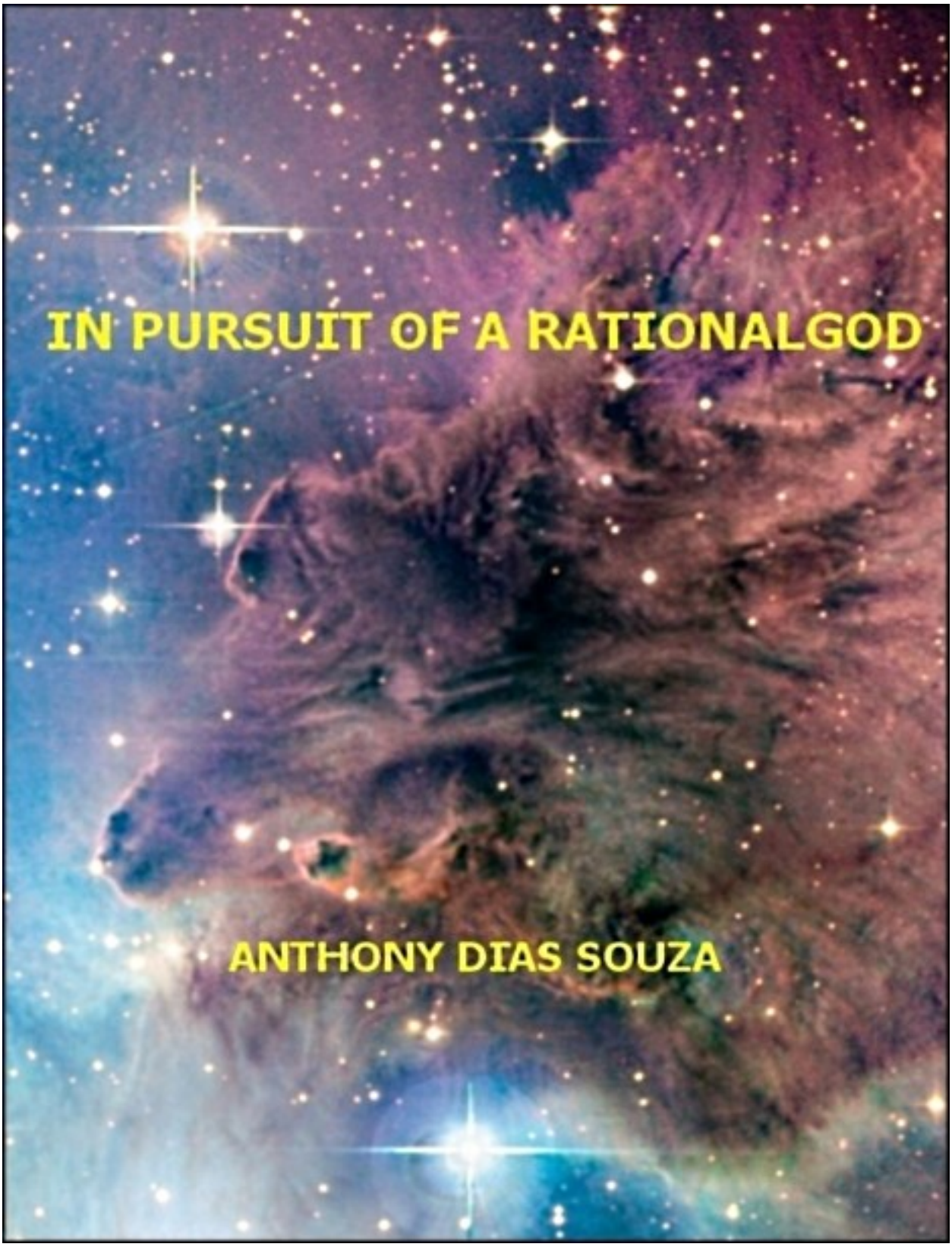
IN PURSUIT OF A RATIONALGOD
ANTHONY DIAS SOUZA

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By Anthony Dias Souza

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Note to Reader:

The inserts [A] refer to the Appendices, [WL] refer to a Web Link, and numbers in parentheses ( ) refer to the number in the Bibliography, all located at the end of the text. Further, the term, theism, in this text is used in the generic sense simply to signify a belief in the existence of a god, gods, or a supreme source. It includes all related concepts such as animism, deism, pantheism, et al.

Additional Literature on Esse is available free of charge at
The Society of Esseans International web site.

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Preface: An Invitation to Criticize

The following text is rendered as the opinion of the author. It does not speak for

the Society of Esseans International or its parent chapter. I express the concepts presented as my personal take on the premise of Esse, which I believe encapsulates many of the views held by my fellow Esseans. If there are points on which we disagree (and such is the strength of our Society), credit to the fact that it is the nature of rational beings to disagree. In this spirit, I welcome and anticipate criticism and divergent views with an open mind. These will afford me the opportunity to broaden my personal perspectives, for truth as we accept it, is the evolutionary product of many inquiring minds.

Comments Welcomed:
mail to:hainaloa@gmail.com Subject: Esse

Anthony Dias Souza

Point of Departure

What am I? What caused me to be? Does life have a purpose? What will happen to me when I die? These are the volatile personal questions that arise when individuals first recognize their mortality and seek to give substance to their lives. Even when not voiced consciously, these questions are the sparks that ignite the fires of inquiry. They channel our inbred sense of curiosity into exploring the depths of self and, by extension, into delving into the fabric of the environment within which we exist. For many, religions provide simplistic answers based upon the professed divine revelations and inspired insights of acclaimed prophets and sages. These answers require no more than a devote faith in their veracity but often fail to pacify the individual's inquisitive rational mind. Even within the true believer, an undercurrent of doubt exists, requiring constant reinforcement to sustain that faith; and, when that reinforcement falters, latent doubts surface, and the need for more palatable answers to life's volatile questions re-emerges. Unless squelched by peer or social pressure, individuals seek out new versions of religion to replace their faith in former true belief. In the process, many cycle through various creeds seeking to suppress the doubts that rational thought breeds. Ultimately, a portion of these resigns the quest in frustration and renounces all religious doctrines. Relegating religion to the realm of fantasy, they proclaim that humanity is the accidental result of the natural evolution of an equally natural universe. This approach is a rejection of theism based upon the conclusion that a God does not exist. It also affords simplistic answers predicated upon empirical observations and, although seemingly rational, those answers fail to adequately address the apparent cohesiveness of the cosmos. Instead, they relegate reality to a jumble of "things" that, for some unknown reason, organizes itself in such a fashion as to produce a modestly ordered universe within which conscious beings just happen to appear. When viewed objectively, this atheistic view is no more palatable than theism founded upon traditional beliefs.

When analyzed, the debate regarding whether or not a God exists is logically moot. Neither the theist nor atheist can substantiate their claims. The question is beyond the reach of science for no empirical evidence exists to either prove or disprove the existence of a God. In essence, both theism and atheism are faith-based opinions. Both are matters of personal belief. Seemingly convincing arguments presented to support either perspective are no more than speculations for the matter of whether or not a God exists is beyond the purview of human inquiry, and anecdotal testimony falls short of tangible proof. However, theism and atheism are not our only options. Reality is sufficiently multifaceted to provide a vast middle ground separating these two extremes. God and Nature are not diametric opposites but merely words that have evolved in such a way as to be no longer relevant when we seek to define the reality that truly exists.

Essentially, our commonly held views on the cosmos are based upon faulty data. We assume most of what we believe upon that which we glean from our five primary senses. Yet, we concede that those senses are both limited and flawed. Thus, it follows that our assumptions also are limited and flawed. In fact, most of those assumptions arose during earlier centuries and became embedded within the social psyche as accepted "universal truths". However, when we reexamine our historical perspectives in light of 21st century discoveries, we again must concede that our ancestors were extremely naïve if not wholly ignorant of the cosmos they beheld through their myth-jaded eyes. For the most part, those ancestors were patently clueless. Even their own bodies were enigmas, defined by speculations that, to be charitable, we now categorize as no better than old wives tales. Still, the majority of people in our present day world cling to those outdated speculations and to irrational dogmas bred during eras when natural phenomena such as lightning, earthquakes and volcanic eruptions were deemed to be evidence of the wrath of mysterious gods. Indeed, our sciences have made great strides in overcoming our past ignorance. Unfortunately, the majority of the world's population has failed to keep pace and few, if any, of the great truly liberated minds of the 21st century have made an effort to reach out to the science-illiterate masses to enlighten their darkened minds. While our scientific elite look forward to the 22nd century, the bulk of humanity holds fast to dogmas that have been frozen in time, searching for answers to life's most volatile questions in antiquated texts authored when rational thought was in its infancy and logic was considered a tool demons utilized to tempt the unwary away from unquestioning faith in the designated true beliefs. On the positive side, although diluted and suppressed by the prevailing myths of the era, enlightened rational thought occasionally did emerge in various segments of society. Unfortunately, with the current focus on science, the tendency has been to discard the wisdom of the ages along with the ignorance of the past. In many instances, we have "thrown out the baby with the bath water" rather than extracting that part of our heritage that now can be substantiated by newly discovered science fact. To mend this travesty, there is a need for a new revival that blends the insights gleaned from cutting-edge science with historical speculations that have withstood the scrutiny of rational thought. With an

unbiased approach to reality, there are no answers to life's volatile questions that can remain forever hidden from a truly freethinking mind.

Reaching Beyond the Obvious

As a result of their research, our sciences have established that the material universe is far more complex than the one we naturally observe. In effect, our natural perceptions are illusions in that they do not reveal that which truly exists. For example, tangible water is a composite of hydrogen and oxygen (H2O), two gases that, in their native states virtually are invisible to the naked eye. Further, those gases are composed of more elusive subatomic particles that, on further dissection, function as little more than detectable activities in a given region of space. Like the rest of the material realm, water is not, in its essence, as it appears to our senses. Thus, we would be naïve to attempt to explain reality merely in terms of the overt phenomena we naturally perceive. Moreover, our observed material universe is not the whole of cosmic existence. Our sciences have proven the opposite to be true. We know that phenomena functions beyond the range of that which we naturally recognize. For instance, invisible electromagnetic radiation powers our radios, televisions, and cell phones, and a host of other devices such as x-rays, radar and microwaves are common to everyday life. Many of theses electromagnetic emanations pass through our bodies undetected and are given tangible substance only through the devices we construct to translate them into frequencies we can perceive. Ultraviolet and infrared light escapes our eyes, and ultrasonic and subsonic sound escapes our ears. Yet, we concede that these exist. Indeed, through our constructed devices, we make use of broad spectra of cosmic activity that, until the recent era, were not known to exist. Therefore, we cannot rely upon our unaided senses in defining the cosmos. This becomes more apparent when we analyze how those senses operate.

Sense experience runs its course through our bodies in discreet impulses, not in continuous contiguous streams. Those impulses are relayed from individual nerve cell to individual nerve cell across an intervening space between each. [A26b] Thus, there is a time lag between the moment a sensation enters the body and when the brain acts it upon. Like individual still frames in a reel of motion picture film, these incremental sensual impulses produce an illusion of constancy and continuity that, in fact, does not exist. Moreover, these incremental sensual impulses merely replicate the stimuli our nerve receptors receive. They transmit impressions that our consciousness translates into a perceived external world. For example, our eyes do not transmit whole images to the brain the way a camera transfers whole images to film. Instead, they input a complex set of coordinates as undifferentiated bioelectrical impulses that, somehow, give rise to the images we consciously see. [A26a] Moreover, we never truly see an object but merely react to the portion of the light spectrum that objects reflect. In fact, we have no way of ascertaining that those images truly represent the environment that exists "out there". Is one individual's red the same as another's, or simply different hues we individually see but have given the common label "red". If one person saw a

conscious blue, while another saw a conscious yellow, and a third saw a conscious red, but collectively agreed to call that certain spectrum of light "red", would it not be "red" to all three? The thought boggles the mind when expanded to embrace the whole of human experience. The discomforting truth is that the only thing we can say for certain is that which Rene Descartes concluded: "I know (conceptualize), therefore I am." Indeed, everything we purport as fact is based upon faith. It is no more than that which we believe to be true based upon collectively agreed-upon experiences that we trust to be commonly held by all individuals. Given that caveat, we can proceed to investigate the process through which we perceive.

To appreciate fully the function of perception, we must extend beyond the mundane world and delve into realm of the microcosm for it is within that realm that the fundamentals of experience take place. At its root, perception rests on change. We interact with other configurations of activity (matter or things) and cosmic currents (energies) in the course of our existence, undergoing changes in the configuration of activity that makes up our bodies. Those changes provide contrasts between past and present states of being through which we become aware of ourselves and of the environment within which we live. Those contrasts are the foundations of our awareness. Without them, we would not be able to perceive. For example, if we were born in absolute darkness, we would not be aware of that darkness until we encountered some measure of light. This contrast is critical to our awareness of both light and darkness, and the same holds true for everything we experience in life. This also explains why we view interstellar space simply as the region where observable matter does not exist.

Mass is the only contrast for interstellar space, and energy (the essence of mass) is the fluctuations we observe within that interstellar space as they contrast with each other. Those fluctuations logically imply a medium within which they function and exist. [A10c] It is inconsistent to presume that those fluctuations are entities unto themselves wandering aimlessly across a vacuum or void. Patterns of movement would have nothing to constrain them and render a basic haphazardness to the cosmos that, in fact, does not exist. Thus, a more rational cosmic model would be one wherein reality consists of an infinite presence whose activity gives rise to tangible form. [A24] This model would provide a theoretical basis for a more intelligent explanation of the universe. It would resolve many of the anomalies that modern science finds itself at a loss to explain.

Placing the Cosmos in Perspective

Interstellar space has been called the final frontier. However, beyond the inner realms of quantum physics, no practical definition has been offered for this fundamental entity within which our material universe exists. Terms such as void, vacuum, and the like, are meaningless. They are merely synonyms for the word: nothing and, illogically, a "nothing" is a "something" that does not exist. Yet, we acknowledge interstellar space as a reality in contrast with the material things we perceive. From our

perspective, it is the prevailing existence, stretching endlessly beyond the visible universe. Moreover, from our perspective, there is no limit to interstellar space. We can assume a limit to space but we have no empirical method to prove that assumption is correct. Some have defined interstellar space as a finite sphere containing activity that is enclosed by time and within which time began at its birth. A fascinating notion; however, it begs the question, "What lies beyond that finite sphere". In response, some have conjured up other universes to fill an implied endless "beyond". [A14a] However, this does not address the dilemma posed by interstellar space. We know that it is not empty. In fact, it is filled with a very thin mixture of cosmic rays, magnetic fields, ions, grains of dust, and other molecules. [A7d] The question remains: In what basic medium does this cosmic "soup" exist and operate.

Beginning with the ancient Greek philosophers, the western world has striven to define the apparently massless spans between visible stellar bodies. [A10d] It presumed the existence of an anonymous cosmic ether through which energy radiated. This concept held sway until the late 19th century when researchers sought to measure the impact that theoretical ether had on the transmission of light. [A10e] These experiments erroneously assumed that the cosmic ether possessed some measurable mass and, when they failed to detect any impact on the transition of light, they concluded that a cosmic ether did not exist. However, the premise utilized in these experiments did not allow for the possibility that the cosmic ether was, by nature, massless. [A13d] In other words, it was not an active component of our material realm, but the underlying medium within which our material realm flourished and which cannot be measured by mechanical means. [A10c] Fundamentally, mass is detected by interaction with mass, and a massless cosmic ether does not interact with movement of mass within its depths. Consider the transit of a single eddy across a pond of the purest water. Its travel would uniformly be constant. Measuring that transit will not reveal the presence of water especially if the observer was another eddy within the same pond. Instead, only the particular characteristics of the subject eddy relative to the observing eddy could be determined as stated in the concept of relativity. It would be as if the water was massless and did not exist. This parallels the conditions present in interstellar space. A human observer (a form of mass or configuration of energy) can detect only the impact mass has on mass even when that occurs on the subatomic level. Since physicists seem to accept the existence of massless particles, why do they find it difficult to acknowledge that the same can be applied to interstellar space? [A13a] Albert Einstein did not discount the possibility of a cosmic ether within his theory of relativity but merely noted that such a presence did not lend itself to measurement. [A10c] Other physicists have allowed for such an ethereal presence but assumed it has no value, assigning the topic to the realm of metaphysics. Others have disagreed, noting that such a cosmic presence would constitute a desired "preferred frame of reference" in the analysis of subatomic mass. [A10e]

Discounting the existence of an underlying cosmic medium is as foolish as compiling data regarding eddies without acknowledging the water within which those eddies exist. After all, it is only by accepting the presence of water that the essential relationship between eddies can fully be understood. Much the same can be said about

interstellar space. The relationship between mass and energy is best defined by postulating a fundamental medium within which both exist. This medium, by nature, would be massless to the extent that it forms the foundation within which all cosmic activity functions. Essentially, its activity interacts and gives rise to the phenomenon of tangible material form (mass and energy). This resolves the dilemma of interstellar space. In the interest of logic, it behooves us to declare interstellar space as an infinite, immeasurable presence and, for the moment, accept this as a theoretical fact. Live with it! Merely understanding how our material universe functions is enough of a chore to occupy us for the next several hundred years. With that said, we can settle on devising a more plausible and practical model of interstellar space.

