The Atheist's Delusion

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Chapter 1

I used to think I was tolerant of other people's ideas and I still think I am. But now I find I've grown weary of the proliferation of militant atheistic books, articles, and internet ramblings especially by those who having lost their own faith seem to have as their main goal in life to try to undermine everyone else's faith. The Bible is dismissed as a work of fiction; the Torah vilified as misogynistic oppression of women (and everyone else, for that matter). The Bible is consigned to the category of primitive, violent literature, without value for the morally sensitive modern individual.

It doesn't take much to see that the sum total of atheistic mockery of God and the Bible are superficial sensationalist rantings. In an outpouring of disgust directed at the God they don't believe in atheists think that God should apologize for not being a contemporary culturally sensitive "progressive" instead of the Creator of the Universe. As one militant atheist (Richard Dawkins) exemplified in venting his rather mean, abasing, truculent assault upon the character of God: "The God of the Old Testament is arguably the most unpleasant character in all of fiction: jealous and proud of it; a petty, unjust, unforgiving control-freak; a vindictive, blood thirsty ethnic cleanser; a misogynistic, homophobic, racist, infanticidal, genocidal, filicidal, pestilential, megalomaniacal sadomasochistic capriciously malevolent bully" (Richard Dawkins). He just doesn't get it! Say whatever such atheists will, what is at issue is not the character of the biblical God but His existence. In a perusal of the biblical creation account in relation to valid scientific research one can see that belief in the existence of the biblical God is valid no matter if you think He is loving or hateful. Like God or not He exists, despite the silly and snide remarks of detractors.

As for the above accusations leveled at the character of God they are an expression of the atheists' delusion. They strain out of the biblical text a harsh, jealous and vengeful God and disregard that God is interested in man's positive destiny. Yes, God cares for the world He created whether you understand His ways or not.

Of course, the Bible has a good deal to say about judgment — not only on Egypt, Canaan, Assyria and Babylon, but also on Israel and Judah. In their most profound form judgment and mercy are inseparable. It will not do to separate judgment and mercy and play them off against one another. If God is a just and holy God, then God must despose evil and legislate to curtail man's free will tendency for injustice and oppression. Mercy often comes at a cost in which the full weight of appropriate judgment is incorporated. One can be forgiven and still be punished. There are times when redemption will occur even though not deserved according to strict justice because divine considerations in the course of human events is a decisive factor.

Atheists come up with what amounts to nothing better than distorted assertions to avoid coming to grips with the Genesis creation narrative within the parameters it sets for itself. The anthology of narratives in Genesis 1-11 trace creation from its initial acts to the establishment of human societies. The Genesis creation account does not set out to give an in depth reckoning of the pre-adamic world. Its foremost declaration is to inform that there is one God and He alone created and sustains us. Note that the garden story narrative is not a detailed description of events. Its purpose is to teach the lessons found within its subtle language rather than to be taken as simply a detailed historic account. The account of creation is concerned not just with the creation of the physical world but with the establishment of a lasting moral and social order in the human world. In other words, creation is not complete until the principles of justice and harmony are established in nature and in culture, and are placed under divine rule. The emergence of Israel following the Exodus merges with the initial acts of creation. What is then established is the creation of the social and moral order of the Israelite people through the Torah thereby unfolding a unique aspect of the purpose of the universe's creation.

Contrary to an erroneous assumption, sustainable proof against the Genesis creation account has never been established, and thus atheists asserting their mythical fabrications is purely subjective. They gleefully accept an abundance of unsubstantiated theorizing as accepted fact. In contrast, we see that as scientifically verified discoveries increasingly unfold about evolutionary development the description presented in the Genesis creation week is further vindicated. Those who attempt to sustain a compelling proof against the biblical narrative increasingly find themselves relying on outdated science, ridiculing childish humor and simply trying to sound like they know what they are talking about when they are incorrect.

One needs to recognize that the Bible contains directives that those lacking understanding of their original implementation find troubling in contemporary society, but that make perfect sense within their historical context and in providing guidance for today's contemporary situations. Those seeking an honest understanding of a biblical text need to look for the message/intentions of the text. This is at odds with the goals of those following militant atheism whose goal is to deny the existence of God and to denigrate the biblical text by an inaccurate and superficial reading of its contents.

Devotees of scientific speculation scoff at what to them is mere folk myth about a Bronze Age god. Some even make it their special project to attack the narrative as a means of destroying any religious system that professes to believe in the biblical God. Nevertheless, note that in the Genesis account of creation there is no battling multiplicity of gods, celestial dragons or preexisting matter; in this, the Genesis account separates itself from all of the ancient creation accounts in representing creation ex nihilo — creation out of nothing. In fact, the Genesis account not only speaks about creation out of nothing but it is the only such ancient creation narrative to do so.

The truth of the matter is that for most atheists what the Bible has to say is irrelevant vis á vis their denial of its validity. Their rejection of belief in God has nothing to do with the Bible's contents. They'll accept any negative statement as a backdrop to their denial of God. Especially for those raised as active participants in belief in God and have lost faith first comes the psychological denial then the seeking for support of that rejection. For most, such rejection had more to do with disappointment in people and institutions, or disappointment in expectation of divine provenance, or is the result of ridicule by the faithless. Needless to say, such a break from their past is often accompanied by pain, acrimony and anger apparently inseparable from the process of a dissident person breaking away from his/her roots. Whatever the reason, biblical and scientific evidence substantiate that a Bronze Age tribal confederation of shepherds' holy book contains information that was not revealed to scientists before the mid-twentieth century. Was this factual information contained in this holy book just a lucky guess or does it point to it being given to them by an external intelligence — the Creator of the universe?

Creator Credibility

There is much to learn from the results of modern scientific study of the origin and development of the universe. There is certainly nothing wrong with that. What is objected to is not the studies themselves but the way these results are often misused. As will be discussed below, outlandish speculations are often proposed in the scientific community based on the flimsiest connection to proven data or built on imaginary scenarios that are fundamentally farfetched and unverifiable. For a discipline that prides itself on experimentation using the "scientific method" with careful peer review many longstanding speculations are foisted on the public at large as certainties. To reject them is to open oneself to ridicule by the ignorant. Anyone who thinks that the scientific method is objective by definition, or at least not infused with matters of belief is naïve to say the least.

As will be presented below, accepting cosmic creation as delineated in Genesis, in accordance with the parameters it sets for itself, is very much scientifically up to date and valid. That is, do not expect the biblical narrative to be a scientific treaties; it sets out to do what it intends to do

and accomplishes just that in the course of 31 verses. Extraneous information touching upon creation and evolution is not its main focus but is nevertheless to be found in the narrative. It should be noted that on the whole, believing Jews never spent too much emotion in opposing evolution. Why? Simply put, the first postulate of Judaism is that there is one God and Judaism believes that God created the universe and our world in particular, but this does not mean that we know how He did it. Why then, would it matter if it were done through evolution or through spontaneous creation? We, whether theist or atheist, simply have no way of knowing what the physical laws and conditions of creation were before or at its commencement.

The Living God

In 1966, Time magazine ran a cover story asking: Is God Dead? Many Bible detractors say, "No, that's not correct, he never existed in the first place!" It is touted that scientific progress had done away with the need for a god to explain the existence of the universe. But contrary to this outmoded pseudo-scientific assessment of scientific progress it is science itself that is supplying evidence for the existence of God and the supernatural cosmic creation through its inadvertent corroborating of the biblical description of creation. Some scientists unwilling to surrender their negative stance reluctantly say, "There may be some outside force that created the universe but then left." "Any creator, but not the biblical God," could be their motto.

The same year that Time featured this headline. The astronomer Carl Sagan announced that there were two important criteria for a planet to be able to support life: The right kind of a star, and a planet the right distance from that star. As knowledge of the universe increased, it has become clear that there were far more factors necessary for life than what Carl Sagan first proposed. His two parameters have grown to where today there are more than 200 known parameters necessary for a planet to support life — every single one of which must be met within certain narrow parameters if life is to exist. As more criteria continue to be discovered, the odds against life in the universe (including Earth) are simply astonishing. Is it reasonable to assume that a life-sustaining Earth just happened to develop without any purposeful direction from an outside force? The odds against the universe existing by "accident" are so astronomical that the notion that it all "just happened" is beyond credulity. The very nature of things suggests that a super-intellect has orchestrated the physics, chemistry and biology needed to create the universe and all it contains. The more we get to know about the universe, the more the hypothesis that there is a Creator gains in credibility as the best explanation of why we are here.

Chapter 2

Genesis and Evolution

The Silence of the Big Bang

When, in the 1950's, the theory of a sudden noiseless explosive creation of the universe was first proposed, astronomer Fred Hoyle coined the term Big Bang. He did not do so because he thought it was noisy, but because he thought the theory of a created universe was ridiculous. He argued that the universe always existed, and that matter continued to be created to keep the density of the expanding universe uniform. A created universe troubled his atheistic beliefs, a sentiment shared by many other leading scientists of his day. Then, in the 1960's, Bell Labs astronomers Arno Penzias and Robert Wilson kept picking up static with their radio telescope. They realized that the noise was a remnant of the dense, hot plasma that pervaded the early universe. This remnant heat (cosmic microwave background radiation) showed that the universe must have begun with a violent explosion. Current cosmology models show that our universe was born with an extremely high initial energy starting at a point of infinite density. What were the odds of this happening by chance? Why should it have had such a special start? That's been a big problem in physics. Scientists now had to come up with creative ways of explaining a created universe.

Something from Nothing

There are those who dismiss the possibility of God's existence; they give no credence to the creation narrative found in Genesis. So how do they account for the fact that we are here? Some propose that something can come spontaneously from nothing without the need for a preexistent Creator. It is said, for example, that in a field of "virtual energy," just such a potential exits. The natural fluctuations of quantum physics drive endless random energy variations. Some scientists speculate that under specific conditions totally nonmaterial virtual particles can be brought into reality. Any one of those fluctuations, it is theorized by some, can spawn a universe, but the weak ones go nowhere; they appear and die away without a trace.

