the tension created in the E-Strings by the absolute motions of the electrons is pulling the wires together.

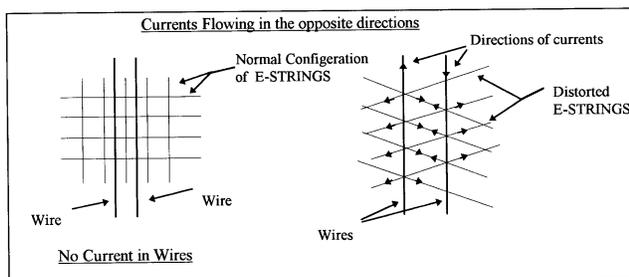


Figure 2. Currents (electrons) in the wires are flowing in the opposite direction, and therefore the force between the electrons is repulsive. The right diagram shows that the tension created in the E-Strings by the absolute motions of the electrons is pulling the wires apart.

Extending this interpretation of the electric-current experiments to include the orbiting motion of the S-Particles will enable us to explain all the nuclear forces between the interacting up quarks and

down quarks [1,2]. This interpretation becomes the most important concept of Model Mechanics and it enables the unification of all the forces of nature naturally.

The Cosmological Repulsive Effect Force (CRE Force)

Current physics posits that there are four forces of Nature: the electromagnetic force, the nuclear weak and strong forces, and gravity. Model Mechanics posits that there is a fifth force of Nature; the new force being the CRE force. As the name implies, the CRE force between any two objects is repulsive. While the CRE force is new to physical theory, it is not new to experience; it is what we commonly refer to as 'inertia'. In other words, the resistance between two objects to change their state of absolute motion is the CRE force between them. The CRE force between any two objects is always repulsive, and it is derived from the diverging structure of the E-Matrix.

To understand the CRE force, recall the inverse square law of physics. This law states that the intensity of light, gravity and electromagnetic force decreases with increasing distance r from the source is inversely proportional to r^2 . The geometry of neighboring E-Strings emanating from any two objects also obeys the inverse square law. This means that each object will follow the diverging geometry of these neighboring E-Strings. Therefore, their path of motions in the E-Matrix will have a tendency to diverge from each other. This repulsive effect is identified as the CRE force. The CRE force between any two objects is not constant; it increases with the square of the distance between the objects. The CRE force is not the cosmological constant that Einstein inserted into his original GRT field equations. Although the cosmological constant is repulsive, it is not the CRE force predicted by Model Mechanics for the simple reason that it is constant.

The CRE force played an important role in the formation of our Universe, and is continuing to do so today. The repulsive CRE force, along with the attractive electromagnetic force between gravitating objects shaped the primeval Universe into the Universe that we see today. The CRE force also played an important role in the manifestation of the nuclear weak force. Without the CRE force, there would be no nuclear weak force. It is the CRE force that initiates the radioactive decay of atoms. Perhaps, the most important function of the CRE force will be a role, in combination with the electromagnetic force, in the processes of life.

Model Mechanics predicted the repulsive CRE force in 1993. However, it was not discovered until 1998 when two independent groups of astronomers discovered that the Universe at the far reached regions is in a state of accelerated expansion. This observation is in direct conflict with the prediction of GRT. In order to explain this observation astronomers are now re-introducing the discarded repulsive Cosmological Constant to the GRT equation. The CRE force eliminates the need for this *ad hoc* approach.

Doppler Theory of Gravity (DTG)

Newton posited that gravity is a force, but he did not provide a mechanism for it. Newton's gravity model involved the unexplained phenomenon of action at a distance, which was troublesome for the physicists of his time. Also, Newton's equation for gravity was eventually found to be slightly inconsistent with observations. Recognizing the deficiencies in Newton's theory, Einstein formulated GRT, which is not a theory of force, but rather a theory of space-time, amounting to an extension of SRT to include gravity. IRT is a completed new theory of relativity. It includes SRT as

a subset and its equations are valid in all environments...including gravity. It gives the same correct predictions for gravity as does GRT, but it avoids the following problematic predictions of GRT:

- 1) The expansion rate of the Universe as predicted by GRT does not match what is currently observed. GRT predicts that the expansion of the Universe is slowing down, and yet observation confirms that the expansion is speeding up.
- 2) The galactic rotational curves as predicted by GRT do not match those that are currently observed.
- 3) The path of travel of Pioneer 10 as predicted by GRT does not match what is observed.
- 4) GRT predicts the existence of black holes and singularities. If these absurd objects exist, they should be as abundant as the stars, and yet none them have been positively detected.
- 5) GRT fails to predict the existence of dark matter and dark energy.