Interstellar space exists. It is a self-enabling reality, not an endless void. The brilliant nineteenth century mathematician, William K. Clifford, implied as much when he described matter as "undulations in the fabric of space". (6) Erwin Shrödinger, acclaimed as the father of quantum physics, supported that premise when he wrote: "What we observe as material bodies are nothing but shapes and variations in the structure of space". (51) Albert Einstein also sustained a similar point of view. He held that matter was inseparable from the space it occupies, and that space must possess a connecting property that extends throughout the whole of it. (12) By the mid twentieth century, quantum physicists dismissed the notion of a cosmic void populated by isolated material bodies, and adopted a perspective that gave substance to interstellar space. (51) Scientific probes into the cosmos within the last fifty years concluded that our visible universe accounts for only about four percent of that which exists. Another twenty-two percent is composed of dark matter [A7a] which we have proven conclusively does exist. [A7b] The remaining seventy-four percent is presumed to consist of dark energy [A6](44) that, as far as we can determine, permeates the cosmos functioning as William K. Clifford stated "as undulations in the fabric of space". The above suggests that interstellar space is a medium in which observed material activity takes place. Recent proposals further support that premise. Physicists have advanced the concept of vacuum energy [A24](52) wherein space, even when devoid of matter, sustains an underlying energy that practical experiments presumably demonstrate does exist. Others have postulated a zero-point field [A27] existing within the backdrop of interstellar space. This field consists of the trace "jiggling" that occurs at the peripheries of electromagnetic radiation, possessing potentially more energy than that which we otherwise detect. (22) This field could be the basis for all that exists within the material universe. A second concept - a string theory [A20] - reduces matter to particle producing "loops" in the fabric of interstellar space. These perspectives give new meaning to the view held by many ancient philosophers who, inspired by simple observations, portrayed the cosmos as a formless expanse whose innate activity gave rise to the material realm. We read in the opening lines of Genesis that "darkness was upon the face of the deep and the Spirit of God was moving over the face of the waters", and thus the whole of creation was formed. Greek mythology held a similar view wherein Chaos, the formless cosmic essence, activated by Eros, gave rise to Gaea and the material universe. Similar analogies were voiced by many other cultures from Africa to Asia basically describing the cosmos as an infinite ocean wherein some sort of

spirit (activity) exists to form the tangible realm. Although extremely uninformed of the practical mechanics of their cosmic model, the fundamental perspective underlying those early myths appear to be vindicated by that which we have deduced. Within the purview of modern cosmic concepts, interstellar space is analogous to an ocean. We now describe exotic subatomic particles by their motion. [A15] (35) (43) No further definition is relevant within the scope of the devices we have constructed to examine the presence of the most elementary aspects of matter. In effect, when reduced to its essence, matter (collectives of energy) is no more than detectable activity occurring within a given region of space. In a practical sense, matter does not exist until it is perceived relative to the same way a wave upon the ocean does not exist until we observe it. In reality, a wave is no more than water in motion and that motion gives that wave its material form. Further, the same holds true for all material phenomena. They exist as activity in a given region of space until they interact with our beings, and that interaction gives them conscious form. If that interaction does not exist then, for all practical conscious purposes, that phenomena will not exist for us. Therefore, it behooves us to distinguish between the material reality we naturally observe and to seek to grasp the cosmic reality that truly exists. This task requires a redefining of interstellar space.

Stepping Outside the Box

In physics, a dimension refers to specific coordinates in a given region of space. Our normal observed world has three - height, width and depth - defined by two points extended from a set point of reference. Initially, Albert Einstein expanded these dimensions by adding time as a fourth mathematical point of reference, essentially redefining our three dimensional world and relocating it within the theoretical realm of quantum physics. More recently, others have postulated additional coordinates, creating hypothetical five to eleven dimensional realms. [A8] Unfortunately, these are portrayed in a manner that the average individual, not possessing a basic grasp of quantum mechanics, has difficulty comprehending. Moreover, these theoretical dimensions still apply to the conventional material universe. They are real only in the sense that they are portrayed as complex equations quantum physicists are able to manipulate and devise laws by which the observable universe operates. Unlike most scenarios portrayed by popular science fiction, these theoretical dimensions do not encompass the possible existence of a fundamental realm within which all of these dimensions exist.

In the pursuit of discovering the root of our material universe, physicists tentatively have identified twelve fundamental particles - quarks and leptons and their antiparticles. In addition to these, there are gluons, photons, and W and Z bosons - the force carriers responsible for strong electromagnetic and weak interactions. These force carriers also are called particles. [A20b] These are little more than observed activities generated by supercolliders and particle accelerators, using processes that basically smash one aspect of matter against another then observing and cataloging the

results of those collisions. Yet as previously stated, this research still involves our known universe. It utilizes a regression technique that breaks matter into ever-smaller pieces (a dice and slice approach), much like dissecting a frog in a biology lab to see how the reptile functions. This reverse engineering does return spectacular results but is based upon the unstated assumption that perceived matter is the sole end product of cosmic activity. It does not allow for the possibility that the evolution of tangible matter as we know it, is but a single stream of development within a multifaceted cosmos. Other streams of development may exist, comprised of fundamental particles radically different from those our supercolliders and particle accelerators now manipulate and observe. Those other streams of development may be the true basis of alternate dimensions, not those that physicists now postulate and debate. By analogy, let us assume that all matter in our perceived universe is made up of tiny cubes. The shape of those cubes will dictate the possible forms of this universe by restricting the potential variations assembling cubes can evolve. Further, if within another universe, tiny pyramids function as its basic building material. A universe evolved from these would offer a radically different range of possibilities that would bear little resemblance to our cube-based world. Feasibly, there could be elements of synchronicity wherever cube and pyramid structures coincide. These could be the seamless boundaries between the separate cube-based and pyramid-based dimensions, across which those dimensions communicate.

The current buzz phrase in the world of industry is "thinking outside the box" which implies setting aside the traditional givens and searching for new approaches that exist within an infinitely diverse world. Yet, as much as physicists wish to portray themselves as avant-garde researchers, they have become little more than disassemblers, taking apart conventional matter to discover what makes our material world tick. This approach is extremely productive and necessary, and the practical applications derived from their discoveries have radically changed our lives. However, we must project ourselves beyond our given material universe and develop a true cosmic approach, conceding that reality is infinite and eternal in scope. True, the concept of a never-ending expanse of interstellar space may be a bit mind-boggling for we are accustomed to observed beginnings and endings within our sensual world. However, those beginnings and endings exist only within the way we view our environment. Within the realm of reality, transmutation, not destruction is the cosmic norm. The essence of matter continues eternally, converting into another energy form. Indeed, we see things appear and disappear but only from our sensual point of view. Yet in fact, the cosmos engages in the natural process of recycling, breeding new material forms from the remnants of the old. In this cosmic sense, nothing is new or destroyed, merely rearranged, as is the cosmic norm. This cycle of transmutation is obvious to anyone who gives the process a bit of thought. As Nature progresses, a thing dissolves to give rise to other things that take on its constituent parts as the continual evolution of reality goes on. Therefore, our cosmic view must encompass that reality in both its infinite and eternal scope.

Presently, modern science postulates a starting point for our material universe predicated on a concept commonly referred to as the "Big Bang". [A23] According to

this theory, before the observed universe existed, all of the matter and energy of space was contained at one point in a presumed highly compressed state within an undefined "absolute nothingness" and, for some reason, suddenly expanded, sending forth its elements to evolve the observed components of the visible material universe. Based upon our observations, that visible universe is expanding, presumably sending its constituent parts outward from the epicenter of its birth. This and other peripheral evidence appear to sustain the "Big Bang" point of view. However, the theory also raises the inevitable discomforting question. Granted that our material universe may have had a beginning, but in what did the germ of the new universe exist before it expanded? A newer theory proposes that the universe transitions through a series of cycles, expanding then contracting to repeat the process endlessly. [A23b] This new perspective fundamentally implies an infinite and eternal cosmos within which a basic form of energy perpetually exists. However, this still returns us to the illogical conclusion that our universe, at some point, exists in infinite "nothingness" as a blob of "somethingness". [A23c] Unfortunately, there isn't an equation to resolve that dilemma. And, as much as quantum physicists resist dealing with infinities, logic mandates the acceptance of an infinite cosmic "somethingness" of which our material universe is but an infinitesimal part. [A17d]

When addressing a cosmic reality, we must venture beyond the constituent parts of our material universe and step outside the "walls of that box" to wander about within the vast unknown of the cosmic whole. If we can postulate a possibility, we can state with a degree of certainty that, somewhere and in some form, that possibility exists. After all, our history of development is based upon doing the seemingly impossible. We have done so repeatedly over the last hundred and fifty years, limited only by the constraints we voluntarily impose upon our rational minds.

Fashioning a Rational Cosmic Model

Within the parameters of a more fact-based cosmic model, the material universe, at its core, can be said to consist of differing configurations of subatomic activity, occurring within the medium of interstellar space, that project the overall impression of tangible form. [A17b] This is its fundamental reality or esse. (The term esse means no more than that which truly exists.) Everything we naturally sense falls into this category and nothing is as it appears to be. Moreover, like all other material components of the universe, the human body is a cohesive aggregate of cosmic activity functioning within a given region of interstellar space. This is our personal esse. By analogy, that esse could be portrayed as a complex collective of eddies within the depths of a pond. That collective interacts with other aspects of the pond's activity - with other collectives of eddies (mass) and separate currents (energies) - to produce pattern changes that constitute the personal experiences we accumulate. As stated previously, we perceive through contrasts, and those pattern changes within our beings are the essence of that which makes us aware of our individual selves and the external environment at large. In an abstract sense, the same can be said about all other

aspects of the material universe. However, the evolution of consciousness is entity specific. That is, it relies upon the particular development of the entity involved. Obviously, we are more proficient than rocks even though, on the subatomic level, rocks function as cohesive configurations of cosmic activity within a given region of interstellar space. Yet, in the abstract, rocks could be said to experience since their environment has a definite impact of their rock-state of being. In a limited way, they interact with their environment, thus evolve to the degree that environmental activity alters their internal states. Further, at the subatomic level, they constantly adapt to compensate for the impact that their environment has upon their material forms. This abstract symbiosis may appear difficult to accept as it pertains to rocks; however, within the realm of a functional cosmic model, it is a logical fact. There is no real separation between our bodies and rocks when viewed from the perspective of the infinite medium of interstellar space. The fundamental difference rests within the structural activity of each in the manner that two eddies behave differently within the depths of a pond. From the cosmic perspective, all aspects of our material universe are united, functioning as elements of activity within the depths of interstellar space. [A17b]

In summary, an effective cosmic model must embrace the whole of existence and explain the apparent phenomenon of perceived separate material entities spanning the spectrum from miniscule particles to gigantic stellar masses. Essentially, it must run the entire gamut of existence from the sensory material realm to the extrasensory phenomena physicists probe and intuitively project that possibly may exist. And, a cosmic model based upon the premise of an infinite presence whose perpetual activity gives rise to tangible material forms fulfills that criterion. It presents a unifying formula that not only explains the universe we perceive but also explains how the function of perception operates. Most of all, it establishes a basis from which the phenomenon of consciousness can be projected and potentially explained.

Consciousness as a Cosmic Presence

Since the advent of modern technology, the human brain has been explored in depth. At the present, we have unraveled most of what it physically does. The rest we hope to define at some future time. However, we have been at a loss to explain how this reasonably understood cranial mechanism produces an expanded consciousness beyond the basic sensory perceptions it receives and manipulates. Even assuming our physical experiences to be representative of our environment, consciousness eludes us. Thus far, our sciences have provided only inadequate speculations to explain this ghost that operates the body machine.

As far as we know, conscious thought is a reaction to the bioelectrical impulses gathered by sensors located within the external body. Those rather identical impulses are transmitted to separate regions of the brain, via a network of nerves, where they somehow are manipulated to produce conscious impressions of the external realm. [A26b] Those impressions evoke contrasts between that outer realm and our personal

beings, thus eliciting an awareness of individuality (a sense of me versus that out there). In practice, much of what we do is evoked by reflex. We behave in a certain manner because that is the way our bodies evolved. We walk because we were born with legs; we grasp because we were born with hands; and so forth. If we were snakes, we would act in a totally different way regardless of how advanced a brain we evolved. Indeed, as science has demonstrated, many of our functions are built into our body structures through an extended evolutionary process. The activities of our distant ancestors elicited genetic modifications that produced the bodies we now possess. However, throughout our evolutionary development, we exhibited consciousness. For that matter, every animate entity on earth displays consciousness to varying degrees. Logically, this leads us to conclude that consciousness is not solely a human phenomenon but a basic capacity somehow prevalent within the environment at large. [A5b]

Traditionally, humanity has utilized two basic approaches in exploring the phenomenon of consciousness. Physiologists examine the mechanisms of the body while psychologists probe the inner workings of the more elusive mind. Yet, both approaches have resulted in failure because both are mired in complexity. The whole of consciousness is not reflected in the sum of the body's physical parts, nor is it evident in the broad spectrum of human behavior and thought. Attempting to explain it in either traditional fashion is as futile as standing in the midst of a forest and seeking to compute its total number of trees. In other words, to begin to explain consciousness, we first must determine the scope of its field. We must know to what extent it prevails within the environment and begin to examine it in its most fundamental state, apart from complex animate beings.

In its simplest observable form, consciousness appears to be the innate ability to act and react productively in a manner seemingly beneficial to an entity's survival, and to distinguish itself within the environment. [A5a] Even a single-cell amoeba possesses these traits. It can detect and avoid obstacles and predators; locate, trap and consume prey; thus, distinguishing itself within the environment. [A5e][WL1] It does all of this without the benefit of sense organs, networks of nerves, and the billions of cells that make up the mammalian body and brain. These are self-motivated activities performed by a microscopic and virtually transparent single-cell living entity that, by selecting a course of action and discriminating between self and environment, exhibits consciousness in its most fundamental, observable form. By virtue of its action, the amoeba is self-aware. Dismissing its behavior as mechanical or instinctive merely evades the logical reality that consciousness is not the exclusive property of an environmentally privileged few, but an extension of the basic activity pervading the cosmos and every tangible aspect that basic activity evolves. This is consistent with that which was said previously regarding the way we perceive. Every aspect of the environment, as composites of cosmic activity, interacts with other aspects of the environment, and that interaction induces changes that constitute the basis of perception. Thus, every aspect of the environment, even the humble amoeba, perceives in some fundamental form. In essence, we are unique only to the extent that our complex beings have modified that cosmic consciousness to generate a higher

degree of intelligence in comparison with the other entities of the material environment. In other words, we do more with our quotient of consciousness in the course of our physical survival than other aspect of our physical world. This is our only claim to uniqueness in a cosmic consciousness base.

To analyze consciousness effectively, we must begin with a new set of simple premises. Stated briefly: (1) consciousness is a universal phenomenon intrinsic within the fabric of the cosmic realm; (2) the root consciousness that exists within us also exists throughout the cosmos in the same basic form; and, (3) the difference between our expression of consciousness and that expressed by other aspects of our environment arises solely from differences in physical structure. [A5f] These three premises divest consciousness of its human mystic by defining it as a cosmic-wide field or, more precisely, as an undercurrent in the sea of interstellar activity. [A5h] It is as physicist Amit Goswami stated, "consciousness is the fundamental activity of the cosmos and contains all the possibilities and is timeless and infinite". [A5h] A variant of pervasive field perspective has been proposed by Johnjoe McFadden but was limited to the confines of the human brain. [A5c](38) His concept embodies an extended underlying field generated by the normal bioelectrical activity of the neurons the brain encompasses. On further analysis, one could project that such a field exists as a natural background to all cosmic activity, and that the neural activity of the brain merely modulates that field to produce the ultra experience that make us consciously alive. This would explain more effectively the apparent conscious behavior of other aspects of our environment that are not privy to the intricacies of the human brain. For example, certain plants, such as the tomato, seem to respond measurably in a fashion that could be deemed emotional. Activity electromagnetically similar to our functioning neurons would account for this phenomenon. Possibly the theory postulated by Johnjoe McFadden could be expanded and utilized to investigate all conscious activity within the environment as a whole. Quantum physics has made great strides in delineating the subtlest aspects of that activity. Quite possibly, it may one day we will accept the existence of a consciousness zero-point field.

Another perspective is that which has been termed, "swarm intelligence". [A22a, c] (7) (30) (42) Briefly described, swarm intelligence is the ability of rather unsophisticated entities such as army ants or African termites to display incredibly creative skills when acting collectively. For example, African termites build elaborate structures, each modified and contoured for a specific environmental locale, complete with intake and exhaust ventilation, without the benefit of a top-down chain of command. In practice, the swarm develops intelligence greater and more effective than the capacities of its individual components. As a functioning collective, the ant or termite swarm abilities vastly exceed those of an individual termite or ant. This enhancement could be termed, "communal consciousness". It is an intangible capacity produced by the whole. Their model now is being used to develop emergency response and computer program structures, and have significantly advanced the cause of artificial intelligence. [A22b, d] Both biologists and computer analysts now are studying the activities of other swarms - from the microscopic to the macroscopic including viruses, bees, bird flocks, and herring schools along with greater universal

phenomena - seeking to discover precisely how these organized systems operate. All the above leads to an intriguing possibility. Could the myriad of human brain cells also be functioning as a contained swarm? If so, there would be no brain command center as such but rather a productive field that, as the Gestaltists phrased it, "is different from the sum of its parts". This could be the reason we have not deciphered how the many facets of our minds operate. In the past, we have assumed a top-down structure with some specific part of the brain in command much like the kingdoms of old. For a fact, the individual neurons of the brain are less versatile than ants or termites. However, like ants and termites, they react to stimuli, and are influenced by their immediate environment and by other neurons in their vicinity. Moreover, they are only a bit more sophisticated than amoebae although collectively produce more profound results. Of course, the inevitable question arises: what unifies this swarm of neurons and generated the entity we call the self? Quite possibly, the answer rests within the observed ability of a swarm to focus on an activity just as ants and termites spontaneously unify and concentrate on a threat to their nests. Those insects align themselves into crawling attack armadas with no specific insect in authority and with no discernible chain of command. This ability to focus collectively could be the essence of that which we call the mind. Natural evolution would have fostered it, eliminating those of our early ancestors who were not able to respond effectively to personal threats. If so, our ability to focus upon specific mental activities in deference to others would produce the illusion of a separate function overseeing the rest of the brain when, in fact, such a function does not exist. It would be an illusion in that the brain is a composite of groups of neurons, each dedicated to different tasks much like the termites within a mound. Those insects can be divided into different castes, dedicated to separate tasks. And like our neurons, each insect functions as an individual entity, organized only by the needs of the swarm, thus forming a consciousness of the whole when driven by necessity. Based on this concept, we have been able to develop more intelligent computer programs with no specific top-down command control. This logically leads to a second inevitable question: if it works for bees, ants, termites, herring and computer, why not apply the same approach to analyzing ourselves? After all, our neurons appear to act and react like comparative swarms.

As previously stated, the degree of material intelligence is relative to the physical structure of a material form. The greater the complexity and versatility of that structure, the greater the possibility a superior intelligence will evolve. [A5f] This premise could be expanded to encompass the infinite cosmic whole that, by far, is the most complex and versatile entity of all. As it embraces all of its interactivity within the realm of an infinite interstellar space, one logically could project that the cosmos is conscious in some fashion, relative to the infinite myriad of its active parts. [A5d] In the abstract, this cosmic swarm could be deemed a universal divine but not in the context of an anthropomorphic god. Its intelligence would assume a vastly different and all-inclusive form, one that induces a cohesive set of natural laws in a fashion similar to the way African termites adapt the structures of their mounds. This would render a new meaning to the term, "intelligent design".