Only the rare, high-energy fluctuations produce viable Big Bangs and keep going. But the problems with these theories are that if before the moment of creation there is absolutely nothing, where did the Nothing that caused the Something come from and when did this happen and why? There was nothing (matter) to react and it could not happen in time and space for in order for something to happen these three things — matter, time, space — need to exist. As they did not exist before creation this speculation of something spontaneously coming from "nothing" is science fiction. So, why the contention that something happened to nothing at that non-existent time in a space that never was there? The replies that are given often include: "probably," "imagine," "may have," "might have," and so on. Proposals are put forward in the name of science that could never be confirmed nor disproven. Great scientific promise often brings great hype — and even scandal. Since theories come and go, if this one goes, another is sure to come. It is for good reason that it has been said, "The world of experimental physics is littered with people who spend decades looking for something that doesn't actually exist."

This brings up questions that need to be asked when supposed scientific explanations are advanced even though there is no serious evidence offered to support these explanations. Simply, where's the science? What's the evidence for such a belief? When challenged the typical academic dodge of "scholarly consensus," is offered. We find speculation and supposition taking the place of the rigorous evidence-driven and evidence-based arguments that we are led to expect from the scientific method. Scientific theories, though interesting, must be considered to be highly speculative when the arguments for them are littered with "mights," "maybes," and "perhaps," verbal indicators that there is no substantial evidence for the highly tenuous and speculative ideas being explored. The arguments often begin with cautious "could be" statements, advancing tentative hypotheses for consideration. Yet they rapidly become bold "is" statements, making assertions without the evidence normally thought to be required for rigorous scientific argument. If all else fails to satisfy, there is always scholarly consensus to fall back on.

As noted, the argument of a possibility for the universe to have sprung into being as a fluctuation in a quantum vacuum leaves unanswered a fundamental question of origins. The expression quantum vacuum can be misleading for someone unfamiliar with the terminology of physics. For the word vacuum tends to convey the idea that nothing is there at all. A quantum vacuum is a term physicists use for a quantum field in its ground or lowest energy state. This is certainly not nothing. According to quantum theory, the vacuum contains neither matter nor energy, but it does contain fluctuations, transitions between something and nothing in which potential existence can be transformed into real existence by the addition of energy. Thus, the vacuum's totally empty space is actually a seething turmoil of creation and annihilation, which to the ordinary world appears calm because the scale of fluctuations in the vacuum is tiny and the fluctuations cancel each other out. Apart from the highly speculative nature of the explanation that the universe arises from a fluctuation in a quantum vacuum is the fact that it simply pushes the origins question one step further back to answering where did the quantum

vacuum come from. And, of course, when and where did this take place before there was time and space?

The situation comes down to this: Reviewing this theory there are some outstanding problems with this supposedly scientific concept of Something from Nothing. Quantum fluctuations are phenomena that would be governed by the laws of nature as found within our universe. It is only with the beginning of the universe that we can speak of there being time and space within which the quantum fluctuations could take place. What is more, there is every reason to believe that the Big Bang also marks the beginning of the laws of nature. As such, prior to the formation of the universe there was no nature and therefore no laws of nature. If there was no nature and no laws of nature then there were no laws of quantum mechanics and no quantum fluctuations.

Furthermore, if the laws of nature pre-existed the universe — that is, a non-existent universe — they can only be pre-existent if they were somehow part of that which created the universe. There is also the problem of cause and effect. Effects are separated from causes by time and time did not exist prior to the creation of the universe. If there is no time in existence than there can be no effect in reaction to the fluctuation. Lastly, where was this quantum fluctuation to take place? As mentioned above, before the existence of the universe, there was no time and there was no empty space within which the universe was to form from the matter that did not yet exist. Such problems are often ignored, deferred, or given fanciful explanations by those scientists guilty of intellectual malpractice. Troubling or difficult questions do not disappear when ignored!

Mathematical physicist Roger Penrose calculated that the odds of the universe coming into existence by chance were an absurd 1 in 10127. Why should we have had such a special start? That's been a big problem in physics; but not for those who take Genesis 1 seriously.

Alternative Universes in a Macro-Universe

Some scientists have theorized that there exists an infinitely large external macro-universe within which are embedded an infinite number of finite universes. Each universe would be a universe having its own duration and its own laws of nature. Some universes would give rise to other universes. One such universe could be our universe. Alas, of course, there is the nagging question of where did this macro-universe come from? What brought about its time, space, and matter? For those advocating this approach to cosmology it's really back to square one — the origin of everything. There is no direct evidence supporting their presumptive claims.

The various hypothetical universes within the multiverse (or meta-universe) are sometimes called parallel universes or "alternative universes." The structure of the multiverse, the

supposed nature of each universe within it and the relationships among the various constituent universes, depend on the specific multiverse hypothesis considered. Multiple universes have been hypothesized in cosmology, physics, astronomy, religion, philosophy and science fiction. In these contexts, parallel universes are also called "alternative universes," "quantum universes," "interpenetrating dimensions," "parallel dimensions," 'parallel worlds," "alternative realities," and "dimensional planes," among others.

The multiverse hypothesis is a source of debate among physicists. Physicists disagree about whether the multiverse exists, and whether the multiverse is a proper subject of scientific inquiry. They argue that the multiverse cannot be a scientific question because it cannot be corroborated through scientific methodology. May we simply label the multiverse hypothesis as pseudo-scientific?

It goes without saying that there is absolutely no observable proof for such a multiverse cosmology. The laws of nature exclude the possibility of seeing outside our universe even if there is an outside. The multiverse hypothesis is a theory that can never be tested by observation; a very convenient point for those advocates of this speculation. In any case, even if there is no cosmic uniqueness to our universe it is the one that needs to be explained within its own context. Of speculations there is no end and new hypotheses are constantly being created. In the process there is a serious lack of sound empirical science.

In the Beginning—The Big Bang

Contemporary society is able, more than at any other time in the history of humanity, to better appreciate the accuracy and precision of the Torah in its description of Earth in its primeval state. Science finally caught up with the Genesis creation narrative in the mid-20th Century, when it was confirmed that the universe must have had a beginning. Cosmic expansion was one of the most important discoveries of the 20th century. Before this it was assumed that the universe was static. Explaining the universe's expansion led to the idea of the Big Bang and later to inflation — a moment of explosive exponential growth in the moments after the Big Bang that allegedly accounts for the uniformity of the visible universe. The Big Bang creation of the universe was a singularity, a singular event. Estimates of early cosmology show that immediately following the occurrence of the Big Bang the universe's volume grew, expanding its space by a factor of at least 1078 in the first trillionth of a trillionth of a trillionth of a second. This inflation, this sudden vast expansion of what became the universe grew from its original extremely compact state as a speck smaller than a proton — that is, it was the sudden, violent origin of our universe from a point of infinite density. Exactly what caused this inflation is the cause for much discussion, but whatever it was it set the universe onto its course of ongoing expansion. From that initial burst of energy, the universe has been on a course of outward

expansion ever since. Where the initial speck of energy derives from and why its sudden explosive expansion eludes scientific inquiry although it is the subject of much speculation.

Following the inflation, the next main event in our cosmic history was the emergence of light. The details are described by science as the emergence of light from the high-energy plasma (super-heated gas) within which it had been locked. Current theory says this occurred about 380,000 years after the Big Bang when the universe had cooled down enough for light to travel freely.

God Before Time, Space and Matter

All things that have beginnings had to have causes. The universe had a beginning; therefore, the universe had a cause. One might say that things are caused by other things from which they evolve, but this does not solve the question of the initial cause. Something that does not need to be given existence must exist to give everything else existence. If there were no first cause, the chain of causes never would have started. Therefore, there is at the beginning a first cause — one that itself had no beginning. The only thing that would not have to be given existence is a thing that's existence is its very nature. This something would always exist, have no cause, have no beginning, have no limit, be outside of time and be infinite. This first cause Genesis tells us is God.

The idea that the beginning of our universe marks the beginning of time, space and matter presents some interesting points to consider. The Big Bang was not an event taking place at a time or in a place. Space and time were themselves created by the Big Bang. Apparently, creation had to have a cause at the origin. Therefore the cause of the universe must transcend the universe itself since it would have to be outside of it. Before our universe came into being, there is every scientific indication that time did not exist. Whatever brought the universe into existence must, of course, antedate the universe, which in turn means that whatever brought the universe into existence must antedate time. That which predates time is not bound by time. It is not inside time. In other words, it is eternal but not in the sense that it always existed in time. Since always is a measure of time and time did not exist we can only say that that which created the universe simply existed, was non-spatial and nonphysical.

Bible critics disingenuously say, there could have been a god (not the biblical God, of course) who created the universe and then left. But do they really believe what they say? Not really; they are still devoted to their denial of a higher Power. It's their way of evading the obvious. They have no viable answer to what caused the creation of the universe, and quite frankly they never will have a true answer outside of the recognition of the creation by the biblical God. The biblical God is not part of creation. He is the creative force existing outside of creation. God,

the source of all creation has no beginning or end and has always existed. The truth that Genesis 1 wishes to convey is that the world in its entirety was created by the word commands of the One God.

Devotees of scientific speculation challenge the biblical narrative by becoming more fundamentalist than the strictest of biblical fundamentalist. They will insist on an extreme literalist reading of the Scriptures even when it is not warranted. On occasion the Scriptures use the literary devices of hyperbole, symbolism, allegory, metaphor, personification, irony and wordplay so we should not be intimidated by negative motivated literalism.

Skeptics don't like it but we live in a universe pointing in the direction of creation by an extra-terrestrial intelligence. It is a universe created out of nothing, situated within a range from the sun providing the right conditions needed to permit life. It is advances in science, not ignorance of science that has revealed the very special place Earth inhabits in the solar system. The more we get to know about our universe, the more the hypothesis that there is a creator God, who designed the universe for a purpose, gains in credibility as the best explanation of why we are here? The question of Origin remains unanswered if we explore it from a strictly naturalistic point of view. There is need for a metaphysical explanation. Herein we find the concept of God and His existence.