Model Mechanics also gives rise to a new theory of gravity called Doppler Theory of Gravity (DTG). Like Newton's theory, DTG also treats gravity as a force but with an identified mechanism. Based on the provisions of Model Mechanics, the mechanism of gravity between two objects A and B moving in the stationary E-Matrix is as follows:

- 1) If both A and B are moving absolutely in the same direction, this gives rise to an attractive force because A's absolute motion distorts the surrounding stationary E-Matrix and B's absolute motion is confined to follow the distortion created by A; conversely, B's absolute motion distorts the surrounding stationary E-Matrix and A's absolute motion is confined to follow the distortion created by B.
- 2) The global structure of the stationary E-Matrix is divergent. Both A and B are confined to this global divergent structure as they travel in the stationary E-Matrix. This gives rise to the repulsive CRE force between A and B globally.

The force of gravity between A and B is the combined result of items (1) and (2). It is noteworthy that gravity is the sum of an attractive and a repulsive force acting on both A and B. This explains why the force of gravity is so weak compared to the electromagnetic and nuclear forces._

The above description for gravity suggests that the Newtonian equation for gravity can be modified to make it consistent with observations. The following is a modified Newtonian equation based on the above description for the force of gravity:

$$F = \left(\frac{F_{ab}}{F_{aa}} \right) \left(\frac{G * M_a M_b (j_a) \cdot (\pm j_b)}{r^2} \right) \quad [16]$$

F = The force of gravity between A and B as determined by A

G = Universal gravitational constant m^3/s^2*kg

M_a = Mass of object A in kg

M_b = Mass of object B in kg

$(j_a) \cdot (j_b)$ = Dot product of the unit directional vectors j_a and j_b . [Note: This dot product can be positive or negative.]

r = Distance in meters between A and B

F_{aa} = Frequency of a standard light source in A's own frame as measured by A.

F_{ab} = Frequency of an identical standard light source in B's frame as measured by A. If F_{ab} is not constant, a mean value is used.

The dot product $(j_a) \cdot (j_b)$ in this new equation expresses the concept that not all objects in the Universe attract each other gravitationally. A positive dot product represents an attractive force, but a negative dot product represents a repulsive force. Those objects that have the same direction of absolute motion are attracted to each other, but those objects that have absolute motions in the opposite direction exert a repulsive force on each other. Assuming the Big Bang model is correct then the dot product of the vectors for all local regions of the Universe is +1. This means that gravity in the local region is attractive. The dot product for a distant region, say beyond the radius of the observable Universe, is -1. Therefore, gravity for all those distant regions is repulsive.

The Electromagnetic Force

This is the force observed between charged particles. It was determined that like-charged particles exert a repulsive force on each other while unlike charged particles exert an attractive force on each other. The reader will recall that a charged particle is the result of a clockwise or counterclockwise orbiting motion of its S-Particle around a specific E-String. A clockwise orbiting motion of the S-Particle gives rise to a positively charged particle. A counterclockwise orbiting motion of the S-Particle gives rise to a negatively charged particle. The charges between the interacting particles determine whether the force between them is attractive or repulsive. The following diagrams describe the electromagnetic force in Model Mechanical terms:

Interaction Between Negatively Charged Particles

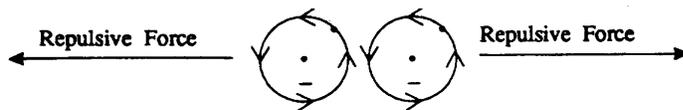


Fig. 3 The force exerts on each other by two negatively charged particles. In this case, the S-Particles are traveling in the opposite directions and therefore the force between these particles is repulsive.