Real Intelligent Design

Every animate entity is motivated to reach out to the environment within which it thrives. It does so by necessity for, if it did not, it would die. This drive is often labeled as the survival instinct. However, that oversimplified pronouncement leaves much to be desired. Regress evolution to its humble beginnings - to the first organism to emerge on the planet Earth. Without predecessors, what gave it its urge to survive? Logically, there must have been a predisposition within its structure to propel it outward into the environment and preserve it from extinction. Otherwise, it would not have proliferated to mutate into a higher form of life. Some men of science have deemed the possibility of chance development extremely remote and have suggested the notion of intelligent design (not to be confused with Creationism as sponsored by various religious sects). [A12a](55) More likely, this progressive evolution was instigated by the universal field of consciousness that permeates the cosmos (as suggested earlier). Animate entities came into existence because that universal consciousness field linked them to the environment, thus conditioning them to survive. In this sense, there exists within nature an aspect of intelligent design. However, this motivating force is not an alien presence superimposed upon the cosmos, but an intrinsic part of that universal whole. The cosmos evolves as it does because that is its nature. Its inherent activity moves to develop specific patterns that produce all of the phenomena of the material realm. Consciousness, an underlying field of interstellar activity, motivates progressively higher forms of life to evolve. Actually, there is nothing mysterious or mystical to the process. If we look around at the more obvious elements of evolution (such as a seed sprouting and developing mutations), we assume that some natural force impels those elements to act as they do. Why can that force not also be super-natural; that is, a more extensive force underlying the commonplace aspects of life?

In recent years, many who insist the Earth and all of its life were instantly zapped into existence by an undefined god have defamed the word, "evolution". Others have advocated a Biblical four thousand five hundred year old Earth - a concept science has debunked. [A1] However, few if any of those who condemn evolution can explain adequately the term god without resorting to meaningless synonyms. The more scholarly of the lot venture to define god as an abstract being, covertly implying that it is a someone, existing somewhere, who by virtue of unexplained mysterious powers takes a special interest in our personal lives. In this, they offer no real explanation except that someone at sometime or another was able to communicate with this super being and were advised as to what his or her wishes were. They often insist that we poor mortals have faith in these historical ancestors, for the human mind simply cannot grasp, let alone understand, the reality of their version of God. When viewed logically, their approach and pronouncements are no more valid those of past primitives who worshiped idols of wood or stone. If we are to have a supreme being, let it be the cosmic Esse. At least, it better fits the concept. It is universal and infinite, and the generator of everything material. It intrinsically possesses the ultimate power, for nothing exists beyond it. Thus, logic behooves us accept the cosmic Esse as a rationally valid God.

Historically, humanity has been obsessed with the notion that something of greater power exists beyond itself. This notion arose from the realization that humans were subject to the caprices of nature and had only a limited influence over their environment and lives. Seemingly invisible forces manipulated human existence, and humanity desperately searched for a way to understand and control those forces. As a result, religions arose. From the first shaman to the modern cleric, this historic quest continues, changing only in social form. To an extent, science is the logical extension of the ancient shaman. It evolves theoretical solutions to age-old puzzles, conjuring up new potions that render humanity even more powerful than its predecessors' gods. Unfortunately, despite all our progress, we remain trapped within the inevitable cycle of life. We are born, live for a measured span, and then die. Even now, that realization drives us to seek an escape, pressing us to discover a solution that will explain the purpose of life. Thus, as the French philosopher Voltaire once said: "If there was no God, it would have been necessary to invent him." If so, we would be well advised to settle for a more plausible and logical cosmic deity. At least the concept would be compatible with all that science has discovered thus far.

Aside from the traditional reasons, accepting a cosmic deity is highly productive and functional. It allays our commonly held sense of helplessness by permitting us to reach out beyond the self to the recognized powers of the universal realm. It allows us to commune with the ultimate cosmic power that shares a greater portion of consciousness than we possess.

Ultimately, we tend to define intelligence by our self-standard. Thus, we infuse human traits into the divine creating an anthropological god that mimics our beings but possessing more power. As said previously, this concept is patently absurd. A being like ourselves inherently would be flawed and no better off than we are. Therefore, we need another standard for intelligence when we apply it to the cosmic realm. This standard must encompass the functioning of our beings as it applies to the universal whole. In essence, intelligence on a cosmic scale is no more than the natural processes of universal activity that science now explores. It is the underlying methodical unfolding that preordains the evolution of our material realm. If we step beyond the debate between creationists and evolutionists, we can grasp the greater reality of intelligent design.

In all of its intricacies, the cosmos presents the best and most rational definition of a deity. It is the creator and sustainer of all material phenomena, and is intrinsically involved in everything it generates. By nature of our physical structures, we are immersed personally within this cosmic deity. It directly influences our lives and provides all that sustains us. If we choose to call it Nature, we do not diminish its reality. Instead, we simply have chosen a more personally acceptable synonym.

God and Nature are Synonyms

Throughout history, much has been ascribed to the three-letter word "god", most of it fanciful and illogical. Regardless of the language, the word has been gender

specific. God is referred to as a he or she, connoting an anthropological (human-like) deity. The concept is logically unsustainable. It assumes a physical gender that, by extension, presumes a limited body with all of its accompanying traits. Simply put, if a god is a he or she, that god must possess the sexual apparatus and biological functions relative to its gender. Would that god require food, drink and sleep to sustain its existence? Does it breathe, excrete and urinate? Clearly, the concept is ludicrous when carried to its logical extremes. To be rationally sustainable, a god must be gender neutral, not a he or she.

By the most commonly accepted definition, the word "god" means a "supreme being". To this extent, the word is a bit ambiguous. A "being" denotes something that is existent in the present tense and not necessarily a person. Nature, taken on a cosmic scale, would qualify as a "being" and, as it would encompass the entire universal realm, it would be supreme as it would be responsible for all that exists. In this sense, the terms "god" and "nature" are synonymous and interchangeable, and definitely not mutually exclusive. However, both terms have acquired considerable historical baggage. They elicit ingrained prejudices and create an adversarial atmosphere that makes rational discussion practically impossible. Thus, it behooves us to discard both and simply encapsulate the concepts underlying both God and Nature within the neutral term, "Esse".

Esse, as utilized in this context, simply means, "that which truly exists". It is a synonym for the reality of an infinite presence whose perpetual activity gives rise to tangible form. Given all that has been presented thus far, this is a rational description for the cosmos. Even if we accept a beginning to our material universe, logic mandates that an active eternal cosmic presence for it is next to impossible to envision an endless but somehow productive absolute void. It would be irrational to assume that somehow everything miraculously sprung from nothing, and that nothing else beyond our material universe exists. Given the stated premise, we can proceed with a reasoned analysis of the cosmic Esse.

As explained earlier, our sciences have demonstrated an intimate similarity between our particle-based beings and the cosmos at large. We are integral facets of that cosmos, functioning in accord with its essential processes. On a subatomic level, we operate according to the same universal laws that govern the whole of existence. Thus, through reverse logic, we can project that the way we function somehow reflects the functioning of the cosmos as a whole.

As previously stated, we perceive through contrasts derived from our experiences. Environmental contact alters the makeup of our bodies, and this contact elicits changes within our bodies that provide the contrasts in states of being through which we perceive. This process occurs on the universal scale, and the ability to recognize those contrasting states of being makes an entity aware. Still, it may be a bit of a stretch to project this material entity-specific awareness to the cosmos. However, that cosmos could function as a swarm, thereby developing a capacity for intended development much in the way a nest of termites adapts the design of its mound to the specifics of the environmental terrain. That capacity would be responsible for the observed intelligent design of our material realm. [A12a] It would account for the

existence of universal natural laws. We know that the cosmos is a hotbed of material activity and, as a result, it constantly undergoes changes within its internal state of tangible being. Thus, it would follow that, like the lowly amoeba, it somehow perceives. However, the cosmos is an enclosed system in that it has no contrasts for its overall being beyond those produced by its internal components. Thus, it would seem that its awareness would be restricted to its internal essence and not extended to an awareness of that essence as a separate ego or self. In effect, it would be as restricted as would a human being deprived of outreaching physical senses and contact with the external material realm. Therefore, while it may possess the functional root awareness exhibited by the amoeba and other material entities, that awareness would bear little resemblance to our sense of personal material self. One might speculate that the cosmos as a conscious entity somehow may derive input from conscious entities such as ourselves, but this would rest solely within the arena of personal belief. In essence, all we can do is speculate about the nature and capacities of the cosmic being for that rests beyond the bounds of empirical proof.

In an abstract sense, the cosmic Esse is super-natural in that its essence is beyond the ken of our natural senses. This perspective gives the term "spiritual" a relevant connotation within the bounds of scientific fact. Accordingly, our essence or Esse also is super-natural and would constitute the human spirit or soul. However, whatever we choose to speculate beyond these givens again falls within the arena of personal belief. We can call the cosmic Esse either God or Nature as we see fit without diminishing it for both terms encompass all that exists.

To summarize, the cosmic Esse can be defined as a basic presence that is synonymous with consciousness. It is the infinite base that is active and could be said to "move". That motion produces the underlying phenomena from which tangible material forms evolve. In other words, consciousness manifests itself by generating eddies or currents that coalesce to produce the multitude of energies that form the foundation for our material universe. It can be experienced only by what it is not in the same manner we experience interstellar space. In other words, interstellar space forms the backdrop for the material universe. We recognize its existence as the absence of stellar bodies. Accordingly, when we regress our conscious minds to a point beyond sensual data, as in deep meditation, we experience consciousness as the backdrop within which those sensual experiences exist. Mystics describe the phenomenon as an indescribable pure light for the lack of a better term. Incommunicable peace, a sense of infinite oneness, and perfect serenity also has been offered as alternate terms. In that moment, they have immersed their awareness in the divine. Many of us have had the fleeting experience of being touched by the proverbial "hand of God". Like the reality of interstellar space, this moment of pure consciousness cannot be further explained. It is the essence of the cosmos our sciences can never examine, dissect nor analyze.

A Normal Paranormal World

As science has demonstrated, the material realm we observe through our native senses is limited to a small portion of the spatial activity that is known to exist. [A21] That cosmic activity functions on a broader range, generating many differing virtual dimensions that create a multitude of alternate universes throughout the cosmos that we ordinarily cannot perceive. These virtual dimensions raise the potential of other entities (cohesive aggregates of cosmic activity) coexisting with us but on another spatial plane. [14a, 14b] For example, assume that a spectrum encompassing a yet undetected level of cosmic activity would evolve a form of mass native to its realm but radically different from our own. Our dissection of mass on our plane of activity would offer little evidence of that unique alternate universe. Given that, sentient entities could exist within that alternate dimension, occupying the same quadrant of interstellar space as does our own material world. Unaware of each other's existence, we could coexist, living in wholly different parallel realms. Possibly, unexplained paranormal phenomena may not originate within the virtual dimension we occupy, but within such a parallel world that, on occasion, may be eliciting harmonics (mirrored activity) within our own world. Feasibly, we would have the same impact on other parallel worlds. Moreover, animate consciousness fundamental to the cosmic whole may possess the capacity to pass to other virtual dimensions via the same harmonic effect; that is, duplicate a mirrored version of itself within a parallel virtual realm in a manner roughly comparable to the way an eddy transmits its form across the depths of a pond. This follows logically from what science has observed. Activity appears to be a cosmic constant that evolves but never dissipates or dissolves. In some manner, each action elicits a comparable reaction within the continuum that traverses the cosmic realm. Like ocean currents, matter (cohesive configurations of energy) replicates itself in some form within the bounds of interstellar space. It continues to propagate in the action-breeding-reaction reality of the cosmos where an abstract "reincarnation" appears to be the norm. [A18] As stated earlier, cosmic activity constantly recycles, perpetually renewing itself in other forms. Thus, it is entirely feasible that a configuration of consciousness could continue within another virtual realm. However, to date, we only can prove that there are multiple layers to cosmic activity and conceding that, thus far, we have discovered only a relative few. Thus, maybe instead of seeking other life forms in the depths of our outer universe, we should search the hidden realms of our own corner of interstellar space. In essence, we should expend at least as much time on probing paranormal phenomena as we expend probing the far reaches of our material universe. And instead of summarily dismissing paranormal phenomena as mental aberrations, we should apply ourselves to the task of discovering an external cause for such phenomena, beginning with the premise that the paranormal does exist.

Regardless of the source or methodology, we appear to be privy to a multitude of extrasensory perceptions, limited only by our willingness to accept the experience we now perceive. Moreover, this capacity is seen throughout the spectrum of animate

entities within our natural environment but usually dismissed as "instinctive" or "inbred" traits, terms that serve as no more than excuses to disguise the fact that we do not know why this capacity exists. [A11a, b] Because of our ability to focus upon that which we choose, we tend to restrict that focus to our overt senses, and relegate our more subtle perceptions to the extreme peripheries of our conscious minds. This self-inflicted "tunnel vision" has been propagated by urbanized societies that promote conformity and an immersion in the external sensual world while discouraging individuality and an exploration of the inner realms of self. Consciousness is what we make of it. As demonstrated by the history of our species, we possess the capacity to expand and evolve, limited only by the restrictions we voluntarily place upon our minds. Living mystics, under the close scrutiny of modern science, have demonstrated an incredible ability to manipulate the autonomic processes of their bodies that once was presumed to be beyond the realm of conscious control. [A2] What other capacities of consciousness remain undiscovered and have yet to unfold?

A Practical Religious View

Assuming the existence of a natural cosmic entity as previously described does not change radically the concept of religion but merely modifies the way we relate to that universal "divine" (being or having the nature of a god). Instead of being subservient to some distant mythological entity, we are intrinsic aspects of the concept we embrace. We are functioning elements of universal existence; thus, we are, in our essence, also divine. There is no real separation between the cosmos and our individual selves. We are, in fact, one.

Being intrinsic aspects of the cosmos redefines the way we approach the notion of God. It establishes new premises to explain the successes of past religions without relegating those successes to the arcane mythologies of the past. For example, consider the proven effectiveness of prayer. Beyond the wealth of anecdotal testimony, praying has been shown to have a measurable impact. [A9a, b] When we consider this in the light of our new cosmic model, the following should illustrate why prayer works.

"In a quiet pond, a small gnat falls into the water and struggles for survival. Its thrashing about sends forth small ripples that, like silent cries for help, echo against the far bank of the pond, jarring loose a small twig that has been supporting a precariously balanced rock. In turn, the rock topples into the pond, sending forth a series of larger ripples that carry the small gnat to the safety of the shore."

Such is the validity of prayer. It is the small ripples of energy we send forth into the cosmic waters that, in turn, incite events that responds to our needs. In this sense, prayer is more than a mythological obligation. We pray not to stimulate some remote deity to action. Instead, we pray to enhance the quality of our immediate lives by consciously mobilizing the latent potentials of our beings and focusing the energies inherent in those beings toward achieving a specific result. In essence, we link our consciousness with the consciousness that pervades the cosmic whole, and induce streams of energy within that universal consciousness that can alter the future course

of events. Our intimate connection with the cosmos validates the process. Just as a tiny spark can ignite a raging fire, our prayers can produce an impact greater than the energy we commit to the act. There is no mystical element to the process within the perspective of our new cosmic model. Instead, it is merely an extension to natural cause and effect. Moreover, prayer has an immediate internal impact. [A11] It relieves the anxieties generated by a sense of helplessness, releasing tensions that are detrimental to our physical and mental health. This has been shown to be beneficial, reducing hypertension, physical discomfort and other elements that induce the onset or proliferation of disease. [A12] It permits the body to function more optimally, allowing the natural processes to overcome that which impedes our physical and mental health.

Finally, the silent acceptance of a real higher power has a direct impact on our attitude toward life. The realization that the infinite power of the cosmos sustains us diminishes our sense of helplessness when encountering seemingly overwhelming events. Individuals have survived under the most trying conditions simply because they believed they would. [A3] Indeed, true faith in a specific outcome marshals the energies of body and mind toward accomplishing that end. It has the same effect as programming a computer to accomplish a certain task. Self-hypnosis, a form of that programming has been used in many instances to alleviate pain. [A17] In essence, faith is the foundation of a natural religion that surpasses the subservience demanded by historical sects. We simply believe in a higher power and believe that this power will provide. Secure in that awareness, we pray. There are no further requirements - no divine commandments - other than those we choose to impose upon ourselves. Traditional dogmas notwithstanding, all religions are self-imposed. Thus, it behooves us to select one mandated by common sense.

Not Another New Religion

When we explore the core of the universe, we discover an eternal reality wherein God and Nature merge, creating a synthesis that transcends both and renders the terms meaningless from the perspective of that which truly exists. This synthesis mandates a thorough overhaul of traditional concepts regarding how we relate to the infinite cosmos and the way we view ourselves and the material environment with which we symbiotically exist. It makes us one with the whole of existence and that, in itself, opens vast portals of possibilities through which we can expand the human potential into realms once assigned to the metaphysical, and develops paradigms for exploration beyond the commonplace material world. This is the bounty we derive by adopting the perspective of a cosmic esse.

By definition, religion literally means, "to tie or fasten" as in committing oneself to a set of beliefs regarding the cause, nature and purpose of existence. In this sense, esse is a religion, but one with a single premise: The cosmos is an infinite presence whose perpetual activity gives rise to tangible form. No other doctrines or dogmas need apply. Anyone who accepts this premise is an Essean regardless of how they wish to further describe themselves. Moreover, the specific evolution of this premise is open

to individual interpretation and it allows for a coexistence of both theistic and atheistic beliefs for, as said previously God and Nature are merged within the basic perspective of esse. Choosing one or the other does not diminish the reality that truly exists.

The concept of esse responds to all of life's volatile questions in a rational, non-traditional fashion. It is the key to an undercurrent of consciousness that fosters the natural evolution of intelligent life. We are because the flow of cosmic activity foreordained our existence and structured our beings in such a way as to enable us to survive for a measured span. To this extent, we are cosmic in essence, no different from the rest of the material realm. We simply exist to fulfill our role as functioning parts of the infinite cosmos and, when we die, this purpose is complete. In the interim, we are free to dedicate ourselves to any personal avocation that makes our lives more meaningful within the perimeters of our minds. Finally, despite all claims to the contrary, we cannot ascertain what will happen to the consciousness we possess after we die. All we can say for certain is that the essence of our beings will live on through the transmutation of cosmic activity and, in this sense, we are immortal. In the real world, all claims made by all religions regarding our essential immortality are based upon unsubstantiated faith. These offer no supporting evidence beyond anecdotal tales and require only that their adherents believe. Accordingly, we are free to choose whatever postmortem future we wish to accept within the constraints of reason as long as we do not inflict that choice upon anyone who ventures to disagree. The same holds true for all other aspects of religion. One's faith never should override one's civility and common sense. It never should be the cause of suffering and death, for no form of benevolent god ever would sanction the atrocities mankind has committed in its name.