God is Watching Over Us: Selective Evolutionary Development

There either was an evolutionary component to the development of life or there was not. The evidence in the structure of all living creatures indicates that there was. Yes, evolution is a postulate, but it is an axiom that both fits the known facts and apparently answers many questions about the composition of living creatures. The fact that some scholars and others are abusing the theory does not invalidate the theory itself. Nevertheless, many scientists armed with only a partial view of the past have built evolutionary stories on a foundation of sand. The propriety of these speculations is often excused with the cautionary remark that in science all conclusions are provisional.

In the classic view of evolution, organisms undergo random genetic mutations, and nature rejects the most detrimental ones. But a supernatural cause to the origin and development of life, is not a contradiction of the physical laws of nature. Life emerges from God's preset laws of evolutionary selective development and is sustained and guided by Him. This is an affirmation of the fact that life developed from the simple to the complex. The universe works according to the God-given laws of nature, the potential built into the capabilities of matter by God at the

origin, without the need for continuous divine intervention in any instances. Nevertheless, divine intervention does take place whether or not we are aware of it at any given instance.

God chose the mechanism of evolution to create microbes, plants and animals. He chose the same mechanism to give rise to humanity. At a particular moment, God specifically conferred His image on one type of hominin that had already emerged from the gradual selective evolutionary process. Hominin refers to a member of a family of two-footed erect mammals (that is, modern humans and extinct human species closer than chimpanzees) of which modern man is the only survivor.

Genesis gives a notably brief outline of creation from its inception through the making of man and in so doing describes a chain of increasing evolutionary complexity. We emphasize again that evolutionary theory's primary flaw is not that it is wrong, but that it can be manipulated by those whose beliefs call for the rejection and abolition of biblical religion. For those who want to dismiss belief in the biblical God, evolution is used as an enabler for their atheism. Denying need for a God to be involved in the universe, non-directed evolution becomes the creation theory for the belief system of atheism. The tactic used is to maintain that evolution does not explain away God, but it does explain away Genesis. What those who reject biblical religion really hope to accomplish is that if they can explain away Genesis they assume this will explain away biblical revelation. They further assume that if they can explain away biblical revelation this will in turn explain away the biblical God. But such efforts are to no avail.

What is Biological Evolution?

Biological evolution refers to the cumulative changes that occur in a population over time. These changes are produced at the genetic level as organisms' genes mutate and/or recombine in different ways during reproduction and are passed on to future generations. Sometimes individuals inherit new characteristics that give them a survival and reproductive advantage in their local environments. These characteristics tend to increase in frequency in the population, while those that are disadvantageous decrease in frequency. This process of differential survival and reproduction is known as natural selection.

The theory of biological evolution as proposed by many of those who deny the existence of God represents an unrealistically large extrapolation from the data. The claim of skeptics is that the theory of evolutionary development of life, as they express it, is the best explanation. The underlying hypostasis for this stance is the presupposition that they cannot be wrong for the very thought of God's existence much less His having a hand in evolutionary direction must be ruled out.

Skeptics explain the origin of life as developing by natural chemical means without divine direction; as far as they are concerned, life began by chance. This is their predominant answer to the question of the origin of first life and the development of animal life and the eventual evolving of humans. The general answer is: "Given enough time life will come from non-life by natural processes and though we do not fully understand how this happened nor can we replicate it today, that is the only explanation." A second answer is that life arrived from outer space on a meteorite (which of course doesn't explain how life started elsewhere). For many skeptics no matter what the odds and evidence against the first life happening by a fortuitous chemical reaction in just the right environment and then evolving over millions of years, it simply has to be true because scientific speculation presupposes it to be.

This attitude highlights a flawed application of evolution. This is not a flaw in the scientific theory of evolution itself, but an example of the way the theory has been abused for non-scientific purposes. Needless to say, there are many questions about the development of biological life that scientific investigation still has not answered and yet there are those who try to transform the theory from a biological explanation into a metaphysical one by claiming that the theory of evolution disproves the existence of the biblical God. In so doing, they take the theory of evolution outside of its own limits and misapply it so as to make it appear that it provides proof that there is no God. The existence of God is not a scientific question. God exists outside of nature. Science is a naturalistic process and can only answer questions about what is inside nature.

The Briny Deep or Warm Little Ponds?

How inert chemical transformed into living molecules is one of the biggest mysteries of science. This has led marine biologists and geologists to promote the idea of more deep-trench aquatic exploration. They hope to find evidence to support the hypothesis that the emergence of life might have been powered by chemical reactions driven by subduction (the tectonic process that forms trenches) could be a really productive area. In particular it is thought serpentinization may also hold part of the answer to the ultimate question of whether life on Earth emerged from the deepest sea. The process releases heat, hydrogen, methane and minerals — a theoretical recipe for chemical-based, or chemosynthetic, life. In some deep-sea locations, chemical reactions supply the energy that living organisms run on, not photosynthetic energy from the sun. Some scientists reason that life might have begun at hydrothermal vents — holes in the seafloor where seawater that has cycled into the rock below reemerges, heated and loaded with chemicals and minerals.

Vents tend to be temporal, however, so some scientists now question whether they could have really spawned life. Others have expressed doubt about marine vents' role in the beginning of

life claiming that hydrothermal temperatures are too hot for essential biomolecules to survive. In response it is countered that the surrounding cold ocean water would allow these molecules to remain intact.

A newer hypothesis proposes that serpentinization in trenches could have more readily fueled the first life because it occurs across much larger areas and is sustained for much longer in geologic time.

On the other hand, there are researches who claim their research shows that life on Earth really started on land in a "warm little pond" and not in the oceans as Charles Darwin said. The findings published in Proceedings of the National Academy of Sciences challenges the view that life originated in the sea.(2012). According to the study, the first primitive cells could have germinated in pools of condensed vapor caused by underground hot water or steam bubbling near the surface of the planet. Researchers analyzed evidence of key rock chemicals in ancient inland and marine habitats and compared them with a genetic reconstruction of Earth's first cells. Physicist professor Dr. Armen Mulkidjanian and colleagues, of Osnabruck University in Germany, discovered the oceans did not contain the best balance of ingredients to foster life. Instead, they theorize, the simplest cells assembled in inland "hatcheries" where — like the hot springs and geysers of Yellow Stone National Park today — volcanic processes actively vented vapor from the planet's interior. The researchers say that the chemical composition of these emissions most closely matches the inorganic chemistry of cells. They say that these "cradles of life" share all the advantages of the deep sea hydrothermal vents that have been previously proposed in the same capacity including the presence of organic matter. Dr. Mulkidjanism says: "In addition — and in contrast to deep sea vents — terrestrial fields are conducive to condensation reactions and enable the involvement of solar light as an energy source." Nobel laureate Jack Szostak of Harvard University in commenting to New Scientist said: "I do not think the oceans were a favorable environment for the origin of life — freshwater ponds seem more favorable. Freshwater ponds have lower salt concentrations, which would allow for fatty acid based membranes to form." Other scientists are more skeptical of the new study, pointing out that meteorites were bombarding the Earth 3:8 billion years ago, and that the surface may not have been hospitable for life.

According to the hypothesis established by these researches, volcanic processes actively vented vapor from the planet's interior. If this vapor condensed into ponds lined with the right terrestrial minerals the environment would have provided a natural starting point for cells to evolve essential biochemical processes. Conceptually similar to the central idea in Darwin's theory, the model in the study proposes life on Earth originated on land and subsequently invaded the oceans.

In 1871, Darwin suggested in a letter to English botanist Joseph Hooker that the original spark of life may have begun in "a warm little pond." Dr. Mulkidjanian suggests that under this scenario the ocean was invaded by life at a later stage following the emergence of chemical membranes.

He says: "Geochemical reconstruction show the ionic (chemical) composition conducive to the origin of cells could not have existed in marine settings but is compatible with emissions of vapor-dominated zones of inland geothermal systems." He continues: "The pre-cellular stages of evolution might have transpired in shallow ponds of condensed and cooled geothermal vapor that were lined with porous silicate minerals mixed with metal sulfides and phosphorous compounds." He dismisses the commonly held belief that the first microbes originated at the bottom of the ocean in black smoker chimneys formed around deep-sea hydrothermal vents. In either case they are invoking chance to an enormous degree.

Cozy little ponds or chimneys formed around vents dependent on fortuitous accumulations of just the right chemical mix to bring forth the singularity of life. What's to be made of these hypotheses and research models — only God knows.

Creating Live Matter out of Inorganic Matter

If we were to imagine a hypothetical experiment by trained researchers in which a laboratory synthesis of live matter out of inorganic matter had a positive outcome, what would that prove? Some would proclaim this as evidence that there is no need to believe in an intelligent Creator. In fact, it would prove the contrary, namely, that live matter could be produced out of nonorganic matter only by an intelligent being with sufficient technological knowledge and practical skills, providing that there is a proper selection of equipment and use of appropriate experimental methodology.

There is a problem with much of the research in that scientists can produce things in the laboratory, but it's not directly applicable to a natural process. Also, they might be able to achieve a chemical reaction here or there, but any sort of comprehensive sustained chemistry has to date never been shown.

The Martian Alternative

Mention needs to be made of the theory of panspermia, which says that life on Earth originated from outer space. It is speculated that organisms might travel from world to world through an evolving planetary system, either moving deliberately or spreading accidently as a result of asteroid impact. Some scientists propose the possibility that the origins of life on Earth are to

be found in microscopic life that first took hold on Mars and then was transported on a space rock to Earth, where things evolved from there. When the Viking landers arrived on Mars in 1976 hopes for finding life-forms were high, but none were found. Despite Viking's assessment many scientists imagine a possible world of microbes waiting to be discovered. In the meantime it is speculated that a tremendous volcanic blast or spectacular asteroid crash could have sent Martian microbes into space and onto Earth, possibly starting all life on our planet. Volcanic eruptions and meteorite collisions routinely send pieces of Mars flying off the planet. A small fraction of these fragments make their way to Earth within about nine months.

The Mars hypothesis grows out of frustration concerning the problems arising as scientists attempt to figure out how a genetic molecule capable of jump-starting life might spontaneously arise from a prebiotic soup of organic compounds. An obvious candidate, DNA, is to be found in the cells of every known living organism and is endowed with the ability to encode genetic information and make copies of itself. But many researchers focus instead on RNA (ribonucleic acid), a biological precursor to DNA that can also store genetic information and self-replicate but arises more easily from organic materials.