Interaction Between Positively Charged Particles

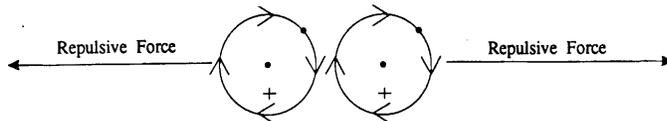


Fig 4 The force exerts on each other by two positively charged particles. In this case, the S-Particles are traveling in the opposite directions and therefore the force between the resulting particles is repulsive.

Interaction: Negatively and Positively Charged Particles

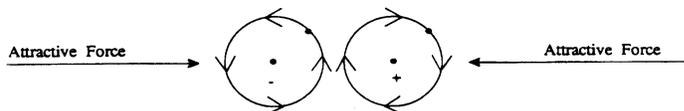


Fig. 5 The force exerts on each other by a negatively and a positively charged particle. At the nearest point of approach the S-Particles are traveling in the same direction and therefore the force between them is attractive.

Note: The net attractive or repulsive force between any two interacting charged particles is not a constant force. The net force is determined by the direction of orbiting motions of their S-Particles at the closet point of approach. When the S-Particles are moving in the same direction at the closest point of approach then the net force between the charged particles is attractive. Conversely, when the S-Particles are moving in the opposite directions then the net force between the charged particles is repulsive. It is noteworthy to point out that the force between any two charged particles is alternating between attractive and repulsive for one complete orbit of their S-Particles. This property of the electromagnetic force is due to the fact that the direction of orbiting motions of the S-Particles is alternating between the same direction and opposite directions. This unique characteristic of the electromagnetic force agrees with Maxwell’s equation that the propagation of the electromagnetic force is alternating between the electric field and magnetic field.

The above diagrams illustrate how the electromagnetic force is manifested between charged particles. This force is long range because the distortions created in the E-Strings are long range. This description of the electromagnetic force eliminates the need for the complicated and abstractive quantum mechanical explanation. In addition, this explanation has no infinities to contend with because the electric charge is not within the particle itself. Therefore, there is no need for the dubious renormalization procedure to get rid of the infinities as in the quantum mechanical description of this force.

The Nuclear Strong Force

This force is responsible for binding the protons and the neutrons in the nucleus. At a more fundamental level, this force is responsible for the binding of the quarks of the protons and neutrons to form the nucleus. According to quantum mechanics the nuclear strong force is manifested by the exchange of messenger particles known as gluons.

The Model Mechanical description of the nuclear strong force is very simple. It is caused by the absolute motion (V_{suq} and V_{sdq}) of the S-Particles of the quarks in the protons and neutrons. This description of the nuclear strong force raises the question: Since the quarks in the protons and neutrons are negatively and positively charged particles, how do they manage to stick to each other? The answer is sta cked-interaction. When two particles of the same charge are stacked on top of each other, their S -Particles are traveling in the same direction. Therefore, they exert an attractive force on each other. The following diagrams illustrate the stack interaction concept.

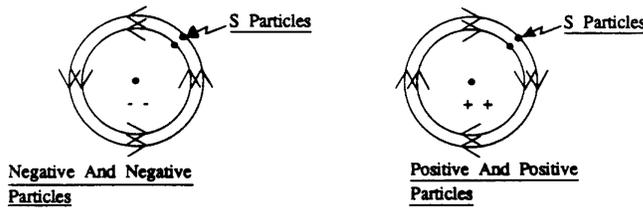


Fig. 6 The stacked interactions of two similarly charged particles. The negative particles would be the down quarks and the positive particles would be the up quarks.

Note: All quarks of the same family have the same orbital diameter. The different orbital diameters shown here are served to illustrate the stacked-interactions. The negative and negative particle interaction is

the stacked-interaction of the down quarks. The positive and positive interaction is the stacked-interaction of the up quarks.