Throughout the course of history, the world has been plagued by conflicts perpetrated by irrational zealots who seek to pressure humanity into accepting their version of religion. Driven by thinly disguised quests for power and control, these zealots harangue susceptible followers into blindly fulfilling their commands, all in the name of the "divine" and promises of postmortem "heavenly rewards". They bolster their religious views by threatening dire eternal consequences for the unfaithful and for the infidels and, when this fails or proves ineffective, they seek to destroy all who dare to disbelieve. Through this process, major religions have become adversarial powers that now endanger human survival. Some even look forward to an apocalyptic end to the world when their notion of god will reign supreme, rewarding the "faithful" with an eternity of bliss. These fringe radicals have carried their organized fervor beyond the bounds of lunacy, intimidating the rest of the world. They have infested several of the world's major religions, in particular Christianity and Islam, creating subsects that pervert whatever merit these principal denominations embrace. However, the solution to this dilemma is far from simple. It requires a major dogmatic shift in focus from the presumed benefits or punishments in the hereafter to the more immediate rewards of living a more productive life here on earth. If the major religions would emphasize improving the human condition and relegate the hereafter to their version of god, they would be less of a threat to the world. This would require the setting aside of traditional superfluous doctrines and embracing an educated approach to the basic questions of life. Adopting the esse perspective will foster such an evolution in reason.

Within the concept, theologians of the various creeds can reinterpret God and immortality in whatever rational fashion they see fit without diminishing their faith in the divine.

Choosing Between an Afterlife and Oblivion

All too often the arguments presented by atheists against the views held by theists are based upon the negative behavior of organized religions. The evils perpetrated by religious zealots have no place in the debate over the validity of a God or of an afterlife. Pol Pot murdered millions in the name of his brand of socialism, as did Adolf Hitler and Josef Stalin. However, sincere socialists should not have their political philosophy tarnished by the atrocious acts of a ruling few. So too, what men have done in the name of religion should not be cast as the primary thrust of their religious point of view. Decrying the evils perpetrated by men has no relevance when debating the merits of theism. Those merely are digressions from the essential topic of the debate. Indeed, religions have denigrated the concept of a spiritual realm. However, attacking the abuses they have foisted upon humanity is no more than exposing the darker side of the human psyche, characteristics possessed by theists and atheists alike. Political ambitions apart from religion has done as much to promote misery and suffering without reverting to an attempt to justify such behavior by calling upon the name of a divine. In essence, each religion should be judged solely on its rational merits and not what men have done in its name. With this said, we hopefully can discuss the merits of the belief in an afterlife with a more open mind.

Life after death is a matter of continuation of consciousness. In one sense, we can prove that the essence of our beings continues to exist beyond the demise of the human body. As discussed in Section 4, the subatomic aspects of our bodies are not annihilated; rather they are recycled within the material environment. This is an empirical fact readily demonstrated by the physical decomposition of corpses. To this extent, the "what" we are continues its presence within the physical universe. However, the critical factor in projecting an afterlife is the human persona - the conscious "who" we are. Does this persona somehow remains intact after the brain dies? Volumes of anecdotal testimony exists to maintain that it does, but no indisputable data has emerged to sustain that premise and we have not conclusively established the existence of a postmortem realm. Still, if we can establish that consciousness is a cosmic phenomenon as suggested in Section 6, this would weigh heavily in favor of the possibility that the human persona (individual consciousness) possesses the capacity to migrate to some alternative form.

Because at the present moment we cannot substantiate the potential of existence after death, this does not preclude the possibility that, at some time in the future, we will not. [A25] After all, within near history, suggesting that we could transmit live video through the air to remote locations would have been considered a sure sign of a demented mind, as would many of the modern marvels we now accept as commonplace facets of daily life. Therefore, it would not only be foolhardy to

dismiss offhand the prospect of an afterlife, but the height of egotistical arrogance for who amongst us dare say we know everything about everything that now exists.

As far as we are concerned, there are two basic options. We can choose to believe in the potential of life after death or choose to accept oblivion as the ultimate end of life. The first provides a sense of optimism while the second imbues the mind with a latent sense of despair as noted by Bertrand Russell, one of the founders of analytical philosophy, who declared himself an agnostic. [A25] Although most atheists would deny that the latter is true. [A25c] However, it would seem that accepting oblivion as the ultimate end of one's life does run counter to the latent urge to survive, thus requiring a greater focus upon more mundane aspects of life. This evokes the question, is it worth the effort when a measure of serenity would more easily be had by admitting that an afterlife is a possibility since the negative will never be proved.

Given the complexity of the cosmos, we are fundamentally ignorant as to what does and does not exist. We can set aside religions as now constituted, but we should not assume the most dismal end to life. Admitting the limitations of our sciences, oblivion appears to be an irrational choice for reason dictates that, while the possibility exists, we should opt to believe in an afterlife. In the least, we should the view of an agnostic and concede that we really do not know whether or not life continues after death. To flatly deny the possibility is the height of arrogance. It is tantamount to declaring ourselves omniscient and the masters of our universe.

Epilogue: The Essean Manifesto

Personal existence is an irrefutable fact. We are. Moreover, this state of be-ing was bestowed upon us without our conscious consent. We exist not because we willed our beings into existence, but because the reality of our be-ing is an intrinsic part of the greater cosmic design. At this immediate moment, we are innate facets of that design, contributing our full share to its symmetry simply by being alive. Thus we need not justify our existence. Indeed, at the present moment, we are; and, this reality of be-ing demands our full and undivided attention. We must live within the scope of its providence and must utilize that providence to the best of our abilities for such is the inherent cosmic mandate. To accomplish that mandate, we have been endowed with the capacity to experience, to act, and to guide our personal actions through our awareness of our experiences; and the exercise of this threefold endowment is the full extent of our prerogatives and obligations. All else remains the province and prerogative of the greater cosmos. Within that cosmos, that which we are in our essence shall continue to survive. Such is the reality of human existence and the foundation of a rational philosophy of life.

Appendices:

1. Age of the Earth:

An age for the Earth and meteorites, and hence the Solar System is calculated at 4.54 billion years with an uncertainty factor of less than 1 percent. The age of 4.54 billion years found for the Solar System and Earth is consistent with current calculations of 11 to 13 billion years for the age of the Milky Way Galaxy (based on the stage of evolution of globular cluster stars) and the age of 10 to 15 billion years for the age of the Universe (based on the recession of distant galaxies).
Source: USGS http://pubs.usgs.gov/gip/geotime/age.html
[For specific reference, see G. Brent Dalrymple in the Bibliography]

2. Autonomic System Control:

During a remarkable experiment reported by L. K. Kothari and associates, a yogi was buried for eight days in an earthen pit and connected by leads to an EKG in a nearby laboratory. After the pit was boarded up, the subject's heart rate sometimes went as high as fifty beats per minute, until a straight line appeared on the EKG tracing when the yogi had been in the pit for twenty-nine hours. There had been no slowing of his heart immediately before the straight line appeared, nor any sign of electrical disturbance, but the experimenters proceeded with certainty that their subject had not died. Suspecting that their EKG leads had been deliberately or accidentally disconnected, they checked their machine and continued to monitor its tracings. To their astonishment, it started to register electrical activity some seven days later, about a half hour before the yogi's scheduled disinterment. "After some initial disturbance," they wrote, "a normal configuration appeared. The [speeded heart rate] was again there but there was no other abnormality." When the pit was opened, the yogi was found sitting in the same posture he had started in, but in a stuporous condition. In accounting for his remarkable EKG record, the experimenters argued that a disconnection of the EKG lead would have produced obvious markings on the tracings in their laboratory, as they found when they tried to simulate ways in which the yogi might have tinkered with it.
Kothari, L.K., A. Bordia, and O.P. Gupta, (1973) as cited in "Chapter 1: Scientific Studies of Contemplative Experience: An Overview" by Michael Murphy, "The Physical and Psychological Effects of Meditation", 2004, Institute of Noetic Sciences
Source text and book available at:
http://www.noetic.org/research/medbiblio/ch_intro1.htm

3. Benefits of Faith:

3a. "There are sound medical reasons to take these beliefs seriously. An analysis of 42 studies involving 125,286 patients, published in the June 2000 issue of Health Psychology, found that those with some sort of religious involvement live longer -- though no one knows whether longevity is due to their faith or their community ties."
Source: http://www.medicinenet.com/ article "Take Your Spiritual Pulse," October 2, 2000, a WebMD feature.

3b. "Pittsburgh, April 3, 2006 - In a study comparing the associations between faith and health, a University of Pittsburgh Medical Center (UPMC) physician has shown the improvements in life expectancy of those who attend religious services on a weekly basis to be comparable to those who participate in regular physical exercise and to those who take statin-type medications. These findings are published in the March-April [2006] issue of the Journal of the American Board of Family Medicine."
Source: Archives, University of Pittsburgh Medical Center,(UPMC.com)

3c. "Dr. Herbert Benson of Harvard Medical School was one of the first scientists to take seriously the claim that spiritual practice is good for your health. From his ground-breaking study of Transcendental Meditation, he went on to a courageous re-examination of the placebo effect and studied the health impacts of spiritual practice and belief. Today, he heads the Mind/Body Institute at Harvard and through books, conferences and studies, works tirelessly to convince the health care establishment of the vital impact of the mind on health."
Prelude to a Shambhala Sun interview with Dr Benson. Article entitled "The Faith Factor: The Health Benefits of Spirituality", July 1998

4. Casimir Effect:

"The attractive force between two surfaces in a vacuum - first predicted by Hendrik Casimir over 50 years ago - could affect everything from micromachines to unified theories of nature. The attractive force between two surfaces in a vacuum - first predicted by Hendrik Casimir over 50 years ago - could affect everything from micromachines to unified theories of nature."

"The phenomenon is now dubbed the Casimir effect, while the force between the mirrors is known as the Casimir force."

"For many years the Casimir effect was little more than a theoretical curiosity. But interest in the phenomenon has blossomed in recent years. Experimental physicists have realized that the Casimir force affects the workings of micromachined devices, while advances in instrumentation have enabled the force to be measured with ever-greater accuracy"

"Even a perfect vacuum at absolute zero has fluctuating fields known as "vacuum fluctuations", the mean energy of which corresponds to half the energy of a photon." "However, vacuum fluctuations are not some abstraction of a physicist's mind. They have observable consequences that can be directly visualized in experiments on a microscopic scale."
Excerpted from: "The Casimir effect: a force from nothing", Published by Physics World, Sep 1, 2002
http://physicsworld.com/cws/article/print/9747

5. Consciousness:

5a. "Consciousness defies simple definition. It has been defined loosely as a conglomerate of attributes such as mental subjectivity, self-awareness, sentience, and the ability to perceive a relationship between oneself and one's environment. Often, it is defined from a more biological perspective as the act of autonomously manipulating

perceptions and awarenesses, usually with the goal of obtaining, retaining, or maximizing specific parameters (food, a safe environment, family, and mates)."

Julian Jaynes has emphasized that "consciousness is not the same as cognition and should be sharply distinguished from it."... The most common error ... is to confuse consciousness with perception."

Source: Wikipedia, "Consciousness"

5b. "We could, if necessary, take every single one of the psychical faculties [reserved] for animals more or less advanced in the zoological scale, and show that the greater part of these faculties belonged equally to micro-organisms." [Author's emphasis]

Source: Alfred Binet in the Preface of his book "The Psychic Life of Micro-organisms" [See Bibliography]

Also see Web Link "Amoeba, The single-cell organism - its curious behavior and abilities"

5c. CEMI (Conscious ElectroMagnetic Information):

"What Professor McFadden and, independently, the New Zealand-based neurobiologist Sue Pockett, have proposed is that the brain's EM field is consciousness.

"The brain's electromagnetic field is not just an information sink; it can influence our actions, pushing some neurons towards firing and others away from firing. This influence, Professor McFadden proposes, is the physical manifestation of our conscious will.

"The theory explains many of the peculiar features of consciousness, such as its involvement in the learning process.

"The electromagnetic theory of consciousness initially proposed by Johnjoe McFadden, Susan Pockett and E. Roy John says the background electromagnetic field generated by the brain (measurable by EEGs) is the actual carrier of conscious experience. The starting point for the theory is the fact that every time a neuron fires to generate an action potential it also generates a disturbance to the surrounding electromagnetic (EM) field. Information coded in neuron firing patterns is therefore reflected into the brain's EM field. Locating consciousness in the brain's EM field, rather than the neurons, has the advantage of neatly accounting for how information located in millions of neurons scattered throughout the brain can be unified into a single conscious experience (sometimes called the binding problem): the information is unified in the EM field. In this way EM field consciousness can be considered to be 'joined-up information'.

"The theory solves many previously intractable problems of consciousness and could have profound implications for our concepts of mind, free will, spirituality, the design of artificial intelligence, and even life and death," he said. [See Johnjoe McFadden in bibliography for a specific text reference.]

"Most scientists now embrace monism, that the stuff of mind is the same as the stuff of the brain, matter. Many, particularly in the artificial intelligence field, take the view that consciousness is just an inevitable product of complex computation, as the evolutionary biologist T. H. Huxley put it, like the 'steam whistle, which accompanies the work of a locomotive [but] without influence upon its machinery.'

"In the steam whistle view, consciousness just pops out of the complex interconnected computations performed by the network of neurons within our brain. But why should it? The Internet now links up millions of computers in a gigantic superbrain that will soon rival our own organic version in computational capability. But does anyone seriously believe that, like HAL, driven by its digital consciousness, the Internet may soon turn on us its creators? The plain fact is that nothing rendered in silicon remotely resembles a conscious mind."
Source: "The Conscious Electromagnetic Field Theory" at
http://www.surrey.ac.uk/qe/cemi.htm

5d. "[The] greater computational complexity and ultra-reductionism to the level of microtubule automata cannot address the enigmatic features of consciousness, in particular the nature of conscious experience. Something more is required. If functional approaches and emergence are incomplete, perhaps the raw components of mental processes (qualia) are fundamental properties of nature (like mass, spin or charge). This view has long been held by pan-psychists throughout the ages, for example Buddhists and Eastern philosophers claim a "universal mind."

"Of particular interest is the work of the 20th century philosopher Alfred North Whitehead, whose pan-experiential view remains most consistent with modern physics. Whitehead argued that consciousness is a process of events occurring in a wide, basic field of proto-conscious experience. These events, or "occasions of experience," may be comparable to quantum state reductions, or actual events in physical reality (Shimony, 1993). This suggests that consciousness may involve quantum state reductions (e.g. a form of quantum computation).

"But what of Whitehead's basic field of proto-conscious experience? In what medium are the "occasions of experience" (quantum state reductions) occurring? Could proto-conscious qualia simply exist in the empty space of the universe."
Source: "3. Pan-experiential philosophy meets modern physics" at
http://www.quantumconsciousness.org/presentations/whatisconsciousness.html

5e. "The amazing thing is that the amoeba don't touch the ciliate until it can't escape. Usually the pseudopods form a kind of 'dome' that makes escaping impossible. They have to have some sort of chemical detection since they notice a prey without having to touch it.

A pretty clever trick for a simple 'blob'. It becomes even more of a mystery. Amoebas seem to use different engulfing tactics to suit the various types of prey. They can detect if a prey needs a fast approach (ciliates) or can be feasted on as a slow meal (immobile algae)"
Excerpted from: Wim van Egmond, "Amoebas are more than just blobs"
http://www.microscopy-uk.org.uk/mag/artsep01/amoeba.html
Microscopy-UK, Micscape Magazine
Issue 267, September, 2009

5f. "The alternative paradigm that is being proposed by myself and others is that consciousness or mind is an innate capacity and potential for subjective experience that is always present in the universe. So consciousness or mind doesn't come out of

the brain, but the brain simply modifies or gives shape to pre-existing consciousness, and this is the fundamental difference.

"As life has evolved, organisms, sensory organs, and nervous systems have become increasingly more complex and so the contents of consciousness and the forms that mind can take have become more complex. In this view, even simple bacteria might have some very, very faint glimmer of consciousness --nothing like what we would call self-conscious awareness, but they may have a very faint sense of their chemical environment, some very simple form of consciousness. That's the basic shift, that everything has some capacity for conscious experience."

"If consciousness is a fundamental quality of the cosmos, then it must be there in everything, not just bacteria, but below that in the virus, and then below that in amino acids. In this new paradigm, there's no place to really draw the line between consciousness and insentience, as our current scientific worldview does. The capacity for experience is always present as a fundamental quality of the cosmos, and it gets filled out as systems become more and more complex."

Excerpt from: "Cosmic Conversations: Dialogues on the Nature of the Universe and the Search for Reality", Stephan Martin, 2010, The Career Press Inc, Franklin Lakes, NJ, USA

5g. "Cells and synapses are far more complex than simple on-off switches. Consider the paramecium, a single cell organism which gracefully swims, avoids predators, learns to escape from capillary tubes, and finds food and mates. Observing intelligent behavior in unicellular creatures C.S. Sherrington said in 1951: "Of nerve there is no trace. But the cell framework, the cyto-skeleton, might serve." Lacking synapses, paramecium utilizes its cytoskeleton for communication and organization. Neurons have a rich and dynamic set of cytoskeletal microtubules which regulates synapses, and tremendously increases potential computational capacity (e.g. 1016 bit states/second/neuron)4. More importantly, neurons are alive and we don't yet know what that implies for consciousness."

Excerpt from: "Funda-Mentality: Is the Conscious Mind Subtly Linked to a Basic Level of the Universe?', Stuart Hameroff, M.D.,
http://www.quantumconsciousness.org/penrose-hameroff/fundamentality.html

5h. "The current worldview has it that everything is made of matter, and everything can be reduced to the elementary particles of matter, the basic constituents-building blocks-of matter. And cause arises from the interactions of these basic building blocks or elementary particles; elementary particles make atoms, atoms make molecules, molecules make cells, and cells make brain. But all the way, the ultimate cause is always the interactions between the elementary particles. This is the belief-all cause moves from the elementary particles. This is what we call "upward causation." So in this view, what human beings-you and I-think of as our free will does not really exist. It is only an epiphenomenon or secondary phenomenon, secondary to the causal power of matter. And any causal power that we seem to be able to exert on matter is just an illusion. This is the current paradigm.

"Now, the opposite view is that everything starts with consciousness. That is, consciousness is the ground of all being. In this view, consciousness imposes

"downward causation." In other words, our free will is real. When we act in the world we really are acting with causal power. This view does not deny that matter also has causal potency-it does not deny that there is causal power from elementary particles upward, so there is upward causation-but in addition it insists that there is also downward causation. It shows up in our creativity and acts of free will, or when we make moral decisions. In those occasions we are actually witnessing downward causation by consciousness."

To give a little background, what had been happening was that for many years quantum physics had been giving indications that there are levels of reality other than the material level. How it started happening first was that quantum objects-objects in quantum physics-began to be looked upon as waves of possibility. Now, initially people thought, "Oh, they are just like regular waves." But very soon it was found out that, no, they are not waves in space and time. They cannot be called waves in space and time at all-they have properties which do not jibe with those of ordinary waves. So they began to be recognized as waves in potential, waves of possibility, and the potential was recognized as transcendent, beyond matter somehow.