However, RNA would have to overcome a major problem in order to occur naturally and this leads researchers to suggest that Mars was the more likely spot for life to originate. Geologists have concluded that around 4 billion years ago Earth was inundated with water. This presents a problem in that water corrodes RNA, literally making it fall apart. Mars, on the other hand, was significantly drier and more hospitable to RNA. However, before a Martian origin of Earth life can be considered anything more than speculation, researchers need to find life on Mars and determine its relationship — if any — with life on Earth. In the long run Earth has proved to be a much better place for sustaining life.

The bottom line is that evolution is changing/adapting to survive but there is probably no life on other planets. The theory of life coming from a meteor that hit Earth has been brought up many times. If life could survive on a meteor, then it could survive on other planets as well. Yet there is no life on the moon, there is no life on Mars and more than likely there is no life on any other planets either. This, despite hypothetical claims to the contrary.

What has been found on Mars and meteorites originating on Mars are small trace amounts of methane. Biological processes can produce methane. Its presence in Martian meteorites might mean Mars was or is habitable for microbial life. Or it might not. Researchers at Brock University in Canada have found methane in Martian meteorites, lending support to the hypothesis that Mars could be habitable for microbial life, now or in the past. The occurrence of methane in Martian rock samples adds weight to speculations whereby any life on Mars is/was likely to be present in a subsurface habitat, where methane could be a source of energy and carbon for microbial activity.

However, although the discovery of methane in Martian rock excites those searching for life beyond Earth, it's not conclusive evidence that biological life exits on Mars. Methane is a simple organic molecule, often produced as a biological waste product. It may also be produced by naturally occurring geologic activity, such as volcanic eruptions or through the process of serpentinization. As mentioned above, this process occurs when water is introduced to the minerals in rocks, which causes the changing rocks to release hydrogen gas, which can bind to other gases and form methane.

The atmosphere of Mars is thin and dry, and, since Mars doesn't have a magnetic field, its surface is bombarded by cosmic rays. These conditions are not conducive for life on the Martian surface. Still speculation remains that microbial life may exist under the surface of Mars.

Microevolution and Macroevolution

Living things have an ability to adapt their biology to better fit their environment. However, such changes can only go so far in the short-run, and those organisms have not fundamentally changed. These small changes are called microevolution.

Long-term evolution, though, requires macroevolution, which refers to large-scale changes. The scientific distinction between microevolution and macroevolution is not uniform or well defined. As some scientists explain it, macroevolution results from the organism's ability to undergo many small changes over the course of time until it transforms one species into another. Whatever the precise determining mechanisms of microevolution and macroevolution they in no way conflict with the essential belief in God's overarching control of creation. Evolution is not incompatible with biblical belief. What the Bible tells us is that life was created by God. But for brief glimpses otherwise, the details are left for science to unfold.

The genetic evidence generally supports the evolutionary model in that species, which appear to be related by descent, have genetic information similar enough to support the supposition that they evolved from a single earlier ancestor. The fossil evidence gives support for the idea of evolution over great periods of time. Independently, and centuries earlier, the Genesis creation narrative made claims now borne out by ever increasing scientific findings. From this we can assume that the source of the Genesis information is the One who is the architect of the creation.

Being Smarter than God

“Oh! If only the god I don’t believe in was as smart as me,” says the devotee of scientific speculation, “he would have found a way to make the Bible relevant for us in the modern world. Why didn’t God provide a more in depth scientifically detailed account of origins of the Heavens and the Earth and especially the world in which we live?” In answer, one might say that in giving us the story in Genesis, God informed us of the most essential knowledge of creation in a way that would be most comprehensible to the widest audience throughout the ages. What Genesis does not state is that which is of no importance to its purpose of proclaiming who created the universe and all it contains. In this respect, determining what Genesis does not state can be of great interest for scientific inquiry but is of no importance for the biblical message. The first chapter of Genesis describes the entire process of creation of the universe, the preparation of planet Earth to host life and the creation of all living organisms in thirty-one verse. Obviously, Genesis is not trying to answer the same kinds of detailed and scientific questions modern researchers are.

The speculation enthusiast asks further: “Why didn’t God get the story right not only in essence but in its essential details? Why didn’t God record events in accordance with scientific explanations? After all, God knows all the details.” But, are these valid questions? Better still, are they sensible questions? The real question to ask is if God did record and so to speak “get it right” with every detail agreeing with the latest (ever changing) scientific claim, who over the centuries would have understood it? A scientifically specific rewriting of Genesis would in essence make it all but useless, for the result would be incoherent to most people. But there is more that devotees of scientific speculation constantly and conveniently overlook: Genesis is not a scientific text. Its lessons are about human character; its cosmology is to let you know simply and efficiently where we come from and Who brought it all into being.

The biblical creation account represents a thoroughly simplified historical construction. If Genesis 1 was written as a scientific text relatively few people even today would understand the science involved. Would the biblical study of creation serve its higher purpose if only reserved for the highly educated contemporary with us today? What would such a creation story mean for all the generations since the giving of the Torah? Should the Bible have been written only with the scientifically educated in mind? Are the less educated or less endowed with intellectual insight lesser beings in the eyes of scientifically educated people? Are they thereby to be regarded as being less worthy of God’s attention than those who believe He doesn’t exist? Apparently, to too many “scientifically educated” elitists the answer to these questions is “yes.” However, the biblical view is that the Genesis description of creation is addressed to everyone. The Torah was not intended specifically for intellectuals but for an entire people, which is not concerned with philosophical or theological speculations. It uses ordinary language, plainly and without sophistication, and pays no heed to the inferences that later readers accustomed to ways of thinking wholly alien to the Bible, may draw from its words.

It is interesting that the claim is made by the scientific community that they are constantly under the scrutiny of their peers and that ensures that science is largely self-correcting. In so doing, it is assumed, we can approach the truth about the universe. But what happens when that truth about the universe confirms what Genesis said all along?

Getting It Right the First Time

With all of their generalizations and the unverified hypotheses that are mere suppositions not borne out and often ready to be discarded, there is a simple point that devotees of scientific speculation fail to address honestly. Indeed, they often show signs of severe cognitive dissonance when confronted with it. Genesis did get it right thousands of years before modern science and its amazing discoveries. Genesis anticipates the very fundamental revelation of the cosmos – the Big Bang. In the 20th century there were still cosmologists who were asserting that Aristotle's teaching of a universe without beginning was correct and ridiculed the biblical claim that the universe had a beginning in time and space. They just couldn't admit that Genesis got it right.

That's exactly right! The holy book given to a wandering desert tribe of Bronze Age shepherds knew about the origins of the universe. It is explained succinctly in thirty-one verses. And, no, it's not theists fitting Genesis into a scientific framework. It was already all there, fit snuggly together with science helping to elucidate what was said more than 3,000 years before our science.

There is nothing in the Genesis narrative that the theory of evolution of life contradicts. The time before the emergence of modern man is briefly expressed, with the description of the processes that caused life to advance from the simple to the complex recorded in the broadest of terms. These facts are also evidenced within the fossil record and by the discoveries of the genetic similarity of all forms of life. Our question is not evolution per se. Our question is how did life begin and then develop.

An ongoing problem with scientific theories on the origin of life is that they don't propose any realistic experiments that recreate the ancient prebiotic world. The theories suggested run into the problem of what was that world like. Proposing hypotheses for the plausible pathways for the emergence of life on early Earth that we often hear about do not explain the question of life's origins. Nevertheless, such speculations offer an unjustifiable pass for the imaginative hypotheses submitted as if they were proven fact. These are only to be dismissed and replaced by new theories that satisfy for the moment those who accept science as if it were a faith system.

Herein lies the problem. There are many scientific theories that are presently thought to be true but will have to be discarded in the future as additional evidence emerges or new theoretical interpretations develop. Scientists typically amass a collection of data, which is analyzed until some pattern emerges. Then assumptions are made about how the data came to be and predictions are made about how more data will turn out. If further experiments turn out as predicted then confidence is gained in the accuracy of the original assumptions. This is all well and good. Much has been learned about ourselves and our environment in this manner. But all too often scientists go beyond these scenarios and assume that their assumptions (theories) are immutable laws of nature.

Scientists Finally Got it Right (Well Almost!)

The Genesis account of ancient cosmogony, the only one to declare that creation was ex nihilo, was scoffed at by cosmologists who held to an eternal universe that had simply always existed. It was with great reluctance that many scientists finally accepted the reality of the Big Bang, their great fear being that it sounded too much like a confirmation of Genesis 1.

The Big Bang explanation for the beginning of our universe out of nothing is now widely accepted. It has replaced the always in existent universe propounded by Aristotle and furiously defended by many scientists even following the discovery of the Big Bang. That is, from the time of Aristotle, 2,300 years ago, until the mid-twentieth century the prevalent scientific theory held the universe to be eternal. In contrast, for 3,300 years, since the revelation on Mount Sinai, the Bible held to a different position, one that proclaimed that there was an origin to our universe, a time before which there was neither time nor space nor matter, only God. And it is He who created that microscopic point of energy that he then triggered to create the universe.

Although it may make Bible critics unhappy, the astronomical evidence supports the biblical view of the origin of the world. The essential elements in the astronomical and biblical accounts of Genesis are the same chain of events that commenced suddenly and sharply at a definite moment in time and, indeed, created time, in a flash of light and energy. Alongside this paleontologists and geologists have produced a chronological list of different periods in the development of life on Earth. These scientific findings resemble the very concise wording of Genesis.

What would be if there was no Genesis account of creation or if the text simply said: “In the beginning God created” and left it at that for further speculation? What would be the state of the scientific approach? The basic assumptions upon which the theory of evolutionary beginnings are based would still be questionable in terms of the times for the systems to evolve and the order by which interactions take place within any system. The question of an ultimate

beginning when explained by unguided evolution and natural selection alone is simply not answered by chemistry, biology, physics or mathematics in a way that satisfies the claims made. In fact, those disciplines provide many challenges to this understanding of evolution and natural selection as an explanation of the universe and all it contains. Nevertheless, devotees of speculative science would rather avoid the evidence in favor of any hypothesis that denies any influence by the biblical God. Bible detractors seeking a rationale for their unbelief will seize upon any excuse concocted.