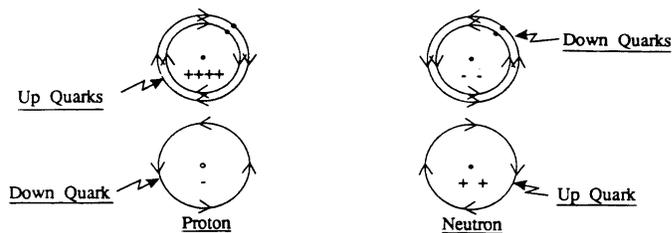


Fig. 7 The stacked-interactions and the electromagnetic interactions in a proton and a neutron.

Note: The proton is formed by the stacked interaction of the up quarks and the electromagnetic interaction between the stacked up quarks and the down quark. The neutron is formed by the stacked interaction of the down quarks and the electromagnetic interaction between the stacked down quarks and the up quark.

It is noteworthy to point out that the attractive stacked-interactions are effective only within a short distance of 10^{-13} cm. At a greater distance than that the stacked-quarks exert a repulsive force on each other. This is the exact behavior of the nuclear strong force that we observed in the laboratory. Another peculiar property of the nuclear strong force is that it becomes stronger when the interacting particles are being pulled apart. This peculiar property is also predicted by Model Mechanics as follows: When the stacked particles are pulled apart the E-Strings surrounding them becomes more distorted. Therefore, the energy required to pull them further apart will be increased accordingly.

The Nuclear Weak Force

Quantum Mechanics describes this force as the force that causes the decaying processes of all the unstable particles through time. The quantum mechanical process for the weak force involves a process called the spontaneous breaking of symmetry. This process gives rise to the weak force messengers W^+ , W^- and Z^0 . These are virtual particles whose brief existence is financed by the uncertainty of energy and time relationship. Also, this description of the nuclear weak force depends on the existence of yet another class of particles known as the Higgs particle. The Higgs particle is necessary because it is the mechanism that imparts mass to the weak force messengers.

Model Mechanics gives a much simpler description of the weak force. In the case of a heavy nucleus, such as a uranium nucleus, the decay is the result of the de-coupling of the stacked-interactions by a combination of neutron captures follow by the repulsive CRE force. The processes involved are as follows:

1. A free neutron is captured by a decaying nucleus
2. The stacked interactions at the site of neutron capture are weakened. This enables the repulsive CRE force to de-couple the weakened stacked-interactions and give rise to the nuclear weak force.

In the case of a subatomic particle, the decaying process is different. The best-known subatomic particle-decaying process is the neutron decay, also known as the beta decay. Quantum Mechanics does not specify when a free neutron will decay or why it will decay in about sixteen minutes. On the other hand, Model Mechanics is capable of describing the neutron decay process in detail. The following diagrams will help the reader to visualize the processes involved.

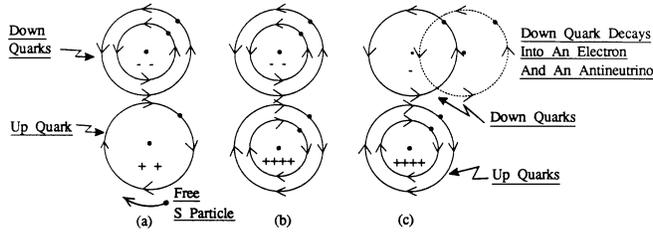


Fig. 8 Schematic diagrams for the neutron decay process (Beta decay)

- The up quark in an unbounded neutron exerts an attractive force on any free S-Particles that are traveling in the same direction as its S-Particle. When a free S-Particle follows the orbit of the orbiting S-Particle of the up quark, it becomes an up quark. This new up quark immediately forms a stacked interaction with the original up quark.
- The down quark between the two-stacked up quarks is pulled closer to them because it feels the force from both of them.
- This has the effect of moving the stacked down quarks laterally relative to each other. When the lateral movement is greater than the radius of the down quark, the force between the stacked down quarks becomes repulsive. This causes the down quark that feels less attractive force from the two stacked up quarks to peel away. The peel away down quark will then interact with a free S-Particle to give an electron and an antineutrino.