But the fact that there is transcendent potential was not very clear for a long time. Then Aspect's experiment verified that this is not just theory, there really is transcendent potential, objects really do have connections outside of space and time-outside of space and time! What happens in this experiment is that an atom emits two quanta of light, called photons, going opposite ways, and somehow these photons affect one another's behavior at a distance, without exchanging any signals through space. Notice that: without exchanging any signals through space but instantly affecting each other. Instantaneously.

Now Einstein showed long ago that two objects can never affect each other instantly in space and time because everything must travel with a maximum speed limit, and that speed limit is the speed of light. So any influence must travel, if it travels through space, taking a finite time. This is called the idea of "locality." Every signal is supposed to be local in the sense that it must take a finite time to travel through space. And yet, Aspect's photons-the photons emitted by the atom in Aspect's experiment-influence one another, at a distance, without exchanging signals because they are doing it instantaneously-they are doing it faster than the speed of light. And therefore it follows that the influence could not have traveled through space. Instead the influence must belong to a domain of reality that we must recognize as the transcendent domain of reality."

"Henry Stapp, who is a physicist at the University of California at Berkeley, says this quite explicitly in one of his papers written in 1977, that things outside of space and time affect things inside space and time. There's just no question that that happens in the realm of quantum physics when you are dealing with quantum objects. Now of course, the crux of the matter is, the surprising thing is, that we are always dealing with quantum objects because it turns out that quantum physics is the physics of every object. Whether it's submicroscopic or it's macroscopic, quantum physics is the only physics we've got. So although it's more apparent for photons, for electrons, for the submicroscopic objects, our belief is that all reality, all manifest reality, all matter, is

governed by the same laws. And if that is so, then this experiment is telling us that we should change our worldview because we, too, are quantum objects."

"In other words, the present science has shown not only quantum paradoxes but also has shown real incompetence in explaining paradoxical and anomalous phenomena, such as parapsychology, the paranormal-even creativity. And even traditional subjects, like perception or biological evolution, have much to explain that these materialist theories don't explain. To give you one example, in biology there is what is called the theory of punctuated equilibrium. What that means is that evolution is not only slow, as Darwin perceived, but there are also rapid epochs of evolution, which are called "punctuation marks." But traditional biology has no explanation for this.

"However, if we do science on the basis of consciousness, on the primacy of consciousness, then we can see in this phenomenon creativity, real creativity of consciousness. In other words, we can truly see that consciousness is operating creatively even in biology, even in the evolution of species. And so we can now fill up these gaps that conventional biology cannot explain with ideas which are essentially spiritual ideas, such as consciousness as the creator of the world."

Excerpt from: "Scientific Proof of the Existence of God", an interview with physicist Amit Goswami by Craig Hamilton, http://www.enlightennext.org/magazine/j11/goswami.asp?page=1

Also see books by Amit Goswami listed in the Bibliography

6. Dark Energy:

6a. "In the 1990's two teams of astronomers, the Supernova Cosmology Project and the High-Z Supernova Search were looking for distant type Ia supernovae in order to measure the expansion rate of the universe with time. They expected that the expansion would be slowing, which would be indicated by the supernovae being brighter than their red shifts would indicate. Instead, they found the supernovae to be fainter than expected. Hence, the expansion of the universe was accelerating!

"In addition, measurements of the cosmic microwave background indicate that the universe has a flat geometry on large scales. Because there is not enough matter in the universe - either ordinary or dark matter - to produce this flatness, the difference must be attributed to a "dark energy". This same dark energy causes the acceleration of the expansion of the universe. In addition, the effect of dark energy seems to vary, with the expansion of the Universe slowing down and speeding up over different times.

"Astronomers know dark matter is there by its gravitational effect on the matter that we see and there are ideas about the kinds of particles it must be made of. By contrast, dark energy remains a complete mystery. The name "dark energy" refers to the fact that some kind of "stuff" must fill the vast reaches of mostly empty space in the Universe in order to be able to make space accelerate in its expansion. In this sense, it is a "field" just like an electric field or a magnetic field, both of which are produced by electromagnetic energy. But this analogy can only be taken so far because we can readily observe electromagnetic energy via the particle that carries it, the photon."

"In the context of dark energy, the cosmological constant is a reservoir which stores energy. Its energy scales as the universe expands. Applied to the supernova data, it would distinguish effects due to the matter in the universe from those due to the dark energy. Unfortunately, the amount of this stored energy required is far more than observed, and would result in very rapid acceleration (so much so that the stars and galaxies would not form). Physicists have suggested a new type of matter, "quintessence," which would fill the universe like a fluid which has a negative gravitational mass."
Source: NASA Goddard Space Flight Center
http://imagine.gsfc.nasa.gov/docs/science/mysteries_l1/dark_energy.html

6b."A major discovery in astrophysics in the late 1990s was the finding from type Ia supernovae redshift-luminosity observations that the expansion of the universe is accelerating. This led to the concept of dark energy, which is in effect a resurrection of Einstein's cosmological constant. (The universe now appears to consist of about 70 percent dark energy, 25 percent dark matter and five percent ordinary matter.) Zero-point energy has the desired property of driving an accelerated expansion, and thus having the requisite properties of dark energy, but to an absurdly greater degree than required, i.e. 120 orders of magnitude."

"According to relativity theory, energy is equivalent to mass as a source of gravity, thus zero-point energy should gravitate, which according to general relativity means producing a positive curvature in space-time. At first glance one might assume that if there is an enormous amount of zero-point energy underlying the universe, its effect would be to dramatically curve the universe to a minute size. Indeed, if the spectrum of zero-point energy extends to the Planck scale, its energy density would be the mass equivalent of about 1093 grams per cubic centimeter which would reduce the universe to a size smaller than an atomic nucleus."
Excerpted from: "Zero Point Energy and Zero Point Field"
http://www.calphysics.org/zpe.html

7. Dark Matter:

7a. Definition: Matter that does not interact with the electromagnetic force, but whose presence can be inferred from gravitational effects on visible matter. According to present observations of structures larger than galaxies, as well as Big Bang cosmology, dark matter and dark energy account for the vast majority of the mass in the observable universe. The observed phenomena which imply the presence of dark matter include the rotational speeds of galaxies, orbital velocities of galaxies in clusters, gravitational lensing of background objects by galaxy clusters such as the Bullet cluster, and the temperature distribution of hot gas in galaxies and clusters of galaxies. Dark matter also plays a central role in structure formation and galaxy evolution, and has measurable effects on the anisotropy of the cosmic microwave background. All these lines of evidence suggest that galaxies, clusters of galaxies, and the universe as a whole contain far more matter than that which interacts with electromagnetic radiation: the remainder is called the "dark matter component."

The dark matter component has vastly more mass than the "invisible" component of the universe. At present, the density of ordinary baryons and radiation in the universe is estimated to be equivalent to about one hydrogen atom per cubic meter of space. Only about 4% of the total energy density in the universe (as inferred from gravitational effects) can be seen directly. About 22% is thought to be composed of dark matter. The remaining 74% is thought to consist of dark energy, an even stranger component, distributed diffusely in space. Some hard-to-detect baryonic matter makes a contribution to dark matter but constitutes only a small portion. Determining the nature of this missing mass is one of the most important problems in modern cosmology and particle physics. It has been noted that the names "dark matter" and "dark energy" serve mainly as expressions of human ignorance, much as the marking of early maps with "terra incognita."
Source: Wikipedia: "Dark Matter"

7b. Proof of Existence: "Dark matter and normal matter have been wrenched apart by the tremendous collision of two large clusters of galaxies. The discovery, using NASA's Chandra X-ray Observatory and other telescopes, gives direct evidence for the existence of dark matter."

"These observations provide the strongest evidence yet that most of the matter in the universe is dark."
Excerpted from NASA News Release 06-297, "NASA Finds Direct Proof of Dark Matter", August 21, 2006,
Erica Hupp, Steve Roy, and Megan Watzke
Source: "NASA finds direct proof of Dark Matter"
Read full article at:
http://www.nasa.gov/home/hqnews/2006/aug/HQ_06297_CHANDRA_Dark_Matter.html

8. Dimensions:

8a. Dimensions Defined: "In mathematics and physics, the dimension of a space or object is informally defined as the minimum number of coordinates needed to specify each point within it. Thus a line has a dimension of one because only one coordinate is needed to specify a point on it. A surface such as a plane or the surface of a cylinder or sphere has a dimension of two because two coordinates are needed to specify a point on it (for example, to locate a point on the surface of a sphere you need both its latitude and its longitude). Cubes, cylinders and spheres are three-dimensional.

"The concept of dimension is not restricted to physical objects. High-dimensional spaces occur in mathematics and the sciences for many reasons, frequently as configuration spaces such as in Lagrangian or Hamiltonian mechanics; these are abstract spaces, independent of the physical space we live in. The state-space of quantum mechanics is an infinite-dimensional function space. Some physical theories are also by nature high-dimensional, such as the 4-dimensional general relativity and higher-dimensional string theories.

"A temporal dimension is a dimension of time. Time is often referred to as the "fourth dimension" for this reason, but that is not to imply that it is a spatial dimension. A temporal dimension is one way to measure physical change. It is perceived differently

from the three spatial dimensions in that there is only one of it, and that we cannot move freely in time but subjectively move in one direction.

"The equations used in physics to model reality do not treat time in the same way that humans perceive it. The equations of classical mechanics are symmetric with respect to time, and equations of quantum mechanics are typically symmetric if both time and other quantities (such as charge and parity) are reversed. In these models, the perception of time flowing in one direction is an artifact of the laws of thermodynamics (we perceive time as flowing in the direction of increasing entropy).

"The best-known treatment of time as a dimension is Poincaré and Einstein's special relativity (and extended to general relativity), which treats perceived space and time as components of a four-dimensional manifold, known as space-time, and in the special, flat case as Minkowski space.

"Theories such as string theory and M-theory predict that physical space in general has in fact 10 and 11 dimensions, respectively. The extra dimensions are spatial. We perceive only three spatial dimensions, and no physical experiments have confirmed the reality of additional dimensions. A possible explanation that has been suggested is that space acts as if it were "curled up" in the extra dimensions on a subatomic scale, possibly at the quark/string level of scale or below. Another less-held fringe view asserts that dimensions beyond the fourth progressively condense time-lines and universes into single spatial points in the above dimension, until the tenth, where a 0-dimensional point equates to all possible time-lines in all possible universes." Extrapolated from:
http://en.wikipedia.org/wiki/Dimension

8b. A Two-Dimensional Approach: "Some of the world's brightest minds are carrying out research in this area -- and still have not succeeded so far in creating a unified theory of quantum gravitation is often considered to be the "Holy Grail" of modern science.

Daniel Grumiller from the Institute of Theoretical Physics, Vienna University of Technology, can now at least unravel some of the mysteries of quantum gravitation. His results on black holes and gravitational waves are pretty mind-boggling - to say the least. Only recently he won the START prize and will use these funds to engage even more young physicists at the TU Vienna.

We perceive the space around us as three-dimensional. According to Einstein, time and space are inseparably linked. Adding the time axis to our three-dimensional space makes our space-time-continuum four-dimensional. For decades, scientists have been wondering about the existence of additional dimensions so far hidden to our senses. Grumiller and his colleagues are trying the opposite approach: Instead of postulating additional dimensions, they believe that our universe could in fact be described by less than four dimensions.

"A hologram, as you find it on bank notes or credit cards, appears to show a three-dimensional picture, even though in fact it is just two-dimensional," Grumiller explains. In such a case, reality has fewer dimensions than we would think it appears to have. This "holographic principle" plays an important role in the physics of space time. Instead of creating a theory of gravity in all the time and space dimensions, one can

formulate a new quantum theory with one fewer spatial dimension. That way, a 3D theory of gravitation turns into a 2D quantum theory, in which gravity does not appear any more. Still, this quantum theory correctly predicts phenomena like black holes or gravitational waves.

"The question, how many dimensions our world really has, does probably not even have a proper answer probably cannot be answered explicitly," Grumiller thinks. "Depending on the particular question we are trying to answer, either one of the approaches may turn out to be more useful."

Vienna University of Technology (2009, February 9). How Many Dimensions In The Holographic Universe?. ScienceDaily. Retrieved September 26, 2009, from http://www.sciencedaily.com /releases/2009/02/090203081609.htm

8C. In the Brane World: "In special relativity, time is treated almost like another dimension; one may perform a special type of rotation between space and time, which is called a boost. Nothing can be accelerated to move faster than light. Also, energy equals mass times the speed of light squared. In an elegant mathematical framework, time is treated as another dimension, so we may consider space-time to be 4 dimensional.

"After an intensive effort over 20 years by hundreds of physicists and mathematicians, we have some idea what the theory is telling us. To start out, the theory has 10 dimensions, 6 more spatial dimensions than our experience tells us. We believe these 6 extra dimensions are curled up into tiny sizes, much smaller than atoms, too small to be detected with the most powerful microscope.

"...we live in a 3-dimensional space called 3-brane (a name generalizing 2-brane, i.e., membrane). For some reason, we (i.e., atoms, molecules, photons etc.) are stuck in this 3-brane, even though there are 6 additional dimensions out there. Gravity, like the bee, can go everywhere. We call this the brane world, a rather natural phenomenon in superstring theory. At the moment, physicists are working hard to understand this scenario better and to find ways to experimentally test this idea."
Henry Tye, Professor of Physics, Laboratory of Elementary and Particle Physics, Massachusetts Institute of Technology
http://www.ccmr.cornell.edu/education/ask/index.html?quid=961

9. Empirical Proof of Effects of Prayer:

9a "Perhaps the most impressive human study had been carried out by physician Randolph Byrd in 1988. It had attempted in a randomized, double-blind trial whether remote prayer would have any effect on patients in a coronary care unit. Over ten months, nearly 400 patients were divided in to two groups, and only half (unbeknownst to them) were prayed for by Christians outside the hospital. All patients had been evaluated, and there was no statistical difference in their condition before treatment. However, after treatment, those who'd been prayed for had significantly less severe symptoms, and required less assistance on a ventilator, and fewer antibiotics and diuretics than patients who hadn't been prayed for."
Source quote: http://www.protectedbyangels.co.uk/
[See Randolph C. Byrd in the Bibliography for specific reference]

9b. "Our findings support Byrd's conclusions despite the fact that we could not document an effect of prayer using his scoring method."
Source: (Original Investigations) Journal of the American Medical Association, Archives of Internal Medicine, http://archinte.ama-assn.org/[See William F. Harris in the Bibliography for further information]

10. Ether:

10a. "If Newton's third law is universally true, it is telling us that the space between objects must indeed have zero mass. Remember all those years physicists wasted on the idea of a substance called the "luminiferous ether" that "fills all of space". . . they'd have realized that this ether must have exactly zero mass. Then, if they really believed Newton's third law, they wouldn't have bothered with the (now abandoned) notion of the ether. They'd have realized that their ether was experimentally indistinguishable from nothing"

"Though the luminiferous ether idea has disappeared from textbooks, seldom rating even a footnote, modern physics has introduced subtler and sneakier ways to give structure and substance to space. These have fancy names like "vacuum states". If any of this new stuff supposedly "in" space has mass, or if space itself has mass, then careful measurements of forces between interacting bodies should reveal that fact. Any inequality of action and reaction forces on bodies interacting through intervening space would reveal the mass of space.

Critics of this interpretation of Newton's Third Law may object to treating space as a "massless body". Why should this be so alarming? Physicists have entertained even crazier concepts and even incorporated them into their theories. In the 20th century physicists quite comfortably lived with the notion of massless neutrinos."
Excerpt from: "A Deductive Proof of Newton's Third Law", Ken Amis
http://www.lhup.edu/~dsimanek/cutting/3rdlaw.htm

10b. "Lorentz Ether Theory: This theory, which was developed mainly between 1892 and 1906 by Lorentz and Poincaré, was based on the aether theory of Augustin-Jean Fresnel, Maxwell's equations and the electron theory of Rudolf Clausius.[B 1] Lorentz introduced a strict separation between matter (electrons) and ether, whereby in his model the ether is completely motionless, and it won't be set in motion in the neighborhood of ponderable matter. As Max Born later said, it was natural (though not logically necessary) for scientists of that time to identify the rest frame of the Lorentz ether with the absolute space of Isaac Newton.[B 2] The condition of this ether can be described by the electric field E and the magnetic field H, where these fields represent the "states" of the ether (with no further specification), related to the charges of the electrons. Thus an abstract electromagnetic ether replaces the older mechanistic ether models."
Excerpt from: Wikipedia.com, "Lorentz Ether Theory"

10c. "It may be added that the whole change in the conception of the ether which the special theory of relativity brought about, consisted in taking away from the ether its last mechanical quality, namely, its immobility.

"More careful reflection teaches us, however, that the special theory of relativity does not compel us to deny ether."

"But on the other hand there is a weighty argument to be adduced in favour of the ether hypothesis. To deny the ether is ultimately to assign that empty space has no physical qualities whatever. The fundamental facts of mechanics do not harmonise with this view."

"It is true that Mach tried to avoid having to accept as real something which is not observable by endeavouring to substitute in mechanics a mean acceleration with reference to the totality of the masses in the universe in place of an acceleration with reference to absolute space. But inertial resistance opposed to relative acceleration of distant masses presupposes action at a distance; and as the modern physicist does not believe that he may accept this action at a distance, he comes back once more, if he follows Mach, to the ether, which has to serve as medium for the effects of inertia. But this conception of the ether to which we are led by Mach's way of thinking differs essentially from the ether as conceived by Newton, by Fresnel, and by Lorentz. Mach's ether not only conditions the behaviour of inert masses, but is also conditioned in its state by them."

"The ether of the general theory of relativity is a medium which is itself devoid of all mechanical and kinematical qualities, but helps to determine mechanical (and electromagnetic) events."

"If we consider the gravitational field and the electromagnetic field from the standpoint of the ether hypothesis, we find a remarkable difference between the two. There can be no space nor any part of space without gravitational potentials; for these confer upon space its metrical qualities, without which it cannot be imagined at all. The existence of the gravitational field is inseparably bound up with the existence of space."

"Recapitulating, we may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, there exists an ether. According to the general theory of relativity space without ether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of existence for standards of space and time (measuring-rods and clocks), nor therefore any space-time intervals in the physical sense."

Excerpts from : "An address delivered in 1920, at the University of Leiden", by Albert Einstein

http://www.spaceandmotion.com/Physics-Albert-Einstein-Leiden-1920.htm

10d."The Fifth element: Plato's Timaeus posits the existence of a fifth element (corresponding to the fifth remaining Platonic solid, the dodecahedron) called quintessence, of which the cosmos and all celestial bodies are made."