What Came Before the Big Bang?

It is a reasonable and logical inference to conclude that there is a causal explanation for the origin of the universe that lies outside the results of the Big Bang. If the Big Bang marks the beginning of the universe then there wasn't even the potentiality for its existence prior to the Big Bang supposedly resulting from natural means. This is simply because there was nothing before the Big Bang — no space, no time, no matter — to provide the potential for its existence. The potential for existence would have to depend on a Being not encumbered by space, time or matter that causes the universe to exist by will.

Evolutionary mutational trial and error tempered by natural selection is the theory accepted by modern scientists. As history shows, scientific theories change. As the discussion of the Earth's formation and the origins of ancient life moves from the realm of speculation and theory into the realm of researched actual findings — in other words, it enters the realm of science, the more it agrees with the biblical record briefly outlined in Genesis. We emphasize that the purpose of the early chapters of Genesis are here to teach us, not specific historical or scientific facts, but to let us know Who created us and that we are made in the image and likeness of God.

As we pursue our study of the early chapters of Genesis we will see that it succinctly describes numerous creative activities, a process overseen by God. From cosmology to the formation of the land and the sea, marine life, plant life, land animals and eventually the evolutionary modifications that selected extant humanity the creation narrative says simply: This is not a science textbook, it is a testimony to show who created the Heavens and the Earth. Nevertheless, its uncanny outline of creation though vilified and scoffed at by those who imagine themselves to be the intellectual elite fits very well into verified science's evolutionary scheme of things. For their part, those who scoff at the Genesis narrative as being fairy tales, fumble with speculative explanations to offset the biblical concept of creation from nothing. Despite this, the astronomical evidence leads to a biblical view of the origin of the universe. Consilience exits between the Big Bang as a singular event and the biblical teaching of God's creating the universe from nothing.

Of course, the theory of evolution has nothing to say about whether God exists or whether there is a deeper plan to life. Evolution is a description of only the material aspect of scientific investigation, and that is all it is. The theory of evolution does not say we got here by random chance but rather by a selective process. There is nothing in this that contradicts the belief that God's will is a determining factor in all that occurs.

Is Earth Special?

Earth orbits one of some 200 billion stars in the great swirl of matter that makes up the Milky Way galaxy. Our galaxy in turn is one of hundreds of billions of galaxies in the observable universe. The observable universe stretches in all directions from us for more than 2.7 x 1023 miles. This apparent insignificance fits with the thoughts of those that maintain that our planet is simply a middling member of a middling solar system. Meanwhile there are reasons to think Earth and its life are special, perhaps even singular. While some theories suggest life could easily be ordinary and common in the universe others suggest the opposite.

The components of our bodies and our array of molecular structures exist at one extreme end of a spectrum of biological scales. There are organisms on Earth that are physically larger and more massive than humans are (e.g., whales and trees). We are much closer to the upper limit of scale than we are to the microscopic end of life's spectrum. The smallest reproductive bacteria measure around 200 billionths of an inch; the smallest viruses are 10 times as small as that. The human body is roughly 10 million to 100 million times larger than the simplest life we know of.

Among warm-blooded terrestrial mammals we are also on the large side but not quite at the extreme top. At the opposite end of the scale, the smallest mammals are the pygmy shrews, barely 2 grams in weight. But most mammals are closer to this size than to our size. The global average body weight of the mammal population is less than 1.5 ounces. Our complex-celled, intelligent bodies are at the boundary of the upper extremes, with comparatively few mammals bigger than us.

We exist at this border between the complex diversity of the biologically small and the limited options of the biologically large. Consider too, our planetary system. It is unusual in certain respects. Our sun is not one of the most numerous types of star (most of which are less massive), our orbits are at present more circular and rather more widely spaced apart than most exoplanetary systems, and we do not count a super-Earth among our planetary neighbors. Such a world, far more massive than Earth, is represented in at least 60 percent of all systems but not our solar system. Our planetary system is a little bit off from the norm as we know it.

As the Earth is situated, we live in a temperate place, not to hot or cold, not too chemically caustic or chemically inert, neither too unsettled nor too unchanging. And the very fact that we are far isolated from any other life in the cosmos if it exists at all profoundly impacts the conclusions we can draw.

To gaze even at the limited view of the cosmos that we have and the speck that is planet Earth, the question to be asked is, "Is this all by accident?" Indeed, we are able to ask this question because we are here now — not millions of years in the past or millions of years in the future. After billions of years for man what is the state of the planet? Earth has revolved around a stable middle-age star for billions of years that provides the right amount of warmth for life to have arisen and evolved. It has abundant life-giving waters, largely because it orbits within a region where the sun's light is neither too intense nor too weak — the planet's water does not boil off into steam nor does it freeze into ice. Earth also has a life-friendly size: big enough to hold on to a life sustaining atmosphere but small enough to ensure gravity exerts just the right amount of friction to enable our movements (walking, swimming, etc.). Earth's size and its rocky composition also give rise to other enhancers of habitability, such as climate-regulating plate tectonics. Is all this and much more a simple cosmic accident with no purpose or direction?

Apparently, a temperate cosmic environment for a planet around a star exists within a narrow range of parameters. If it is a universal rule that life exits only under these circumstances, Earth's cosmic significance greatly increases — so far, no life has been found under any circumstances across the cosmos. And if some sort of life form exists elsewhere in the cosmos that would not shatter any thoughts of God's special influence on planet Earth. Nowhere in the Jewish Bible does God say life in any form is restricted solely to Earth.

The Making of Modern Man

Most scientists are in agreement with the hypothesis that the first human ancestors appeared between five and seven million years ago, probably when some apelike creatures in Africa began to walk habitually on two legs. From a biblical point of view this is irrelevant. Such creatures, if they ever existed, outside of speculative imagination, would be biblically categorized as "beasts of the field." Following mention of humanity's initial evolutionary creation from the minerals of the ground, Genesis 1 is concerned with the transition from the adam, modern mankind's ancestor, into the adam who is modern man.

Modern Homo sapiens are unique among life on Earth, and much remains a mystery as to how they evolved. What steps came first? Why did they evolve this way and not in another

direction? Why are they the only human species left? What other paths might they have gone down in their evolution?

Ultimately, no theory of human evolution proposed by science can be absolutely proven, and the scant fossil record to date makes it difficult to test hypotheses. Scientists are uncovering more and more ancient hominids (bipeds including humans), modern man's direct ancestors and closest relatives all the time. Researchers strive to answer that most fundamental question in human evolution — what adaptations made us human, and in what order did they happen. With the overall number of fossils that are available to demonstrate hominid evolution being miniscule in relation to the span of time under study all those hypotheses are basically shooting from the hip.

It is believed that Homo erectus, the assumed precursor to modern humans, evolved in Africa and gradually expanded to Eurasia about 1.7 million years ago. With much presumption, many scientists think that people who look like anatomically modern Homo sapiens evolved by at least 130,000 years ago from ancestors who had remained in Africa. Their brain had reached today's size. They, too, moved out of Africa and eventually replaced non-modern human species, notably the Neanderthals in Europe and parts of Asia and Homo erectus in the Far East.

Why do we say presumption? That is because so much of what science has to say about the origins of the human species and particularly modern man is speculation. Agreement breaks down completely on the question of when, where and how these anatomically modern humans began to manifest creative and symbolic thinking. That is, when did they become fully human in behavior as well as body? When, and where, was human culture born?

Consider the wide range of disagreement among researchers. One scientific hypothesis maintains that modern humans evolved relatively recently in Africa and then spread around the world, replacing existing populations of archaic humans. Other researchers maintain a multiregional hypothesis. This theory contends that modern humans evolved over a broad area from archaic humans, with populations in different regions mating with their neighbors and sharing traits, resulting in the evolution of modern humans.

Researchers say that by 100,000 years ago, several species of hominids populated the Earth. Homo sapiens lived in Africa, Homo erectus in Southeast Asia and China and Neanderthals in Western Eurasia. Researchers say that around 50,000 years ago, there was a migration of modern humans out of Africa, and by about 30,000 years ago, they (Homo sapiens) were the only species of hominids surviving. They spread rapidly across most of the world's lands to colonize all continents except Antarctica, reaching even the most remote Pacific Islands. A number of scientists conjecture that this migration was linked with a mutation that transformed Homo sapiens brains, leading to their modern, complex use of language and enabling more sophisticated tool, art and societies. Another view suggests hints of such modern behavior

existed long before this migration out of Africa. As of now, one of the most controversial issues in evolutionary studies is how and when humans spread out of Africa.

The uncertainty and confusion over the origin of modern cultural behavior stems from what appears to be a great time lag between the point when the species first looked modern and when it acted modern. Did the need to act modern come about gradually in response to stresses of new social conditions, environmental changes or competition from non-modern species? Or perhaps the capacity for modern behavior came late, a result of some as yet undetected genetic transformation. Was there some fundamental shift in brain function or some change in conditions of life. Researchers speculate using the evidence at hand.

Some researchers believe discoveries in Africa and the Middle East are providing the first physical evidence to support an older, more gradual evolution of modern behavior. Other researchers believe that human creativity appeared suddenly and mainly in Europe. They present the theory of genetic change to explain a more recent and abrupt appearance of creativity. Accordingly, prior to 40,000 years ago human anatomical and behavioral change proceeded very slowly, more or less at the same pace. Afterward, the human form remained remarkably stable, while behavioral change accelerated dramatically. In the space of less than 40,000 years, spectacular cultural changes have taken humanity from being a relatively rare mammal to having dominion over the planet.

In that view, 40,000 years ago was the turning point in human creativity, when modern Homo sapiens arrived in Europe and left the first unambiguous artifacts of abstract and symbolic thought. They were making more advanced tools, burying their dead with ceremony and expressing a new kind of self-awareness with beads and pendants for body ornamentation and in finely wrought figures of the female form. As time passed, they projected on cave walls something of their lives and minds in magnificent paintings of deer, horses and wild bulls.