The decaying process for a subatomic particle such as a muon is different from that for a neutron. It was found that a muon at a speed closed to that of light would have a much longer decay length than that of a muon at the rest frame of the laboratory. When these decay lengths are converted to decay times they agree with the SRT time dilation equation. This led physicists to claim that the muon decaying process is a proof of the time dilation concept of SRT. The Model Mechanical explanation of the muon decay process is as follows:

- The orbit of the muon's S-Particle is unstable and it will decay into a stable orbit of the electron.
- In the rest frame of the Lab a muon decays in 2.2 microseconds.
- In the rest frame of the cosmic muon it also has a decay time of 2.2 microseconds.
- However, in terms of the lab clock the cosmic muon has a decay time of $(2.2 * 10^{-6})(F_{aa}/F_{ab})$ seconds.
- Therefore from the Lab point of view the decay length for a traveling muon is:

$$v(2.2 * 10^{-6})(F_{aa}/F_{ab}) \text{ meters}$$

Where v is the relative velocity between the Lab and the traveling muon.

This Model Mechanical prediction for the decay length of a traveling muon agrees with experimental observations.

The Origin of Life as Interpreted by Model Mechanics

Model Mechanics describes that all the particles, all the forces and all the processes of nature are the results of absolute motion of S-Particles or S-Particle systems in the space filling E-Matrix. The unique properties of the E-Matrix leads to the discovery of a new repulsive force called the CRE force. It turns out that the CRE force is directly responsible two of the most important processes of life: The cell division process and the ability of a replicated RNA strand to rip away from the DNA template. These interpretations lead to a new theory on the origin of life on earth. The relevant provisions of Model Mechanics are summarized in the following table:

Item	Description	Properties	Functions in Life Processes
The E-Matrix	It is a light-conducting medium occupying all of space.	It is a stationary and structured elastic medium. It is composed of E-Strings.	The structure of the E-Matrix is divergent and thus it gives rise to the repulsive CRE force which is necessary for cell division process of life.
The E-Strings	The E-Strings are very thin elastic strings. They are compacted together to form the E-Matrix.	The E-Strings are repulsive to each other. Orbiting S-Particles around an E-String will follow the geometry of the E-String.	The properties of the E-Strings allow the S-Particles to orbit around them to give rise to the various Basic Particles that are the building blocks of life.
The S-Particle	The S-Particle is the only fundamental mass-bearing particle exists.	The S-Particle is a spherical-object. It is repulsive to the E-Strings surrounding it. Therefore its motion in the E-Matrix is maintained.	The orbiting motions of the S-Particles around the E-Strings give rise to the various Basic Particles that are the building blocks of life.
The CRE Force	This force is the result of the interacting particles or particle systems follow the divergent structure of the E-Matrix.	This force is repulsive between interacting particles or particle systems.	This force is directly responsible for the cell division processes. The CRE force rips the DNA molecule into two halves when it become to long.
The Electromagnetic Force (the EM force)	This force is the result of interacting particles follows the geometry of the E-Strings to which they are confined by orbiting motion around these E-Strings.	The EM force can be attractive or repulsive between interacting particles or particle systems.	The EM force in combination with the Nuclear strong force forms the protons and neutrons from the Basic Particles. The EM force also responsible for the forming of all atoms, DNA RNA and all the proteins of life.
The Nuclear Strong Force	This force is the result of stacked interaction up quarks and down quarks.	The Nuclear strong force is attractive between interacting particles.	The Nuclear strong force is responsible for the forming of all the nuclei of all atoms from the Basic Particles.
The Basic Particles: Electrons, Up-Quarks And Down-Quarks	These particles are the results of different orbiting motions of the S-Particles around the E-String(s).	The Basic Particles are the building blocks of all the atoms in the universe. The Nuclear Strong force and the EM force acting on these particles gives rise to the protons, neutrons.	The atoms formed by the Basic Particles are the building blocks of all life forms
Protons, Neutrons and Atoms	Protons, Neutrons and Atoms are form from the Basic Particles via the Nuclear Strong and the EM forces.	These particles are the building blocks of molecules, DNA, RNA and Proteins via the EM force.	The DNA, RNA and Proteins formed by the protons, neutrons and atoms in combination with the different forces acting on them is the basis of all the life processes.
Constituents, DNA, RNA and Proteins	The constituents, DNA, RNA and Proteins are formed from the Protons, Neutrons and Atoms via the EM force and Nuclear Strong Force.	The DNA strand can be self-replicating within a cell. It acts as a template for the production of RNA strands which in turn acting as messenger for the production of Proteins.	The DNA in combination with the CRE force is the basis of the cell division processes. Also the ability of the RNA strand to rip away from the DNA template is another essential life process.