"Aristotle included aether in the system of the classical elements of Ionic philosophy as the "fifth element" (the quintessence), on the principle that the four terrestrial elements were subject to change and moved naturally in straight lines while no change had been observed in the celestial regions and the heavenly bodies moved in circles. In Aristotle's system aether had no qualities (was neither hot, cold, wet, or dry), was incapable of change (with the exception of change of place), and by its nature moved in circles. Medieval scholastic philosophers granted aether changes of density,

in which the bodies of the planets were considered to be denser than the medium which filled the rest of the universe. Robert Fludd stated that the aether was of the character that it was "subtler than light". Fludd cites the 3rd century view of Plotinus, concerning the aether as penetrative and non-material."
Excerpt from: "Ether (aether)", http://www.wikipedia.com/

10e. "Historically, the Michelson-Morley experiment has played a crucial role for abandoning the idea of a preferred reference frame, the ether, and for replacing Lorentzian Relativity with Einstein's Special Relativity. However, our re-analysis of the Michelson-Morley original data, consistently with the point of view already expressed by other authors, shows that the experimental observations have been misinterpreted. Namely, the fringe shifts point to a non-zero observable Earth's velocity v_obs = 8.4 +/- 0.5 km/s. Assuming the existence of a preferred reference frame, and using Lorentz transformations to extract the kinematical Earth's velocity that corresponds to this v_obs, we obtain a real velocity, in the plane of the interferometer, v_earth = 201 +/- 12 km/s. This value is in excellent agreement with Miller's calculated value v_earth = 203 +/- 8 km/s and suggests that the magnitude of the fringe shifts is determined by the typical velocity of the Solar System within our galaxy. This conclusion, which is also consistent with the results of all other classical experiments, leads to an alternative interpretation of the Michelson-Morley type of experiments. Contrary to the generally accepted ideas of last century, they provide experimental evidence for the existence of a preferred reference frame. This point of view is also consistent with the most recent data for the anisotropy of the two-way speed of light in the vacuum."
Source: "The motion of the Solar System and the Michelson-Morley experiment", M. Consoli, E. Costanzo, Submitted on 26 Nov 2003, http://arxiv.org/abs/astro-ph/0311576

11. Instinctive Behavior:

11a: "An instinct is a stereotyped, species-typical behavior that appears fully functional the first time it is performed, without the need for learning. Such behaviors are usually triggered by a particular stimulus or cue, and are not readily modified by subsequent experience. For instance, a kangaroo rat instantly performs an automatic escape jump maneuver when it hears the sound of a striking rattlesnake, even if it has never encountered a snake before. Clearly, instinctive behaviors play an important role in survival, but our understanding of the forces that promote and guide their development in living animals is in fact quite limited."
Excerpt from: http://science.jrank.org/pages/3611/Instinct.html

11b: "Many fixed action patterns occur in association with a triggering stimulus, sometimes called a releaser. Baby gulls respond to the sight of their parent's bill by pecking it to obtain a tasty morsel of food. The releaser here is a bright red spot on the parent's bill; neither the shape nor the color of the adult's head have a significant influence on the response. When a female rat is sexually receptive, rubbing of her hindquarters (the releaser) results in a stereotypical posture known as lordosis, in which the front legs are flexed, lowering the torso, while the rump is raised and the tail is moved to one side (a fixed action pattern). A male rat who encounters a female in

lordosis experiences another releaser and initiates copulation. Neither sequence requires any prior experience on the part of the animal."
Excerpt from: http://science.jrank.org/pages/3608/Instinct-Classic-examples-animal-instinct.html

12. Intelligent Design:

12a. "Not by Chance" "The modern theory of intelligent design was not developed in response to a legal setback for creationists in 1987. Instead, it was first formulated in the late 1970s and early 1980s by a group of scientists - Charles Thaxton, Walter Bradley, Roger Olson, and Dean Kenyon - who were trying to account for an enduring mystery of modern biology: the origin of the digital information encoded along the spine of the DNA molecule.

"In the book The Mystery of Life's Origin, Thaxton and his colleagues first developed the idea that the information-bearing properties of DNA provided strong evidence of a prior but unspecified designing intelligence..."

"Even as early the 1960s and 70s, physicists had begun to reconsider the design hypothesis. Many were impressed by the discovery that the laws and constants of physics are improbably "finely-tuned" to make life possible. As British astrophysicist Fred Hoyle put it, the fine-tuning of numerous physical parameters in the universe suggested that "a superintellect had monkeyed with physics" for our benefit..."

"The theory does not challenge the idea of evolution defined as change over time, or even common ancestry, but it does dispute Darwin's idea that the cause of biological change is wholly blind and undirected."
Source: Article by Stephen C. Meyer entitled "Not by chance: From bacterial propulsion systems to human DNA, evidence of intelligent design is everywhere", originally appearing in the December 1, 2005 edition of the National Post of Canada. http://www.nationalpost.com/news/story.html?id=8f7f51f2-a196-4677-9399-46f4f17b5b61

12b. "Is Intelligent Design the Same as Creationism?" "No. The theory of intelligent design is simply an effort to empirically detect whether the "apparent design" in nature acknowledged by virtually all biologists is genuine design (the product of an intelligent cause) or is simply the product of an undirected process such as natural selection acting on random variations.

Creationism typically starts with a religious text and tries to see how the findings of science can be reconciled to it. ID starts with the empirical evidence of nature and seeks to ascertain what scientific inferences can be drawn from that evidence. Unlike creationism, the scientific theory of intelligent design does not claim that modern biology can identify whether the intelligent cause detected through science is supernatural. The charge that ID is "creationism" is a rhetorical strategy on the part of Darwinists who wish to delegitimize ID without actually addressing the merits of its case.

12c. "Is Intelligent Design a Scientific Theory?" "Yes. The scientific method is commonly described as a fourstep process involving observations, hypothesis, experiments, and conclusion. ID begins with the observation that intelligent agents

produce complex and specified information (CSI). Design theorists hypothesize that if a natural object was designed, it will contain high levels of CSI. Scientists then perform experimental tests upon natural objects to determine if they contain complex and specified information. One easily testable form of CSI is irreducible complexity, which can be discovered by experimentally reverse-engineering biological structures to see if they require all of their parts to function. When ID researchers find irreducible complexity in biology, they conclude that such structures were designed."
Source for 11b and 11c: The Center for Science & Culture (CSC) at Discovery Institute [www.intelligentdesign.org]
For more thorough study of the subject:
http://en.wikipedia.org/wiki/Intelligent_design

12d. "No matter how large the environment one considers, life cannot have had a random beginning ... there are about two thousand enzymes, and the chance of obtaining them all in a random trial is only one part in (1020)2000 = 1040~000a, n outrageously small probability that could not be faced even if the whole universe consisted of organic soup.

If one is not prejudiced either by social beliefs or by a scientific training into the conviction that life originated on the Earth, this simple calculation wipes the idea entirely out of court ... the enormous information content of even the simplest living systems ... cannot in our view be generated by what are often called "natural" processes, as for instance through meteorological and chemical processes occurring at the surface of a lifeless planet.... For life to have originated on the Earth it would be necessary that quite explicit instruction should have been provided for its assembly

There is no way in which we can expect to avoid the need for soup, as we ourselves hoped might be possible a year or two ago." information, no way in which we can simply get by with a bigger and better organic soup, as we ourselves hoped might be possible a year or two ago." "The correct position we think is ... an intelligence, which designed the biochemicals and gave rise to the origin of carbonaceous life

Given an atlas showing the amino acid sequences of all the enzymes, human biochemists could construct them with complete accuracy, thereby demonstrating the enormous superiority of intelligence allied to knowledge over blind random processes

Any theory with a probability of being correct that is larger than one part in 1040*0m00u st be judged superior to random shuffling. The theory that life was assembled by an intelligence has, we believe, a probability vastly higher than one part in 10403000 of being the correct explanation of the many curious facts discussed in preceding chapters

Paley likened the precision of the living world to a beautifully made watch. He then argued that, just as a watch owes its origin to a watchmaker, the world of Nature must owe its origin to a Creator, God

The speculations of *The Origin of Species* turned out to be wrong.... It is ironic that the scientific facts throw Darwin out, but leave William Paley, a figure of fun to the scientific world for more than a century, still in the tournament with a chance of being the ultimate winner.... Indeed, such a theory is so obvious that one wonders why it is

not widely accepted as being self-evident. The reasons are psychological rather than scientific."
Referenced in "*The Mystery of Life's Origins*", Charles B. Thaxton, et al, Pgs. 196-7, Lewis and Stanley, Dallas, Texas. [Quoted from: *"Evolution From Space*", by Hoyle and Wickramasinghe]

13. Massless Particles:

13a. "A massless particle is a particle whose invariant mass is zero. Currently, the only known massless particles are gauge bosons: the photon (carrier of electromagnetism) and the gluon (carrier of the strong force). However, gluons are never observed as free particles, since they are confined within hadrons."

"The behavior of massless particles is understood by virtue of special relativity. For example, these particles must always move at the speed of light. In this context, they are sometimes called luxons to distinguish them from bradyons and tachyons."
Excerpt from: "Massless Particles", http://www.wikipedia.com/

13b. "Particles propagating in a fundamentally discrete space-time will not follow the smooth geodesics predicted by general relativity. In causal set theory we can construct a simple Lorentz invariant model for the 'swerving' of massive particles caused by discreteness. On macroscopic scales these swerves can be approximated by a diffusion equation in phase space. For massless particles a model is less simple to construct, but a diffusion equation can still be obtained. We find that massless particles will undergo a diffusion and drift in momentum magnitude. This effect will be most significant over cosmic distances. The diffusion and drift distorts a blackbody spectrum, and thus the perfect blackbody nature of the cosmic microwave background allows us to place tight constraints on the values of the diffusion and drift constants."
Excerpt from: Philpott, Lydia; Dowker, Fay; Sorkin, Rafael, "Massless particle diffusion in causal set theory" Journal of Physics: Conference Series, Volume 174, Issue 1, pp. 012048 (2009).

13c. "Massless particles are famous to change the unvaried gravitational acceleration as separate particles (which provides falsifiable inform for the equivalence generalization) because they do acquire relativistic general, which is what acts as the attraction asking. Thus, orthogonal components of forces performing on massless particles just convert their route of happening, the angle move in radians state GM/rc2 with gravitational lensing, a resultant predicted by mass relativity. The part of validness comparable to the motion solace affects the particle, but by changing the oftenness kinda than the travel. This is because the forcefulness of a massless particle depends exclusive on hurry, and path). Massless particles run in honorable lines in space-time, called geodesics, and gravitational lensing relies on space-time conformation. Gluon-gluon interaction is a little diametrical: they utilise forces on each other but, because the speedup is collateral to the communication connecting them (albeit not at simultaneous moments), the quickening testament be correct unless the gluons act in a content orthogonal to the connexion connecting them (so that rate is rectangular to speedup)."
Excerpt from "Massless particle", Rila, Sept 29, 2009

http://www.nmyyzx.com/2009/09/massless-particle.html

13d. "If Newton's third law is universally true, it is telling us that the space between objects must indeed have zero mass. Remember all those years physicists wasted on the idea of a substance called the "luminiferous ether" that "fills all of space". . . they'd have realized that this ether must have exactly zero mass. Then, if they really believed Newton's third law, they wouldn't have bothered with the (now abandoned) notion of the ether. They'd have realized that their ether was experimentally indistinguishable from nothing"

"Though the luminiferous ether idea has disappeared from textbooks, seldom rating even a footnote, modern physics has introduced subtler and sneakier ways to give structure and substance to space. These have fancy names like "vacuum states". If any of this new stuff supposedly "in" space has mass, or if space itself has mass, then careful measurements of forces between interacting bodies should reveal that fact. Any inequality of action and reaction forces on bodies interacting through intervening space would reveal the mass of space.

Critics of this interpretation of Newton's Third Law may object to treating space as a "massless body". Why should this be so alarming? Physicists have entertained even crazier concepts and even incorporated them into their theories. In the 20th century physicists quite comfortably lived with the notion of massless neutrinos."
Excerpt from: "A Deductive Proof of Newton's Third Law", Ken Amis
http://www.lhup.edu/~dsimanek/cutting/3rdlaw.htm

14. Meditative Prayer:

"Prayer heals. So say thousands of Americans who use prayer to improve their health. According to a study by Dr. Anne McCaffrey of the Harvard Medical School, one-third of Americans use prayer to facilitate physical healing. Sixty-nine percent of the 2,000 people surveyed said prayer greatly improved their health.

Additional studies have linked prayer to positive health outcomes with high blood pressure, asthma, heart attacks, headaches and anxiety. "It's not a fringe thing," says McCaffrey. "I think very mainstream Americans are using prayer in their daily lives."
Source: Armstrong Williams, "Health Benefits of Prayer", July 29, 2005,
http://archive.newsmax.com/archives/articles/2005/7/29/04002.shtml

15. Motion in Quantum Physics:

"Spin (Physics)" "In particle physics and quantum mechanics, spin is a fundamental characteristic property of elementary particles including the force carriers (bosons), composite particles (hadrons), and atomic nuclei."
http://en.wikipedia.org/wiki/Spin_%28physics%29

16. Multiverses:

16a. "The multiverse is the hypothetical set of multiple possible universes (including our universe) that together comprise all of reality. The different universes within the multiverse are sometimes called parallel universes. The structure of the

multiverse, the nature of each universe within it and the relationship between the various constituent universes, depend on the specific multiverse hypothesis considered.

"Multiverses have been hypothesized in cosmology, physics, astronomy, philosophy, theology, transpersonal psychology and fiction, particularly in science fiction and fantasy. The specific term "multiverse," which was coined in 1895 by psychologist William James, was popularized by science fiction author Michael Moorcock. In these contexts, parallel universes are also called "alternative universes," "quantum universes," "parallel worlds," "alternate realities," "alternative time-lines," etc.

"According to Max Tegmark, University of Pennsylvania physicist, the existence of other universes is a direct implication of cosmological observations. Tegmark describes the set of related concepts which share the notion that there are universes beyond the familiar observable one, and goes on to provide a taxonomy of parallel universes organized by levels."

Source: "Parallel Universes and the Multiverse"

Excerpt from: http://www.hep.upenn.edu/~max/multiverse.pdf

Also see Max Tegmark in Bibliography

16b. "If the universe is, as the dictionary has it, "all existing things ... regarded as a whole," then isn't it true by definition that there is only one such thing?. . . Well, yes. But when physicists and philosophers talk about different space-time domains being "two universes," what they generally mean is that those regions are 1) very, very large; 2) "causally isolated" from each other (meaning that an event in one cannot have an effect in another); and hence 3) mutually unknowable by direct observation (since observing something means causally interacting with it). The case for saying the two domains are separate universes is further strengthened if 4) they have very different characters: if, say, one of them has three spatial dimensions (like ours), whereas the other has 17 dimensions. Finally-and here is the existentially titillating possibility-two domains might be called separate universes if 5) they are "parallel," meaning that they contain somewhat different versions of the same entities, like your own alter ego."

" Thinkers who entertain the possibility that there are lots of universes have invented a new term for the entire ensemble: "the multiverse." Why believe in the multiverse? The "pro" camp has essentially two kinds of arguments."

". . . measurements of the cosmic background radiation (the echo left over from the big bang) indicate that the space we live in is infinite and that matter is spread randomly throughout it."

"A more extravagant kind of multiverse is entailed by the theory of "chaotic inflation." Proposed by Andrei Linde to explain why our universe looks the way it does-big, uniform, and flat-inflation theory also predicts that big bangs should be a fairly routine occurrence, giving rise to an eternal network of universes tied together by impassable "wormholes." These universes, according to the theory, would have different physical characteristics. This kind of multiverse has become the bane of natural theologians."

"According to the "many-worlds" interpretation of quantum theory, Schrödinger's experiment splits the universe into two parallel copies, one with a live cat, the other with a dead one (and each with a version of you). Physicists who buy into this

interpretation-and many distinguished ones do-claim that each universe splits into something like 10 to the 100th copies every second, all of them equally real. Yet, since quantum theory forbids these parallel worlds from interacting, there is no experimental way to confirm their reality."
Excerpt from: "My So-Called Universe. Our cozy world is probably much bigger-and stranger-than we know",
Jim Holt, http://slate.msn.com/id/2087206/ Jim Holt writes the "Egghead" column for Slate and also writes for The New Yorker and the New York Times Magazine.

17. Oceanic Space:

17a. "All matter comes from a primary substance, the luminiferous ether," stated Nikola Tesla. He sensed the universe was "composed of a symphony of alternating currents with the harmonies played on a vast range of octaves," wrote Margaret Cheney. "To explore the whole range of electrical vibration, he sensed, would bring him closer to an understanding of the cosmic symphony."

"Tesla understood that the cosmos is in resonance. Everything that exists possesses a unique vibratory rate which resonates with the heart of the cosmos."
Source: Margaret Cheney, "Tesla: Man out of Time", 2001, Simon & Schuster, NY

17b. In his book "Quantum Reality, Nick Herbert considers the fact that our bodies form a connected part of that single entity, the universe: "Physicists have discovered that the very atoms of our bodies are woven out of a common superluminal fabric". He then proceeds to quote Einstein who realised the social implications of the illusion of separateness: "A human being is part of the whole, called by us 'Universe'; a part limited in time and space. He experiences himself, his thoughts and feelings as someone separated from the rest - a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty."
Source: Thomas, Andrew, "Quantum Mechanics: An Introduction"
http://www.ipod.org.uk/reality/index.asp

17c. "What is empty space? This question also stems from ancient Greece. Democritus argued that empty space was a true void whereas Aristotle contended that it was in fact a plenum (background filled with substance)-a medium in which heat and light traveled. Siding with Aristotle, Maxwell's 19th century theory of the luminiferous ether described a plenum that carried electromagnetic waves. However attempts to detect the ether failed and Einstein's special relativity in 1905 reverted to Democritus in that empty space was an absolute void. However ten years later Einstein's general relativity with its curved space and distorted geometry reversed his stand to opt for a richly-endowed plenum termed the space-time metric."