As an explanation for this apparently abrupt flowering of creativity a neurological hypothesis has been proposed. About 50,000 years ago, it is theorized a chance genetic mutation in effect restructured the brain in some critical way, possibly allowing for a significant advance in speech. The origin of human speech is another of evolution's mysteries. It has been asked if this is the period when God implanted the neshamah, the divine breath, into mankind so that in the course of time he would evolve into an extraordinary living soul (Genesis 2:7).

Although this transformation, with the genetic change leading to behavioral change, is believed to have occurred in Africa, it allowed human populations to colonize new and often inhospitable environments. On reaching Europe, the mentally restructured anatomically modern humans, who researchers call Cro-magnons, presumably outsmarted the resident Neanderthals, driving them into extinction by 30,000 years ago. Although most researchers agree that dramatic changes occurred about 50,000 years ago they differ on whether they were gradual or abrupt. Proving the hypothesis of an abrupt cognitive change presents a difficulty in that the idea fails to

meet one important measure of a proper scientific hypothesis — it cannot be tested or falsified by experiment or by examination of relevant human fossils. Critics object that such a concept of abrupt change in human cognition is too simplistic, as well as unverifiable. Instead, it is stated that new findings are pushing human origins tens of thousands of years earlier, and thousands of miles south. Researchers point to some archaeological finds that seem to show that anatomically modern people in what is now South Africa were turning animal bones into awls and fine polished weapon points more than 70,000 years ago. It is reported that ancient people 80,000 to 90,000 years ago not only possessed considerable technological capabilities at that time, but also incorporated symbolic or stylistic content into their projectile forms.

Symbolic thinking, scientists explain, is a form of consciousness that extends beyond the here and now to a contemplation of the past and future and a perception of the world within and beyond one individual. Thinking and communicating through abstract symbols is the foundation of all creativity, art and music, language and, more recently, mathematics, science and the written word.

The debate is complicated by differing definitions of what constitutes "modern" behavior, and differing interpretations of the archaeological record. Common elements used to define modern behavior include the ability to plan ahead; technological innovation, establish social and trade networks; adapt to changing conditions and environments; and exhibiting symbolic behavior like cave paintings, bead making (used to show status or group identity) and burying the dead. The crux of the argument comes down to whether these abilities resulted from a sudden biological and genetic occurrence, or a more gradual evolution of abilities that culminated around 50,000 years ago and were the impetus for migration from Africa.

Did humans undergo a dramatic genetic change in brain function —perhaps increased memory or improved language skills — around 50,000 years ago, which gave them the enhanced ability to innovate and enabled the migration from Africa? Interestingly, the skills and behavior of Neanderthals and early modern humans in Africa were not that different until the sudden change around 50,000 years ago. It has been pointed out that the alternate argument of gradual evolution of skills is based on the assumption that the present is key to the past, that because we have never seen a modern change in cognition it did not occur in the past. But, there is no reason to make that assumption. Revolutionary changes in behavior are also said to have occurred roughly 2.5 million years ago, and again at 1.8 million years ago. It is also said that increased brain size was not a gradual process. Greater intelligence occurred quickly at times. It was not a continuous process. Scientific controversies over the origins of modern human culture are far from resolved.

Human brains expanded to about triple the size of their ancestors' brains due, some researchers suggest, to a few genetic adjustments. Brain size, it is said, didn't really start to change in the human lineage until about 2 million years ago. Over time, human brains tripled in size. While

some scientists think it took many genetic changes for evolution to expand the human brain there are some studies that suggest relatively few changes were necessary to inflate brain size.

From the biblical point of view, the purpose of the creation account is not to inform us of the exact date or time frame in the anatomical and the cognitive development of modern man. The most important idea the Genesis narrative conveys concerning mankind is that modern humans did not come about by happenstance but by a carefully monitored winnowing of the species by God. Genesis 2:7, in the Hebrew text, by the simple use of the preposition "to," "into" indicates that evolutionary steps in the development of modern humans did take place over an unspecified period of time.

The quest leading to the discovery of scientific truth, that is, what precisely were the steps in human development are not to be discouraged but it should be realized that all such verified knowledge is ancillary information to the goal of the biblical narrative, which is to convey that God is the exclusive Creator of the world.

The Creation of Adam — a Preview

· Genesis 1:25: "God made the beasts of the land," which included the creatures that eventually evolved under divine direction, into modern man. Animals were made from existing raw material from which they evolved: "And the Lord God had formed out of the ground every beast of the field" (Genesis 2:19).

· Genesis 1:26-27: God makes adam in His image and likeness. Adam is a term that can be interchangeably used both in the singular or plural (e.g., sheep) of males and/or females or plural in general: "Let them have dominion," "He created him [oto used generically]," "male and female He created them."

· Verses 26 and 27 encompass two periods of adamic change. First, the overall intension to "make" man from the existing, "beasts of the land" indicating evolutionary steps (verse 26). Second, the goal is reached in that "God created the man," that is, modern humans in His image and likeness.

· In Genesis 2:7: "And the Lord God formed the adam from a dirt clod taken from the ground," that is, in some way not indicated in the text God formed "the human" from the minerals in the earth (perhaps the seabed). Man's formation from the ground is summed up succinctly in a verse covering millions of years. Mankind's ultimate origin is in the minerals found in the soil and that were used in the initial development of life. What makes humans different is that God did not leave them "beasts of the land" but at some indeterminate time

"breathed into his nostrils," so that humans could evolve into modern humanity. This is indicated by the phrase, "and the man became to a living soul." The word to found in the Hebrew text shows that what occurred was going from one evolutionary step to another. Humans evolved into a very special "living soul," cognitively unlike any others.

The scientific method

Science is the systematic process of gathering information about the universe and organizing it into theories and laws that can be tested. The scientific method comprises a system of processes used to establish new or revised knowledge. To be termed scientific, a method of inquiry must be based on gathering unbiased evidence through observation, experience and experiment. Scientists scrutinizing a test result or theory may attempt to prove or disprove the original study's findings by reproducing the observation or experimentation under identical conditions; scientists also may perform new tests. However, the origin of the universe and the origin of life cannot be tested or observed. Neither can be tested because we cannot go back billions of years to observe the origin of the universe or of life in the universe. Similarly, the singular events presented in Genesis 1 cannot be duplicated by experimentation but none the less have ever increasing support even if begrudgingly from scientific findings in relevant fields of study.

Science to most people is equated with what is known as the scientific method, which is, as we have said, based primarily on the use of experiment. The use of the scientific method is responsible for much of what we know about physics, chemistry and biology today. But science encompasses more than the scientific method, for many situations in nature resist experimentation. In these cases one must depend upon deductions from the facts at hand to arrive at a theory. This accounts, in part, for the many "mights," "maybes" and "perhaps" that accompany announcements of new scientific theories or explanations of old ones.

In reality, to what extent do scientists rely on the scientific method in presenting how life originated and evolved on Earth? Startling to many is that there is very little reliance on this method in their presentation despite much scientific research in the search for the origins of life and evolution. What is often claimed as the "latest findings" are found to be no more than speculations, "educated guesses" presented as if they were facts.

A major stumbling block in the search for the origin of life has to do with the fact that our genetic coding is so complex that it is a major problem for the theory of evolution. In calculating the odds for the formation of the first DNA molecules as conjectured by scientists they simply did not have the putative time for spontaneous generation given the overwhelming odds it would take to accomplish this. One such scientific calculation puts the odds at 1 chance in 10 to

the 1000 billionth power. These odds have been calculated based on the complexity of the 2000 enzymes in the cell, each consisting of 100 to 1000 specific amino acids linked together in a specific sequence. The bottom line conclusion is that DNA just didn't happen spontaneously. Try as random evolution apologists will, DNA and its first appearance is the issue that won't go away in discussing the origin of life on Earth.

There are a lot of scenarios about the early Earth and how the principal chemicals supposedly got together with the right energy sources to produce that first cell. It is all conjecture with none of it corroborated in a laboratory. For example, the often quoted theory that bubbles or mud in a primordial soup of just the right chemical mix could have combined and been exposed to the right energy source (lightening) to make something happen is nothing more than a scientific dream that on closer examination is a nightmare of speculations. In desperation, some turn to the subject of panspermia, which says that life on Earth originated from outer space.

Science/scientists make predictions in evolution. By doing so they put their life's work, their reputation, the science field reputation, the explanation of all the time and money and the integrity of it all on the line because the reputation of it all rests solely on those predictions being true. They already set a path to follow and they stay on that path until they make it work. Science is a good tool to have but lying for science is a big disgrace to everyone.

The scientific community often insists that the dynamic, self-correcting nature of the scientific method ensures that any theories that do not conform to the rules for doing science and that are not based on solid, well-documented evidence are unceremoniously rejected. Within the context of evolution, science has devised an ever changing fairy tale seeking to explain the origin and development of life, soothing itself with the elusive promise of achieving its goals with ever newer hypotheses—the balm of skeptics. Thus what is often presented by those who dismiss the biblical creation narrative is scientific mythology based on strongly held unproven beliefs, often held simply to deny the existence of God. And when they are proven to be wrong they are replaced by other imaginative theories based on flimsy data or none at all. Science should be about science; it should be about looking at the evidence critically, obtaining proof, being able to repeat results, and presenting facts in defending the results. Why not apply the same criteria to the biblical creation narrative? That is exactly what is happening. Nevertheless, the biblical creation narrative is not about science, it's about establishing God's sovereignty over the universe that He created. That bona-fide scientific research (not "scientific creationism") independently has found and continues to find evidence supporting the biblical record is of interest but irrelevant in establishing the purpose of Genesis. That stands on its own merit.