In 1859, Charles Darwin published the book *'On the Origin of Species by Means of Natural Selection.'* In his book he detailed his theory that all species are evolved from more primitive species through the process of natural selection. With this process, he theorized that all life, as we know it today originated from a few primitive forms. In his words *"From so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved."* What was the process that gave rise to the few primitive forms? Publicly, Darwin endorsed the theological idea of his time, that the Creator originally breathed life *'into a few forms or into one.'* Privately, he suggested that life could have arisen from chemistry. It was this suggestion that initiated much of the research efforts in the 20th century.

The first step of life from chemistry would be that the primitive earth must be capable of producing the basic constituents of life. They are the amino acids that make up the proteins and the nucleic acid bases that make up the RNA and DNA -- the master molecule of life. In 1952, Stanley L. Miller, with the help of his professor Harold C. Urey at the university of Chicago, designed and carried out an experiment to demonstrate this capability of the primitive earth. In this experiment, Miller exposed a sealed flask of boiling water with a mixture of gases consisting of methane, ammonia and hydrogen. To help the process along, he exposed the gases to a continuous electrical discharge to simulate the primitive lighting. This experiment yielded many amino acids, the constituents of protein. In later experiments, by Juan Oró in 1961, he demonstrated that a simple aqueous solution of hydrogen cyanide and ammonia would yield not only amino acids but also one of the nucleic acid bases. Further experiments with aqueous solutions of other chemicals would yield the remaining nucleic acid bases. Although these experiments could give us a reasonable picture on the origin of the constituents of life, recent studies have cast doubts on the existence of these conditions. There were two other theories that could account for the origin of these life constituents. One is that these constituents could have been delivered to earth in the early formative stage by way of interstellar dust, meteorites and comets. The other is that they may have arisen from the deep-sea vents. However, both of these theories have not been confirmed. Furthermore, even if these life constituents were available, molecular biologists are having difficulties coming up with a valid process that could construct the RNA and DNA molecules from their constituents.

Can Model Mechanics help? Maybe. To begin with, we could try to apply the *Pyramid Techniques* [2] to these complex problems. The first step of the *Pyramid Techniques* is to assume a set of initial conditions that could give us the life constituents. Since the three processes described could contribute to the accumulation of these constituents, the *Pyramid Techniques* allows us to assume that all three of these processes were being carried out at the primitive earth. The next step of the *Pyramid Techniques* is to assume another set of conditions that could bring these constituents to the point of self-polymerization or mineral-catalyzed polymerization. The assumed sequence of events can be visualized as follows: All the water bodies (oceans, seas and lakes) of the primitive earth would have been subjected to drying out by the continuous shifting of the earth's crust. This would mean that the life constituents that were made would have been concentrated and that the self-polymerization process could have been initiated in these concentrated broth. The concentrated broth would eventually be dried out and trapped with other minerals in the settlements. This could initiate the mineral-catalyzed polymerization process. As time evolved, these mineral-catalyzed polymers would have washed down to new bodies of water and these processes would have continued until the self-replicating RNA and then the DNA master molecules were produced. After

that, the processes of evolution as described by Darwin would have advanced these primordial master molecules to the complex beings that we are today.