"We now know that at very small scales space and time are not smooth, but quantized. This granularity occurs at the incredibly small dimensions of the "Planck scale" at 10-33 centimeters and 10-43 seconds. Roger Penrose portrays this basic makeup of the universe as a dynamical spider-web of quantum spins8. These "spin

networks" create an evolving array of Planck scale geometric volumes defining four dimensional space-time Penrose applies Einstein's general relativity (in which mass equates to curvature, or perturbation of space-time) all the way down to this near-infinitesimal geometry. Thus everything is in reality particular arrangements of space-time geometry. Building on these ideas, Lee Smolin9,10 likens spin network volumes to Leibniz monads and suggests that self-organizing processes at this level constitute a flow of time, raising the issue of whether the universe is in some sense alive. Could infinitesimally small, weak and fast processes be coupled to biology? A reasonable possibility for such a link is Penrose's objective reduction-a particular type of quantum state reduction in which new macroscopic information emerges."
Excerpt from: "Funda-Mentality" Is the Conscious Mind Subtly Linked to a Basic Level of the Universe?', Stuart Hameroff, M.D.,
http://www.quantumconsciousness.org/penrose-hameroff/fundamentality.html

17d. " The words "deep space" conjure up images of exploring far corners of the galaxy. This romantic idea is somewhat correct; deep space refers to space beyond our Solar System. Deep space can sometimes refer to interstellar space, which is any space outside a star and its planetary system. Interplanetary space is the space in a planetary system up to the heliopause where the interplanetary space gives way to interstellar space. The heliopause is part of the heliosphere, which is a kind of shield protecting the Solar System from radiation. Deep space is a combination of interstellar space and interplanetary space from all other solar systems except our own.

"Interstellar space, and deep space for that matter, is not the empty vacuum that fictional portrayals have led us to believe. It is filled with interstellar medium (ISM). Interstellar medium is gas and dust that occupies interstellar space. It is a very thin mixture of cosmic rays, magnetic fields, ions, grains of dust, and other molecules. The density of the material changes depending on where it is. It is denser closer to the planetary system with an average density of a million particles per each cubic meter. The gas in the interstellar medium is composed of approximately 89% hydrogen, 9% helium, and 2% of other heavier materials including tiny amounts of metals.

Astronomers have been trying to determine the nature of interstellar space for centuries - at least since the 1600's - but their efforts were hampered by the limited tools and technology they had available. The interstellar medium is important to astrophysicists because it helps them determine how quickly a solar system uses up its gases, and from that, how long its lifespan of active star formation is.

"In addition to interstellar space, deep space includes intergalactic space. Intergalactic space refers to the space between galaxies. Intergalactic space is almost completely empty and very close to a total vacuum. The density of the material in intergalactic space - intergalactic medium (IGM) - differs in different spots. There is a higher density of intergalactic medium closer to star systems because much of the medium comes from solar winds and other debris from the planetary system. Astronomers believe that the gas in the intergalactic medium is ionized gas as a result of its relatively high temperatures. Deep space holds a certain allure hinting at the unknown and mysterious, which is one reason why it has always fascinated people."
Reprint from: http://www.universetoday.com/tag/interstellar-space/August 2nd, 2009

18. Reincarnation:

"Probably the best known, if not most respected, collection of scientific data that appears to provide scientific proof that reincarnation is real, is the life's work of Dr. Ian Stevenson. Instead of relying on hypnosis to verify that an individual has had a previous life, he instead chose to collect thousands of cases of children who spontaneously (without hypnosis) remember a past life. Dr. Ian Stevenson uses this approach because spontaneous past life memories in a child can be investigated using strict scientific protocols. Hypnosis, while useful in researching into past lives, is less reliable from a purely scientific perspective. In order to collect his data, Dr. Stevenson methodically documents the child's statements of a previous life. Then he identifies the deceased person the child remembers being, and verifies the facts of the deceased person's life that match the child's memory. He even matches birthmarks and birth defects to wounds and scars on the deceased, verified by medical records. His strict methods systematically rule out all possible "normal" explanations for the child's memories."
Source: Reprinted article at:
http:// reluctant-messenger.com/reincarnation-proof.htm

19. Self Hypnosis:

"Mention Labor and Delivery to an expectant mom in her last trimester, and chances are good that her heart will begin to race, her mind floods with concern and in some cases, panic. She knows that the day is coming when a force much bigger than herself will take over and her body will govern itself completely. For some women, this is a very fearful event, but for hypnomoms, it is merely a challenge."
Excerpt from: "Hypnobirthing", Kerry Tuschhoff, http://www.hypnobabies.com/
Or "Hypnosis for Childbirth", at http://www.pregnancy.org/article/hypnosis-childbirth-what-it-and-does-it-work?

20. String Theory and Particles:

20a. "Think of a guitar string that has been tuned by stretching the string under tension across the guitar. Depending on how the string is plucked and how much tension is in the string, different musical notes will be created by the string. These musical notes could be said to be excitation modes of that guitar string under tension.

"In a similar manner, in string theory, the elementary particles we observe in particle accelerators could be thought of as the excitation modes of elementary strings.

In string theory, as in guitar playing, the string must be stretched under tension in order to become excited. However, the strings in string theory are floating in space-time. They aren't tied down. Nonetheless, they have tension.

"These strings are identical except in the way they vibrate. Each vibrates in such a way to create a different particle. These particles produced by strings, go on to evolve the entire material realm we observe.

"Two basic types of particles: bosons (that emit energy and are the constituents of radiation) and fermions (that form the basis of matter). Two fermions cannot occupy the same space."

Source: "String Theory Basics [basic and advanced]"
http://www.superstringtheory.com/basics/index.html

20b. "In the modern theory, known as the Standard Model there are 12 fundamental matter particle types and their corresponding antiparticles. The matter particles divide into two classes: quarks and leptons. There are six particles of each class and six corresponding antiparticles. In addition, there are gluons, photons, and W and Z bosons, the force carrier particles that are responsible for strong, electromagnetic, and weak interactions respectively. These force carriers are also fundamental particles."
"Building Blocks of Matter", Stanford Linear Accelerator Center (SLAC) National Accelerator Laboratory
http://www2.slac.stanford.edu/vvc/theory/bldgblocks.html

21. Subatomic Particles - also called "elementary particles":

"Discovery of the electron in 1897 and of the atomic nucleus in 1911 established that the atom is actually a composite of a cloud of electrons surrounding a tiny but heavy core. By the early 1930s it was found that the nucleus is composed of even smaller particles, called protons and neutrons. In the early 1970s it was discovered that these particles are made up of several types of even more basic units, named quarks, which, together with several types of leptons, constitute the fundamental building blocks of all matter. A third major group of subatomic particles consists of bosons, which transmit the forces of the universe. More than 200 subatomic particles have been detected so far, and most appear to have a corresponding antiparticle (see antimatter)."
Excerpt from: "subatomic particle." Encyclopædia Britannica. 2009. Encyclopædia Britannica Online. 08 Oct. 2009
http://www.britannica.com/EBchecked/topic/570533/subatomic-particle/
"subatomic particle." Encyclopædia Britannica. 2009.

22. Swarm Intelligence:

22a. So-called "social" insects such as bees, ants and termites demonstrate collective problem-solving capabilities. A swarm of termites, for example, exhibits a collective intelligence that far exceeds the intelligence of any individual insect, which by itself has limited capabilities for processing and communicating information. "The collective intelligence of the swarm emerges in a decentralized way from the actions of individual insects responding to local stimuli from the environment and, most importantly, from other members of the swarm. There is no "boss" in charge. No individual insect grasps the big picture," asserts Frank Lacombe ("Modeling Swarm Behavior" referenced in the Bibliography)

Vijay Kumar, a professor of mechanical engineering at the University of Pennsylvania agrees, stating, "In biology, if you look at groups with large numbers, there are very few examples where you have a central agent. Everything is very distributed: They don't all talk to each other. They act on local information. And they're all anonymous." That is how swarm intelligence works: simple creatures following

simple rules, each one acting on local information. No one sees the big picture. No one tells any other what to do.

22b. "The swarming behavior of ants, bees, termites, and other social insects has implications far beyond the hive. Swarm intelligence - the collective behavior of independent agents, each responding to local stimuli without supervision - can be used to understand and model phenomena as diverse as blood clotting, highway traffic patterns, gene expression, and immune responses, to name just a few. Swarm technology is proving useful in a wide range of applications including robotics and nanotechnology, molecular biology and medicine, traffic and crowd control, military tactics, and even interactive art."
Excerpt from: "Modeling Swarm Behavior", Frank Lacombe, University of Calgary, http://www.apple.com/science/profiles/universityofcalgary/index.html

22c. "Ants, Bees or Termites - all social insects - show impressive collective problem-solving capabilities. Properties associated with their group behaviour like self-organisation, robustness and flexibility are seen as characteristics that artificial systems for optimisation, control or task execution should exhibit. In the last decade, diverse efforts have been made to take social insects as an example and develop algorithms inspired by their strictly self-organised behaviour. These approaches can be subsumed under the concept of "Swarm Intelligence". With their book Swarm Intelligence: From Natural to Artificial Systems Eric Bonabeau, Marco Dorigo and Guy Theraulaz - pioneers of so called ant optimisation and the simulation of social insects - do not only provide an overview of the state of the art in swarm intelligence. They go further by outlining future directions and areas of research where the application of biologically inspired algorithms seems to be promising."
Excerpt from: Review by Franziska Klügl, Department of Artificial Intelligence, University of Würzburg, Germany, "Swarm Intelligence: From Natural to Artificial Systems", Eric Bonabeau, Marco Dorigo and Guy Theraulaz, New York, NY: Oxford University Press, Santa Fe Institute Studies in the Sciences of Complexity, 1999, http://jasss.soc.surrey.ac.uk/4/1/reviews/kluegl.html
[For further information, see "Swarm Intelligence" under Web Links]

22d. "Applicability of Swarm Intelligence to Terrorism and Disaster Response: Three characteristics of "swarm intelligence" particularly relevant to emergency management are flexibility, robustness, and self-organization.8 Most people would agree that all three of those characteristics were missing from the governmental response to Katrina.

The single noteworthy agency exempted from the criticism of governmental response was the U.S. Coast Guard, whose Gulf Coast units did not wait for express authorization to begin search and rescue operations. According to a Government Accountability Office report, "... underpinning these efforts were factors such as the [Coast Guard's] operational principles. These principles promote leadership, accountability, and enable personnel to take responsibility and action, based on relevant authorities and guidance."

Similarly, on 9/11 the only effective response was a classic example of swarm intelligence. A group of total strangers on Flight 93 coalesced (in circumstances when

no one would have blamed them for instead dissolving into hysterics) to thwart the hijackers' plan to crash the plane into the Capitol or White House. They exhibited all three characteristics of swarm intelligence in abundance.

Another example is how individuals came together via the Internet to provide a variety of invaluable and reliable information to victims of the tsunami, and, more recently, of Hurricane Katrina. In particular, some of these people took it upon themselves to create the tsunami help blog and wiki10. Later, a core group of those people took the lead in creating the Katrina help wiki. As one of the tsunami help volunteers, Dina Mehta, wrote: We experienced a near-magical interdependence as we were setting up and establishing this blog. It's not just about the people who were blogging; there [were] a whole lot of volunteers who fed us with links, sent us letters from affected people reaching out for help, others who took on the mantle of editing, sub-groups working on design and template issues, still others quietly contributing by buying up bandwidth and applications and offering up mirror servers, that made the blog more effective.

Mehta accurately describes how individuals participating in a situation that evokes swarm intelligence produce results that are far greater than the sum of their parts. In the case of Katrina, still others spontaneously came together to craft imaginative Google Map mashups (applications combining information from multiple sources) to allow identification of homes in New Orleans12 and to create unified databases of those needing assistance.

Perhaps the most astonishing examples of swarm intelligence in a recent disaster response situation were the variety of ad hoc rescue efforts in New Orleans that Douglas Brinkley described in The Great Deluge. Spurred by word of mouth, hundreds of Cajuns spontaneously navigated their small boats to New Orleans in an ad hoc citizens' flotilla, the "Cajun Navy," which rescued nearly 4,000 survivors.14 Reggae singer Michael Knight and his wife Deonne saved approximately 250 people by themselves.15 Richard Zuschlag, co-founder of Acadian Ambulance Service, used his 200 ambulances, plus medivac helicopters, to evacuate 7,000, while also providing the only reliable emergency communications system."

Excerpt from: "Expecting the Unexpected: The Need for a Networked Terrorism and Disaster Response Strategy", W. David Stephenson and Eric Bonabeau, The Journal of the Naval PostGraduate School Center For Homeland Defense and Security, Volume III No. 1: February 2007, http://www.hsaj.org/

23. The Big Bang:

23a. "About 15 billion years ago a tremendous explosion started the expansion of the universe. This explosion is known as the Big Bang. At the point of this event all of the matter and energy of space was contained at one point. What existed prior to this event is completely unknown and is a matter of pure speculation. This occurrence was not a conventional explosion but rather an event filling all of space with all of the particles of the embryonic universe rushing away from each other. The Big Bang actually consisted of an explosion of space within itself unlike an explosion of a bomb

were fragments are thrown outward. The galaxies were not all clumped together, but rather the Big Bang lay the foundations for the universe."

"Since the Big Bang, the universe has been continuously expanding and, thus, there has been more and more distance between clusters of galaxies. This phenomenon of galaxies moving farther away from each other is known as the red shift. As light from distant galaxies approach earth there is an increase of space between earth and the galaxy, which leads to wavelengths being stretched".
Excerpted from: "The Big Bang", Chris LaRocco and Blair Rothstein
http://www.umich.edu/~gs265/bigbang.htm

23b. "A new theory of the universe suggests that space and time may not have begun in a big bang, but may have always existed in an endless cycle of expansion and rebirth.

"Princeton physicist Paul Steinhardt and Neil Turok of Cambridge University described their proposed theory in an article published April 25 in an online edition of Science.

"The theory proposes that, in each cycle, the universe refills with hot, dense matter and radiation, which begins a period of expansion and cooling like the one of the standard big bang picture.

"After 14 billion years, the expansion of the universe accelerates, as astronomers have recently observed. After trillions of years, the matter and radiation are almost completely dissipated and the expansion stalls. An energy field that pervades the universe then creates new matter and radiation, which restarts the cycle."
Excerpt from: "Adding Trillions Of Years To The Life Of The Universe", Princeton University, May 01, 2002
http://www.spacedaily.com/

23c. Astrophysicist Robert Jastrow, a self-described agnostic, stated, "The seed of everything that has happened in the Universe was planted in that first instant; every star, every planet and every living creature in the Universe came into being as a result of events that were set in motion in the moment of the cosmic explosion...The Universe flashed into being, and we cannot find out what caused that to happen."
Robert Jastrow, "Message from Professor Robert Jastrow",
http://www.leaderu.com/truth/1truth18b.html, 2002

24. Vacuum Energy:

"Vacuum energy is an underlying background energy that exists in space even when devoid of matter (known as free space). The vacuum energy is deduced from the concept of virtual particles, which are themselves derived from the energy-time uncertainty principle. Its effects can be observed in various phenomena (such as spontaneous emission, the Casimir effect, the van der Waals bonds, or the Lamb shift), and it is thought to have consequences for the behavior of the Universe on cosmological scales. The energy of a cubic centimeter of empty space has been calculated to be one trillionth of an erg.

"Quantum field theory states that all of the various fundamental fields, such as the electromagnetic field, must be quantized at each and every point in space. In a

naïve sense, a field in physics may be envisioned as if space were filled with interconnected vibrating balls and springs, and the strength of the field can be visualized as the displacement of a ball from its rest position. Vibrations in this field propagate and are governed by the appropriate wave equation for the particular field in question. The second quantization of quantum field theory requires that each such ball-spring combination be quantized, that is, that the strength of the field be quantized at each point in space. Canonically, the field at each point in space is a simple harmonic oscillator, and its quantization places a quantum harmonic oscillator at each point. Excitations of the field correspond to the elementary particles of particle physics. Thus, even the vacuum has a vastly complex structure. All calculations of quantum field theory must be made in relation to this model of the vacuum.

"The vacuum implicitly has the same properties as a particle, which are spin, or polarization in the case of light, energy, and so on. On average, all of these properties cancel out: the vacuum is, after all, "empty" in this sense. One important exception is the vacuum energy or the vacuum expectation value of the energy. The quantization of a simple harmonic oscillator states that the lowest possible energy, or zero-point energy, that such an oscillator may have is:

"Summing over all possible oscillators at all points in space gives an infinite quantity. To remove this infinity, one may argue that only differences in energy are physically measurable, much as the concept of potential energy has been treated in classical mechanics for centuries. This argument is the underpinning of the theory of renormalization. In all practical calculations, this is how the infinity is handled.

"Vacuum energy can also be thought of in terms of virtual particles (also known as vacuum fluctuations) which are created and destroyed out of the vacuum. These particles are always created out of the vacuum in particle-antiparticle pairs, which shortly annihilate each other and disappear. However, these particles and antiparticles may interact with others before disappearing, a process which can be mapped using Feynman diagrams. Note that this method of computing vacuum energy is mathematically equivalent to having a quantum harmonic oscillator at each point and, therefore, suffers the same renormalization problems.

"Vacuum energy has a number of consequences. In 1948, Dutch physicists Hendrik B. G. Casimir and Dirk Polder predicted the existence of a tiny attractive force between closely placed metal plates due to resonances in the vacuum energy in the space between them. This is now known as the Casimir effect and has since been extensively experimentally verified. It is therefore believed that the vacuum energy is "real" in the same sense that more familiar conceptual objects such as electrons, magnetic fields, etc., are real."
http://en.wikipedia.org/wiki/Vacuum_energy

25. Views on Religion:

25a. "As a philosopher, if I were speaking to a purely philosophic audience I should say that I ought to describe myself as an Agnostic, because I do not think that there is a conclusive argument by which one prove that there is not a God."

Bertrand Russell, "Am I An Atheist Or An Agnostic?" (A Plea For Tolerance In The Face Of New Dogmas), (1947)
http://www.solstice.us/russell/atheist_agnostic.html

25b. "The theoretical atheism is in its essence an anti-religion, because it is also based on belief. As religions are formed on faith in the existence of God, so atheism builds up on the belief that He does not exist. Indeed, if God is a spirit, then how can material devices "prove" that He does not exist? This is comparable to rejecting the existence of the Earth's magnetic field on the basis of barometric readings. Atheism replaces the belief in God with a belief in self-sufficiency of matter and laws of nature."
"The cause and consequences of the atheism",
http://www.orthodoxphotos.com/readings/sketches/cause.shtml

25c. "To start with, it is arrogant as well as mistaken to assume that, without a belief in their god, then I must have nothing to hope for. Granted, I can't hope for their particular idea about an afterlife, but that hardly warrants the conclusion that I have nothing to hope for or to look forward to in the future. "What do I have to look forward to? Life - an enjoyable life doing the things I love and being with the people I love. Why do I live? Because of the people I love and the things I love - basically, because I enjoy life. Does it matter that, eventually, I am going to die and the life I enjoy will end? I admit that that will be unfortunate, but it doesn't mean that doing what I enjoy now is therefore worthless. After all, every individual action I am doing will end - every good meal end, every trip to an amusement park ends, every good book ends."
"Myth: Atheism Leads to Hopelessness and Despair, Atheism is Depressing. Do Atheists Have No Hope, Nothing to Look Forward To Without God?", Austin Cline, Regional Director for the Council for Secular Humanism, http://atheism.about.com/bio/Austin-Cline-5577.htm

25d. " Despair is the only genuine atheism." Jean Paul (1763 - 1825), born Johann Paul Friedrich Richter

25e. " Life has no meaning the moment you loose the illusion of being eternal." Jean-Paul Sartre

26. Vision:

26a. "Vision is a complicated process that requires numerous components of the human eye and brain to work together. The initial step of this fascinating and powerful sense is carried out in the retina of the eye. Specifically, the photoreceptor neurons (called photoreceptors) in the retina collect the light and send signals to a network of neurons that then generate electrical impulses that go to the brain. The brain then processes those impulses and gives information about what we are seeing."