There is no conflict between believing in the biblical God and non-speculative evolution at the same time. Science is no threat to Judaism. Studies in modern genetics are not a threat. Evolutionary theory is not a threat. There is no doubt that at times science can inform our understanding of the Bible but at the same time one has to be vigilant to oppose disingenuous claims against the Bible by deconstructionists who become literalists. For instance, it would be

wrong to read Ecclesiastes 1:5 in a geocentric way as if the author was interested in telling us scientifically about the relation of the planet to the sun. In such cases, poetry and symbolism (e.g., 1 Samuel 2:8, Psalms 104:5) are thrown to the wind as if Bible detractors never expressed themselves with, "the sun comes up in the morning and sets at night" or used the expression the "four corners of the globe." Concerning science, if a theory is to fall, let it fall for one reason: it proves to be bad science. All truth is God's truth after all and that includes scientific truth. If we want to know the purpose of our existence, we look to the Jewish Scriptures. If we want to know the how of our existence, we look to science. It is true in a sense that we can say of everything that exists that God did it, but the focus of the Bible is not to answer the question how. There are things that appear to be concealed by God that are left for man to search out.

One cannot derive from evolution a moral code, a purpose for our lives, or a meaning to life. Those things do not fall within the realm of science, and science will not give us answers to them. Evolution does not teach that life is nothing but the result of random chance. It does not tell us that our life is the purposeless result of chance; it does not say anything on the topic at all. As for the conviction that God intended for humanity to develop all along and guided the course of evolution appropriately, that is not a belief that science can speak to.

The theory of evolution has nothing to say about whether God exists or whether there is a deeper plan to life. Evolution itself is a branch of science, and like all sciences, when properly documented tells us only what is proven by experimentation, not what scientists imagine should be; the exaggeration of probabilities is too often what we see passing as accepted science. Too often evolution is corrupted to support an atheistic agenda in an effort to undermine religious beliefs.

Chapter 3

GENESIS 1

(13.82 billion B.P.)

Creation — Not by Chance

"In the beginning God created: the Heavens and the Earth." This was a period encompassing billions of years. It is interesting to note what Maimonides (Rambam) commented (in The Guide

to the Perplexed, trans. by Moses Friedlander, 1904, p. 334) concerning this verse as referenced by the rabbis of the Talmudic era. In particular, the participle et in the phrase et hashamayim ve-et ha-aretz (the Heavens and the Earth). Et is a word placed before a definite direct object but can also mean with. Maimonides points out that they reasoned that God created with the Heavens everything that the Heavens contain, and with the Earth everything that the Earth includes. That period would include the initial formation of the sun, moon and stars as well as the planet Earth.

According to cosmology, the universe, following its explosive beginning, was in a state of chaos. Science speaks of chaotic, super-extreme hot energy — the swirling super-hot gases that physicists call a plasma. In such a situation, it can be expected that the natural tendency would be for a random directionally unguided system to degenerate into even more extreme chaos. As such, the universe's expansion would have produced a disordered random mix of energy and matter, but this wasn't what happened. Instead, out of the primordial universal chaos, there eventually developed an orderly universe following certain natural laws. What brought about this directed order out of the initial primordial chaos and channeled the energy created at the beginning? Indeed, what was the cause of the initial event often referred to as the Big Bang? What are the origins of the fine-tuned laws of nature? Was it simply random development of the cosmos or all directed by an outside source? Those who say there is no God and that life can and did emerge naturally from preexisting, non-living building blocks under the influence of natural laws without outside assistance do not explain the origin of those natural laws to any rational degree.

The Grammar of Creation

The opening verse of the Bible, Genesis 1:1, literally reads: "In the beginning, created God: the Heavens and the Earth." This verse refers to an indeterminate period of time prior to day one. The opening word, bereshit appears to be in the construct state (smechut), showing possession. However, it is not followed by a required noun but rather by the past tense verb, bara. To sidestep this problem, some render the phrase as, "In the beginning of God's creating," using a participle, creating, rather than the past, created. Others add a word to clarify the construct chain, e.g., "In the beginning of [time] God created," or see it as a unique reflexive of the construct state, "In the beginning of [the beginning] God created." But these attempts to clarify the text are unnecessary if one considers the trope — the Ta'amei ha-Mikra'— an essential part of reading and understanding the Torah. They indicate the accented syllable; function as punctuation marks delineating correct syntax; and are musical notes that guide reading the Torah. Under the word bereshit we find the punctuation tarcha, a slight pause comparable to a comma. This pause indicates that the bereshit is semantically independent of the following

word (bara). Under the word Elohim (God) we find the punctuation atnach comparable to a semi-colon.

Genesis indicates that there were three distinct stages to the creation of the universe.

- *To create ex nihilo (libro)*
- *To make (la'asot)*
- *To form (litzor)*

In the Bible the verb libro is an action exclusively attributed to God, especially of a thing that went from non-existence to existence (e.g., neshamah). A second verb, "to make" (la'asot), indicates "improvement" — the reorganization of a structure into a more complex structure. In certain cases it also means "completion." This verb is used extensively in Genesis to describe God's activity during the six days. "In six days God 'made' the heavens and the Earth" (Genesis 2:2). The third verb, "to form" (litzor) is occasionally used to indicate a creation from something previously formed or a transformation. For example, "And Y-H-V-H Elohim formed [yatzar] the man from a dirt clod from the ground … and the man became to a living soul" (Genesis 2:7). The prefixed preposition "to" indicating that a previously formed Homo sapiens creature was transformed into modern man.

The verb, la'asot, "to make," is used more than any other verb throughout the story of Creation. While litzor conveys the idea of a new creation from previous matter, la'asot expresses a second creative step done on or out of an already existing creation. It usually means the final improvement made upon an already existing creation, or a by-product of the same creation.

The verb, litzor, "to form," indicates a creation out of preexistent matter. Thus, when in the second chapter of Genesis we are given a more detailed report of the creation of Adam, the text says explicitly that God formed (yatzar) man's body from the ground (Genesis 2:14). In opposition to libro, the verb litzor indicates a creation that is not ex nihilo. Genesis 1:27, which says that God "created" (vayivra) the first man, refers to the creation of his neshamah, exclusively given to humans. For his body, which was formed out of the ground, Genesis used the verb litzor ("to form")

The initial act of creation, by which the entire universe was made, is described in the first verse of Genesis (Genesis 1:1) using the term bara, "[God] created." The verb "to create" (libro) refers to bringing something into existence out of nothing. Other than its use in the opening statement, libro appears only twice in the relating of creation events: one time in 1:21 (a reminder that even what some consider a sea-god was created by God) and the second time in 1:27 for the creation of humans in the "image of God." This unique action Genesis attributes exclusively to God. However, creation ex nihilo was not the end of the creation process. During

the six days that at some point followed the initial act of creation and until the establishment of the Shabbat, God kept recreating and transforming those first elements into life and the structures that would sustain it. Virtually all the creative activities reported in the first chapter of Genesis do not pertain to the category of creation ex nihilo, but to the formation of elements or systems deriving from the original creation ex nihilo. For example, God created the Earth ex nihilo, but He created the plants and trees from the earth, not ex nihilo (Genesis 1:12). Genesis does not go into detail as to the evolutionary process that occurred between the first act of creation and the other creative acts.

Overview

The biblical narrative, anticipating modern post-Aristotalian science, describes a beginning to our universe. Genesis 1 is a condensed description of the entire creation process from beginning to end. It begins by giving us an overview of what God created.

In Genesis 1:1, God's creative act involves bringing the universe into being from nothing. "In the beginning, God created: the Heavens and the Earth." Why do we say, "from nothing"? Because whatever mechanism jumpstarted the process that brought the universe into being was created and directed by God. All that existed from before time was God.

The narrative then focuses on Earth and its development. It begins with a description of the world in a state of lifeless desolation (1:2). It then describes how God through a series of verbal commands creates an inhabited world culminating with creatures that uniquely bear God's image and likeness—human beings. It is simple and concise. The events in each of the first six days follow a set pattern: God speaks, something is created, God sees that it is good and then the day ends. The overview gives us the structure to which we can relate new scientific information about the creation. But it provides us with very few details of the physical creation. The sequential details of the creative actions are not stated.

That life developed from the simple to the complex is shown by a variety of sources, biblical and non-biblical. This is seen in the account we find in the opening chapter of Genesis. It is also corroborated by the fossil record and by the genetic similarity of all forms of life. What was the origin of the multitude of forms of life? Was it a series of haphazard combinations by nature that through random selectively saw life developed from the simple to the complex, or is there indication of an outside directive leading from one stage of development to another?

Genesis is not giving us a description of the first six days as if they were days of a single Earth week. They are rather a sequence of six "creation days," that is, epochs of indeterminate length as seen from Earth's perspective. Each epoch begins a new creative period whose individual

length may vary. It has been suggested that what is millions of years to humans may be but a short space of time from God's perspective. In any case, each level of creation introduced new forms of life that existed for an unspecified period of time before many became extinct. There followed the appearance of new species, accompanying the commencement of the next stage of development. Fossil evidence reveals the appearance of species with new levels of complexity, followed by periods during which there was no creational activity detected until the next period.

"In the beginning" — When was that? According to current scientific calculations it was 13.82 billion years ago. What was before that? Well, for us earthlings it becomes a curious but irrelevant question because before the beginning there was no time, space or matter. Where was God? To use our understanding of time, He just existed. There was simply no measurement of time. Where did He come from or was He created? These questions are absurd. As there was no space as we understand it, He just was there with no beginning — for there was none. If there was no space how did He make room for the universe? The Genesis record does not explain it. If there was no time, space or matter then His Being could not have a beginning but just was. (This should not be difficult for skeptics to accept for if not for the Big Bang they would still be holding by Aristotle's universe without beginning!) What did He do before creating our universe? Were there earlier universes no longer in existence? We have no way of knowing. All such inquiries can only be answered by speculation.

Genesis 1:1 does not refer exclusively to the creation of planet Earth. There are countless other celestial objects much older than Earth, which was formed only about 4.55 billion years ago. The overall universe is estimated to be 13.82 billion years old. So planet Earth was not literally created "in the beginning" but only billions of years later. The opening statement of Genesis 1:1, whose main focus is to emphasize God as creator, skips billions of years at this point because the biblical message is Earth centered. There are people who are under the assumption that Genesis literally teaches that the Earth is 6000 to 10,000 years old. This misconception is not based directly on Genesis but on much later extrapolations. There is no reference to the age of the overall universe or the Earth, in particular, in the Hebrew Bible.