In the past few decades, many of the molecular processes of life at the cellular level were discovered. Perhaps the most important of these discoveries was the deciphering of the double helix structure of the DNA strand by James Watson and Francis Crick in 1953. However, many mysteries remain. Perhaps the biggest mystery is the process of cell division--the ability of a cell to sub-divide to form two new cells. Also, there is the related question of how a cell knows when to sub-divide. Another big mystery is the ability of a replicated RNA strand to rip away from the DNA template when the replicating process is completed. A template is referred to the de-coupled end of a double helix DNA strand. I consider these processes are mysteries because the force that carries out the replicating processes is surely attractive. As it turns out, there exist logical explanations for these mysterious processes under the framework of Model Mechanics. To understand how Model Mechanics explains these mysteries, the reader will need to recall the following provisions of Model Mechanics:

1. At the most fundamental level, the S-Particle is the only truly fundamental particle in the universe. The orbiting motions of the S-Particles around the E-Strings give rise to the stable Basic Particles (the electron and the quarks). The Strong Force and the EM Force acting on these Basic Particles give rise to the various atoms that are the basic building blocks of life.
2. Each Basic Particle is confined to a specific E-String by orbiting motion of its S-Particle. The geometry of all neighboring E-Strings obeys the inverse square law. With these specifics, all neighboring Basic Particle or Basic Particle Systems will exhibit a repulsive effect on each other. This is identified as the CRE force. The magnitude of the CRE force between organized Basic Particle systems (DNA, RNA and Proteins) is proportional to the number of Basic Particles in each Basic Particle system.

The above provisions of Model Mechanics enable us to come up with the processes that control the cell division phenomenon. Further, these processes control the timing for when a living cell is to be divided. The Model Mechanical processes of cell division can be visualized as follows: A living cell is composed of a central region known as the nucleus that consists of a DNA strand and is surrounded by the various nucleic acids that make up the DNA strand. As noted previously, a DNA strand is composed of a repeated sequence of specific constituents. On this basis, these sequences could continually be added to both ends of the strand and could cause it to grow in length unchecked. If this was the only process, there would be no cell sub-division and thus no life. Fortunately, as the DNA strand grows in length, the CRE force acting on it also grows proportionately. This causes a continuing increase in tension on the DNA strand. The highest tension point would be in the middle of the DNA strand. When the CRE force grows to a point that it is stronger than the coupling EM Force in the middle of the DNA strand, it will split the DNA strand into two equal parts. The two DNA strands will each become the nucleus of a new cell. These processes will continue as long as there are constituents available to repeat them.

Similarly, the CRE force is responsible for the de-coupling of a replicated RNA strand from the DNA template. The process is as follows: The DNA template attracts constituents from the surrounding fluid to form the RNA strand. As the RNA strand grows in size, the CRE force is also growing. When the CRE force becomes stronger than the coupling EM Force the newly formed RNA strand will rip away from the DNA template.

Model Mechanics tells us that all the Basic Particles and all the forces of nature are the results of motions of the S-Particles and/or S-Particle systems in the E-Matrix. The subsequent organization of the Basic Particles, mainly by the attractive EM and Nuclear Strong forces, gave rise to all the atoms of the universe. Further organization of the atoms gave rise to the molecules and then the constituents of life. This sequence of organizational events implies that life is a natural outcome of the Model Mechanical theory. However, an organized system of particles by itself is lifeless -- a crystal is a good example of a lifeless organized system of particles. On the other hand, an organized system of constituents could have life properties. The main requirement is that it is capable of self-generating and self-reacting to its own dynamic¹ properties with time. How does a constituent system generate and react to its own dynamic properties? Interactions between the dynamic CRE Force with the EM Force is capable of doing just that. Those constituent systems that can maintain an organization and, at the same time, react to the dynamic CRE force generated within themselves are considered collectively to have life properties. Of course, there is no such thing as a constituent system with an organizational force weaker than the CRE force. Such a system does not exist. On the other hand, an organized constituent system (such as a crystal) will remain lifeless if the CRE force of the system cannot overcome the attractive EM force that forms them. In other words, life is a continuous process of balancing the organizational attractive EM Force and the dynamic repulsive CRE force within a collection of organized systems of life constituents.