"We now know the basic function of the components of the human eye and how they participate in the vision process. Light that reflects off of objects around us is imaged onto the retina by the lens. The retina, which consists of three layers of neurons (photoreceptor, bipolar and ganglion) is responsible for detecting the light from these images and then causing impulses to be sent to the brain along the optic nerve. The brain decodes these images into information that we know as vision."
Excerpts from article by: Diane M. Szaflarski, Ph.D

http://www.accessexcellence.org/AE/AEC/CC/vision_background.php

26b. "The main function of the eye is to convert light from the outside world into electrical nerve impulses. These impulses then travel to the part of the brain responsible for vision, where they are interpreted as a visual scene. In the eye, light traverses through the tear film, cornea, anterior chamber, pupil, lens, and vitreous to the retina, which sends the nerve impulses through the optic nerve to the brain."

"When light hits the retina, a photochemical reaction takes place. Electrical impulses develop in the light receptors (rods and cones), the impulses are processed by other cells within the eye, and then they are transmitted to the brain via the optic nerve, which is composed of a group of nerve fibers. When the impulses reach the brain, they are interpreted as a visual scene."

Excerpted from article from the University of Illinois at Chicago
http://www.uic.edu/com/eye/LearningAboutVision/EyeFacts/HowWeSee.shtml

27. Zero-point Field:

26a. Zero Point Definition: "In quantum field theory, the zero-point field is the lowest energy state of a field, i.e. its ground state, which is non zero. This phenomenon gives the quantum vacuum a complex structure, which can be probed experimentally; see, for example, the Casimir effect. The term "zero-point field" is sometimes used as a synonym for the vacuum state of an individual quantized field. The electromagnetic zero-point field is loosely considered as a sea of background electromagnetic energy that fills the vacuum of space, and is often regarded merely as a curious outcome of the quantum mechanical requirement, namely the Heisenberg uncertainty principle, that the lowest allowable energy level in a harmonic oscillator mode is not zero but hv /2, where v is the characteristic frequency of the oscillator.

"It is believed that an electromagnetic field exists in a vacuum even when the temperature of the surrounding material is reduced towards absolute zero. The existence of such a zero-point field has been confirmed experimentally by the Casimir experiment, i.e. the measurement of the attractive force between two parallel plates in an evacuated, near-zero temperature enclosure. That force is found to be proportional to the inverse fourth power of the distance apart of the plates; it has been shown that such a result can only be produced by a zero-point field whose spectral energy density has a frequency dependence of ?(?) = k?3. It has been assumed until recently, though without any experimental evidence, that there are zero-point energies for the strong and weak forces as well as the electromagnetic force. More recently it has been understood that because the electromagnetic force, expressed by the Lorentz force equation, does not require mass that the electromagnetic zero-point field and the electromagnetic force carrier, the photon, are probably fundamental to all three forces."
Source: Wikipedia: "Zero-point field"

26b. Zero-Point Field: "In conventional quantum physics, the origin of zero-point energy is the Heisenberg uncertainty principle, which states that, for a moving particle such as an electron, the more precisely one measures the position, the less exact the best possible measurement of its momentum (mass times velocity), and vice versa. The least possible uncertainty of position times momentum is specified by

Planck's constant, h. A parallel uncertainty exists between measurements involving time and energy (and other so-called conjugate variables in quantum mechanics). This minimum uncertainty is not due to any correctable flaws in measurement, but rather reflects an intrinsic quantum fuzziness in the very nature of energy and matter springing from the wave nature of the various quantum fields. This leads to the concept of zero-point energy."

"Zero-point energy is the energy that remains when all other energy is removed from a system. This behaviour is demonstrated by, for example, liquid helium. As the temperature is lowered to absolute zero, helium remains a liquid, rather than freezing to a solid, owing to the irremovable zero-point energy of its atomic motions. (Increasing the pressure to 25 atmospheres will cause helium to freeze.)"
Excerpted from: "Zero Point Energy and Zero Point Field"
http://www.calphysics.org/zpe.html

Bibliography

1. Binet, Alfred, "*The Psychic Life of Micro-organisms*", subtitled: "*A study in Experimental Psychology*", 1910, The Open Court Publishing Co, London [Consciousness as a universal phenomenon]
2. Bonabeau, Eric; Marco Dorigo, and Guy Theraulaz, "*Swarm Intelligence: From Natural to Artificial Systems*", Swarm Intelligence: From Natural to Artificial Systems", 1999, Oxford University Press, NY, Santa Fe Institute Studies in the Sciences of Complexity.
3. Byrd, Randolph C., "*Positive Therapeutic effects of intercessory prayer in a coronary care unit population*", Southern Medical Journal, 1988, **81**(7): 826-9
4. Camazine, Scott, Jean-Louis Deneuborg, Nigel R. Franke,James Sned, Guy Theraulaz and Eric Bonabeau, "*Self-organization in Biological Systems*", 2001, Princeton, Princeton, NJ. [Especially Chapter 19.]
5. Cheney, Margaret, "*Tesla: Man out of Time*", 2001, Simon & Schuster, NY [Alternating currents filling space]
6. Clifford, William K. "*Mathematical Papers*", 1882, edited by R Tucker, with an introduction by Henry J. S. Smith. [Matter is simply "undulations in the fabric of space".]
7. Crichton, Michael, "*Prey*", 2002, Avon Books, NY. [A fictional thriller involving swarm intelligence based on fact with an excellent bibliography. An easy reading introduction to the topic.]
8. Curd, Patricia, "*The Legacy of Parmenides: Eleatic Monism and Later Presocratic Thought*", 2004, Parmenides Publishing, (First edition Princeton University Press 1998);
9. Dalrymple, G. Brent, "*The Age of the Earth*", 1991, Stanford University Press, Stanford, Ca, p. 492
10. Dirac, P.A.M., "*The Principles of Quantum Mechanics",* Oxford University Press Inc, New York, 1930-1999
11. Einstein, Albert, "*On Science and Religion*", 1940, Nature **146**: 605;
12. Einstein, Albert; Podolsky, Boris & Rosen, Nathan, "*Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?*" May 15, 1935, Physical Review **47**(10): 777–780
13. Everett III, Hugh, "*The Theory of the Universal Wavefunction*", Manuscript (1955), pp 3-140 of Bryce DeWitt, R. Neill Graham, eds., *The Many-Worlds Interpretation of Quantum Mechanics*, Princeton Series in Physics, Princeton University Press (1973)
14. Feynman, R.P.; Leighton, R. B.; and Sands, M., *The Feynman Lectures on Physics*, Addison-Wesley, 1965.
15. Goswami, Amit, "*The Self-Aware Universe*", Tarcher, 1995 reprint; "*The Visionary Window: A Quantum Physicist's Guide to Enlightenment*", with Deepak Chopra, Quest Books, 2000; "*Physics of the Soul: The Quantum Book of Living, Dying, Reincarnation and Immortality*", Hampton Roads Publishing,

2001; "*Quantum Mechanics*", Waveland Press, 2nd edition, 2003; "*The Quantum Doctor: A Physicist's Guide to Health and Healing*", Hampton Roads Publishing, 2004; "*God Is Not Dead: What Quantum Physics Tells Us about Our Origins and How We Should Live*", Hampton Roads Publishing, 2008; "*Creative Evolution: A Physicist's Resolution Between Darwinism and Intelligent Design*", Quest Books, 2008

16. Greene, Brian, "*The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory*", 1999, Norton [The Multiverse]

17. Gribbin, John, *In Search of Schrödinger's Cat*, Bantam Books, Toronto: 1984

18. Haisch, B., Rueda, A. (1998). "*Contribution to inertial mass by reaction of the vacuum to accelerated motion*". Foundation Physics, 28: 1057–1108.

19. Haisch, B., Rueda, A. (1999)**.** 21 September 1999, "*Toward an Interstellar Mission: Zeroing in on the Zero-Point-Field Inertia Resonance*" arxiv: physics/9909043, 21 September 1999

20. Haisch, B., Rueda, A., and Dobyns, Y. (2001). "*Inertial mass and the quantum vacuum fields* ". Annalen der Phyik **10**: 393–414 [Matter and energy as wave functions.]

21. Haisch, B., Rueda, A., and Puthoff, H. E. (1994). "Inertia as a zero-point-field Lorentz force". *Physical Review A* **49**: 678–694.

22. Haisch, Bernard. *"The God Theory: Universes, Zero-point Fields, and What's Behind It All",* York Beach, ME: Red Wheel/Weiser Books, 2006 [Simplified explanations and analyses of dark matter, zero point fields, et al]

23. Hameroff, S.R., and Penrose, R. (1996b) "Conscious events as orchestrated spacetime selections", Journal of Consciousness Studies **3**(1):36-53

24. Hansen, John T and Koeppen, Bruce M., (2002). *Netter's Atlas of Human Physiology*. Teterboro, N.J: Icon Learning Systems.

25. Harris, William S., Gowda, Manohar, Kolb, Jerry W., Strychacz, Christopher P., Vacek, James L.; Jones, Phillip G.; Forker, Alan; O'Keefe, James H.; McCallister, Ben D.; "*A Randomized, Controlled Trial of the Effects of Remote, Intercessory Prayer on Outcomes in Patients Admitted to the Coronary Care Unit*", Archives of Internal Medicine, Oct 1999; **159**: 2273 - 2278

26. Hart, George, "*Egyptian Myths* (Legendary Past Series)". University of Texas Press (1st edition), 1997. [The cosmic ocean concept]

27. Heisenberg, W., "*Physikalische Prinzipien der Quantentheorie",* 1930, (Leipzig: Hirzel). English translation "*The Physical Principles of Quantum Theory* ", Chicago: University of Chicago Press, 1930. [Exposition of the Heisenberg Uncertainty Principle]

28. Heisenberg, W., "*Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik*", *Zeitschrift für Physik*, 43 1927, pp. 172-198. English translation: J. A. Wheeler and H. Zurek, *Quantum Theory and Measurement* Princeton Univ. Press, 1983, pp. 62-84.

29. Humphreys, Nicholas, "*A History of the Mind: Evolution and the Birth of Consciousness",* 1999, Copernicus Books, NY

30. Jacob, Christian; Anna Barbasiewicz, and Glorious Tsui, "*Swarms and Genes: Exploring !-Switch Gene Regulation through Swarm Intelligence*", PDF Text from: http://pages.cpsc.ucalgary.ca/~jacob/HomeCJ/Christian's Home Page/Publications/7B3DBFC4-3A4F-4

31. Johnston, Sarah Iles, *Religions of the Ancient World: A Guide*, Harvard University Press, 2004 [Ancient perspectives on cosmos and consciousness]

32. Kennedy, James and Russell C. Eberhart, "*Swarm Intelligence*", Academic Press, San Diego, Ca

33. Kothari, L.K., A. Bordia, and O.P. Gupta, "The Yogic Claim of Voluntary Control over the Heart Beat: An Unusual Demonstration," American Heart Journal **86** (1973): pps. 282-284. [Autonomic system self-control]

34. Lacombe, Frank. Article "*Modeling Swarm Behavior*", University of Calgary release, available at: http://www.apple.com/science/profiles/universityofcalgary/index.html

35. Lemmens, P and P. Millet, P (2004). "Spin - Orbit - Topology, a Triptych". *Lect. Notes Phys* **645**: 433–477.

36. Levy, Steven, "*Artificial Life*", 1992, Pantheon, NY

37. Ludwig, **Gunther,** "*Wave Mechanics*", Pergamon Press, Oxford, 1968
38. McFadden, Johnjoe, "*The Conscious Electromagnetic Information (CEMI) Field Theory*", Journal of Consciousness Studies, **9**, No. 8, pp. 45-60, UK
39. Marvin Chester, *Primer of Quantum Mechanics*, 1987, John Wiley, N.Y.
40. Michelson, A. A.; *et al*. (1928),"*Conference on the Michelson–Morley Experiment Held at Mount Wilson, February, 1927*". Astrophysical Journal **68**: 341–390. [On the flawed experiment that erroneous used to disprove the existence of a cosmic ether.]
41. Michelson, A. A.; Morley, E. W. (1887), "*On the Relative Motion of the Earth and the Luminiferous Ether*". American Journal of Science **34** (203): 333–345.
42. Miller, Peter; "*Swarm Theory*", National Geographic, July 2007, available at: http://ngm.nationalgeographic.com/2007/07/swarms/miller-text/1
43. Pauli, Wolfgang (1940) "The Connection Between Spin and Statistics," *Phys. Rev*. 58: 716-722.
44. Peebles, P. J. E. and Ratra, Bharat. "*The cosmological constant and dark energy*", Reviews of Modern Physics **75,** 2003, pps. 559–606
45. Penrose, R., with Shimony, A., Cartwright, N. And Hawking, S., "*The Large, the Small and the Human Mind*", Cambridge: C.U.P. 1997, revised ed. 1999.
46. Penrose, Roger, "*Shadows of the Mind: A Search for the Missing Science of Consciousness*", Oxford University Press, 1994.
47. Pinch, Geraldine, "*Egyptian Mythology: A Guide to the Gods, Goddesses, and Traditions of ancient Egypt*". Oxford University Press, 2004.
48. Plato, "*Parmenides"*, 127A-128B; **Parmenides of Elea** (Greek, early 5th century BC, founder of the Eleatic school of philosophy), "*Way of Truth"*, [He explained how reality is one; change is impossible; and existence is timeless, uniform, and unchanging.]; "*Way of Opinion"* [He explained the world of appearances, which is false and deceitful.]
49. Rae, Alastair, "*Quantum Physics: Illusion or Reality?*" Cambridge University Press, London: 1986.
50. Russell, Bertrand, "*The Analysis of Mind*", London, G. Allen & Unwin; New York, Macmillan [1922], London; New York ,1921
51. Schrödinger, Erwin R.J.A., "*Space-Time Structure*" Cambridge University Press, 1950; "My View of the World", Ox Bow Press (1983); "The interpretation of Quantum Mechanics" Ox Bow Press (1995) - ["What we observe as material bodies are nothing but shapes and variations in the structure of space."
52. Sean Carroll, Sr Research Associate - Physics, California Institute of Technology, June 22, 2006 C-SPAN broadcast of Cosmology at Yearly Kos Science Panel, Part 1 ["Energy of one cubic centimeter of empty space has been calculated at one trillionth of an erg."]
53. Steinberg, Derek and Tyrer, Peter; *Consciousness Reconnected: Missing Links Between Self, Neuroscience, Psychology and the Arts*, 2006, Radcliffe Publishing, Oxford
54. Tegmark, Max, "*Parallel Universes*" appearing in "*Science and Ultimate Reality: From Quantum to Cosmos*" J.D.Barrow et al, eds., Cambridge University Press, 2003, and also in *Scientific American,* May 2003
55. Thaxton, Charles B., Bradley, Walter L., and Olsen, Roger L., "*The Mystery of Life's Origin: Reassessing Current Theories",* Philosophical Library, Jan 19, 1984, Fourth Edition, 1992, Lewis and Stanley, Dallas Texas
56. Valencia, G., "*Anomalous Gauge-Boson Couplings At Hadron Supercolliders*", 1992, Fermi National Accelerator Laboratory, http://arxiv.org/PS_cache/hep-ph/pdf/9209/9209237v1.pdf

Web Links:

1. Amoeba, The single-cell organism - its curious behavior and abilities
http://www.microscopy-uk.org.uk/mag/indexmag.html
Or directly reference:
http://www.microscopy-uk.org.uk/mag/artsep01/amoeba.html

Amoeba: Much Wierder than You Think
http://catalogue-of-organisms.blogspot.com/2009/09/amoeba-much-wierder-than-you-think.html
2. "A Theory of Everything?" by Brian Greene, PBS. July 2003:
http://www.pbs.org/wgbh/nova/elegant/everything.html
3. Chlamydomonas - the model organism: Activity of other single-cell entities:
http://www.ruf.rice.edu/~bioslabs/studies/invertebrates/chlamydomonas.html
4. Dark Energy:
http://physicsworld.com/cws/article/print/19419
5. Intelligent Design:
http://www.discovery.org/csc/topQuestions.php
6. Multiverse, on the structure of:
Deutsch, David, "The Structure of the Multiverse," Oxford University, 2001:
http://arxiv.org/pdf/quant-ph/0104033v1 Also in ebook at:
http://xxx.lanl.gov/ftp/quant-ph/papers/0104/0104033.pdf
7. NASA's proof of the existence of Dark Matter:
http://www.nasa.gov/home/hqnews/2006/aug/HQ_06297_Chandra_Dark_Matter.html
8. Parallel Universes and the Multiverse
http://www.hep.upenn.edu/~max/multiverse.pdf
9. Paramecium putrium: Activity of other single-cell entities.
http://www.bio.umass.edu/biology/conn.river/parameci.html
10. Parmenides (b. 510 BCE.) Outline of his philosophy:
http://www.iep.utm.edu/p/parmenid.htm
11. Quantum Consciousness
http://www.quantumconsciousness.org/presentations/whatisconsciousness.html
12. Quantum mechanics and quantum theory synopsis:
http://www-history.mcs.st-andrews.ac.uk/history/HistTopics/The_Quantum_age_begins.html
13. String Theory:
http://www.superstringtheory.com/basics/index.html
14. Swarm Intelligence:
Jacob, Christian; Anna Barbasiewicz, and Glorious Tsui, "Swarms and Genes: Exploring !-Switch Gene Regulation through Swarm Intelligence", PDF Text available from:
http://pages.cpsc.ucalgary.ca/~jacob/HomeCJ/Christian's Home Page/Publications/7B3DBFC4-3A4F-4
Lacombe, Frank. Article "Modeling Swarm Behavior", University of Calgary release, available at:
http://www.apple.com/science/profiles/universityofcalgary/index.html
Miller, Peter; "Swarm Theory", National Geographic, July 2007, available at:
http://ngm.nationalgeographic.com/2007/07/swarms/miller-text/1
15. Vacuum Energy:
http://www.astro.ucla.edu/~wright/cosmo_constant.html
http://en.wikipedia.org/wiki/Zero-point_energy