Model Mechanics Interpretation of Consciousness

With all the research devoted to understanding the human brain, there have been limited successes on the question of consciousness. What are the processes that enable us to become aware, to think, to intuit, to interpret, to appreciate, to fear, to enjoy and finally, to form an opinion? Essentially these questions have been left unanswered. Neuroscientist, Gerald M. Edelman, claims in his book *Bright Air, Brilliant Fire* that he has solved the consciousness problem. Edelman's idea: consciousness is the result of a process he calls neural Darwinism. This process involves groups of neurons competing with one another to arrive at an effective representation of the world. Edelman did not give details of the competition processes. Other neuroscientists, notably Nobel Laureate Francis Crick, accused Edelman of dressing up old ideas in obscure jargon. Most neuroscientists agree with Crick's assessment. Neuroscientists have determined that all conscious processes involve the collective activities of the neurons² in the brain. How these activities can be collapsed into a conscious thought is a mystery yet to be resolved. Crick advocates the concept that consciousness is a '*electrophysiological*' phenomenon. Others, such as famed physicist Roger Penrose at the University of Oxford, proposed that consciousness is a quantum mechanical process and as such, it is not computable. Still others advocate the view that we are not capable of discovering a physical theory that could explain consciousness.

The proposed Model Mechanical processes for consciousness is as follows: Each input of a signal from the sensory organs, such as seeing a table visually, will result in a specific geometric pattern on the E-Strings in the brain. These geometric patterns serve as memory cards for future recognition of the same signal (seeing a table). When the same signal (seeing a table) arrives in the brain at a later

¹ The dynamic properties referred to here are the results of the interactions of the dynamic CRE force with the electromagnetic force between organized constituent systems such as DNA and RNA molecules.

² Neuron is a term used to identify those cells in the brain that are responsible for receiving the sensory activities from the various senses. They then, collectively, dispense a reaction to the other parts of the brain for actions. Neuroscientists have no idea how these processes are realized.

time the specific geometric pattern (seeing a table) on the E-Strings in the brain will show up automatically. The neurons in the brain will react to that specific geometric pattern in the E-Strings and conclude that it represents a table.

The above Model Mechanical interpretation of the processes of life will need to be confirmed experimentally. However, as they stand, they do not conflict with any known observations or experiments. Furthermore, they will give scientists a new way of dealing with the ever-increasing complex problems of life processes.

What About God?

The Model Mechanical processes of life described above are capable of self-generating and self-reacting. Did God just simply leave us alone to evolve after He started the universe? Or is He in His mysterious ways controlling the way we are evolving? The true answers to these philosophical questions will probably be forever be unknown to us. However, we can still speculate. Personally, I support the view that God is involved in our evolution to this day. I can offer very little supporting evidence for this view. Perhaps the most compelling evidence is that life appears to have evolved from a grand design. The following provisions of Model Mechanics support the idea of a grand design:

1. The elastic property and the repulsive force between the E-Strings appear to be designed properties.
2. The compacting force that compacts the E-Strings together is also a designed property.
3. The incompatibility between the S-Particles and the E-Strings allows the S-Particles to move unimpeded in the E-Matrix is a grand designed property.
4. The forces of nature appear to be the result of a grand design. Specifically, the dynamic CRE force acting on a DNA strand in the cell division process of life.
5. The E-Strings and their distorted geometry that connect all the neurons enable the brain to recognize patterns that it had experienced previously represent the consciousness processes of life. This is another example of a grand design.
6. The continuous competition between the electromagnetic force and the CRE force gives rise to the dynamic processes of life. This also is an example of a grand design.

All these properties of Model Mechanics are the necessary ingredients of an automatic mechanism that could produce life. The possibility that these ingredients come together by chance is very remote. The only other choice would be that it is a grand design of God. If God is involved in our evolution, how would He do it? One of the ways would be to adjust the geometry of the E-Matrix locally or globally. Such an adjustment could affect all the processes in the universe, including the processes of life.

What is the purpose of life? This question has been in the minds of humans since the beginning of intelligent life. Model Mechanics sheds little light on this question. Certainly the grand design has a purpose. What is that purpose? We will never know because knowing the purpose of life knows the mind of God. The theological view of this question is that life is to serve the will of God. How are

we accomplishing this? Perhaps the way we evolve is already the will of God. In that case, there is no greater purpose for life than to serve the will of God.

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