It should be noted that the Jewish calendar does not count from the moment of the creation of the cosmos or from the first day of the creative week. It commences, rather, following the seventh day, Shabbat Bereshit; it is the day following the seven days of the creative process that marks the beginning of the traditional yearly count. The period encompassing the creation of the cosmos and the creative week are considered outside the concept of normal time. This fits well with the evolutionary development of pre-adamic hominins and a historic Neolithic Adam and Eve (the subjects of the allegorical garden story) coming towards the end of this creative period followed by a Sabbath of 24 hours.

Inflation — the Ongoing Stretching Out of the Universe

Researchers tell us that immediately following the initial explosion of the Big Bang, the universe was a hot "pea soup" of particles. It took about 380,000 years to cool enough that the particles could form atoms, then stars and galaxies. Billions of years later, planets formed from gas and dust that were orbiting stars.

According to the prevailing scientific theory, our sun and all the planets started their existence in a nebula — a giant cloud of cold molecular gas and dust. And then about 4.55 billion years ago, a shock wave (the Divine Voice) caused the nebula to collapse. With its collapse, the mutual gravity from the particles in the cloud pulled together, and formed pockets of denser material. These were star forming regions, and one of them was to become our solar system.

As the cloud collapsed, conservation of momentum for all the particles in the cloud made it spin faster. As illustrated by our solar system, most of the material ended up in a ball at the center, but this was surrounded by a flattened disk of material. The ball at the center would eventually form the sun, while the disk of material would form the planets.

Genesis 1:1 informs us of what God created in the beginning. This initial creation of the universe and a subsequent period of time are separated from the seven days of creation that specifically concern the Earth. Thus as we have observed, the Earth's age is not the same as the overall age of the universe. Accordingly, "day one" in the formation of earthly activity begins in verse 2 and not in verse 1. Verse 1 refers to events that occur before the days of earthly creation begin to unfold. The initial event called the Big Bang and the subsequent creation of the universe is a singularity and not reproducible. It took place prior to day one, but Genesis does not give a detailed accounting of all that transpired.

Genesis gives what seems to be an unbalanced view of the cosmic creation. Earth is infinitely insignificant in comparison to the rest of the universe yet in the biblical narrative everything else is fleeting. The reason is that Genesis is focused on mankind as the end-purpose of creation here on Earth — not with what occurred prior to creation or with what can be found in outer space at any time.

In establishing God's role in creation the Torah's account refutes idolatrous ideas about the universe's origin as well as the belief in naturalism and establishes the concept of One God who transcends nature and who created everything in the natural material world. Naturalistic formation of the universe ideas attempt to explain the creation of the universe and things within it (galaxies, stars, planets, etc.) without God. All events are described in terms of what can be explained within the laws of nature — nothing beyond nature is allowed. This is naturalism. Science depends on the fact that there are laws of nature, which the universe

consistently obeys. Genesis makes it clear that God (either directly or indirectly) made everything that was made, yesh m'a-yin, "something from nothing." God is "outside" of the physical universe. Therefore, the processes which created the universe are not the processes that exist within it.

Chapter 4

DAY ONE

Verse 1:2: And the Earth was desolate and empty, with darkness over the face of the deep primordial waters; and a ruach elohim [powerful wind] was stirring the surface of the waters.

Earth in the Beginning

The first words with which Genesis describes planet Earth are tohu vavohu. What is tohu vavohu? The text is saying that at this stage in its development the planet was lifeless (cf., Isaiah 45:18, Deuteronomy 32:10) devoid of all human and animal life. As the planet cooled it remained desolate becoming completely covered by water that originated in the material that coalesced to form the planet. Planet Earth was initially not just uninhabited and desolate, it was uninhabitable and inhospitable to any form of life. Contrary to what other ancient civilizations believed, but compatible with what modern science affirms, water was there first, before land.

As we have observed, Genesis describes Earth in its primeval state with the words tohu vavohu, "uninhabited" and inhospitable." God deliberately created it without life and lacking the basic physical conditions needed to support life. A slow and progressive process of adjustments and adaption would still be necessary to transform Earth from a desolate world into a living planet. Of major importance, our planet is unique in that it contains water, the most essential element needed for sustained life.

The term ruach is a common homonym that can have many meanings: breathing, the soul, inspiration, etc. Ruach here means a "physical wind" and in combination with the adjective elohim to give ruach elohim, expresses the intensity of the primeval wind as a "powerful wind" coming from God.

Elohim, in the Bible, is used in reference to something or someone powerful, magnificent, or with extraordinary authority. Men vested with judicial powers are called elohim (Exodus 22:8). Even "gods" or idols with imaginarily attributed powers are also called elohim (Exodus 20:22). The term elohim here is an adjective meaning "powerful," "mighty." This is true even when the term elohim refers to God. Elohim should be understood primarily as an adjective that defines a noun, a superlative. It is not God's proper name but God's attribute.

The word merachefet is usually rendered as "hovering" but it could also mean "stirring," "shaking" (see Jeremiah 23:9).

Darkness

Although the biblical text uses the word darkness it is referring to something of an entirely different nature than the darkness in verses 1:4 and 1:5. We are actually dealing here with homonyms, two words that have the same pronunciation but have different meanings. This primeval darkness was the planet's nascent toxic atmosphere that consisted of a dense, thick layer of gasses covering and darkening Earth. Perhaps this was similar to Venus' hostile-to-life atmosphere that is like a "blanket" of carbon dioxide and thick clouds of sulfuric acid, chlorine and fluorine. It is only during day two that a more conducive-to-life atmosphere begins to develop.

Premordial Water

Verse 2 is a description of the matter that came together to form planet Earth over an extended period of time. In this period of time prior to and into "day one" that which composes planet Earth is given shape, the protostar that is to become our sun is also in the process of formation. As the planet cools, water covers it as it rains down from a steam-filled sky. Research models of the early Earth suggest that water initially covered almost all, if not all, the planet from this formative stage. Where did Earth's earliest terrestrial water come from? One hypothesis suggests that water was already present on the surfaces of interstellar dust grains when they accreted to form planet Earth. Other researchers speculate that water from impactors, comets and asteroids, from the water-rich outer solar system bombarded the Earth and this along with volcanic outgassing formed seas as Earth's surface cooled down.

This bombardment of asteroids a few million years after the start of the solar system could have easily delivered enough ice — locked inside the rocks, safe from the sun's heat — to account for Earth's oceans, computer simulations indicate. Water makes up to about 20 percent of the mass of these asteroids. (Christopher Crockett, "Water, Water Everywhere," Science News, May 16, 2015: 20)

Computer simulations on the adhesion of water to a mineral commonly found in the interstellar dust clouds, show that the highly fractal surfaces found on the interstellar dust grains are indeed suitable for the strong retention of water under the extreme temperatures and pressure conditions prevalent in the accretion disk during planetary formation.

As we see, there are a number of theories suggested as to the origin of Earth's earliest terrestrial water. It is interesting that scientific research has shown that water was indeed present at the birth of our planet. The presence of (now eroded) pillow lavas that form when volcanoes erupt underwater is a sign that liquid water was present on ancient Earth. Moreover, that instead of a frozen planet, evidence reveals a watery past with signs of life poses a challenge to those who believe life began as a natural result of chemical reactions that occurred over billions of years without any outside guidance.

During the Earth's infancy some 4.5 billion to 2.5 billion years ago the sun was dimmer. Far less solar radiation reached the planet. Calculations suggest that the Earth should have been a frozen wasteland. But all geologic signs point to a planet awash in liquid water, with the first life forms emerging. Scientists call this conundrum the "faint young sun paradox."

Four billion years ago, a dimmer sun shone down on Earth and the moon was closer to Earth. This early condition of the sun and the moon has implications for why they are not mentioned until the "fourth day." With the moon closer to Earth in the Archean eon (3.8 billion to 2.5 billion years ago) and moving away ever since, the tidal drag has slowed the rotation of our planet from about nineteen hours to twenty-four hours. Faster rotation changes how the air and oceans transport heat from the tropics to the poles. This has further implications for the formation of sea ice that, in turn, influences warming because it reflects more sunlight back into space than land or liquid water. In so doing, it helps cool the planet. Climate scientists have created various scenarios of the composition of early Earth's atmosphere in order to figure out which atmospheric gases, and at what levels, may have been present to keep the planet warm under that faint young sun.

Scientists identified that faint young sun paradox in 1972. By then, researchers had determined that a newborn star's brightness gradually increases over time as the hydrogen atoms in the star's core fuse into helium. Working backward, researchers estimated that the sun generated 20 to 30 percent less energy during the first half of Earth's history than it does now.

Evidence of the paradox comes from clues in the rock record that indicate the presence of liquid water as far back as the Archean eon. Geologists, as mentioned above, have found ancient pillow lavas — knobby, volcanic rocks that form only when lava erupts under water — and ripple marks etched by waves on sedimentary rocks. No such rocks are known from the earlier Hadean eon 4.5 to 3.8 billion years ago, but the chemistry of Hadean-aged zircons recycled into younger rocks suggests that liquid water must have been present by at least 4.2 billion years ago.

By this time, much of the heat from Earth's formation would have dissipated, so it couldn't account for the warm temperatures. The only explanation is that some unknown factor helped warm the planet. The dilemma seems impossible to resolve because data on fundamental climate factors are missing for this primordial period. The Earth is such an active system that the evidence gets erased and recycled.

There has been no dearth of theories, however. Climate scientists have offered a range of speculations — everything from high concentrations of insulating greenhouse gases in the atmosphere to changes in Earth's proximity to the sun. Some ideas are more plausible than others, but even the most probable hypotheses present roadblocks for scientists. Many scientific fields remain moving targets with researchers often shooting wild or irresponsible speculations from the hip.

Climate scientists acknowledge that the faint young sun paradox probably doesn't have one simple solution. The Hadean and Archean eons stretch over 2 billion years. Multiple factors probably worked together to make Earth mild during that time. Given the Hadean's sparse geologic record, climate scientists tend to focus on ways to explain the paradox during the better understood Archean. The work is complicated by the fact that researchers don't really know what global temperatures were like back then, only that they were warm enough for oceans of water to exist.

Some research seems to suggest that there is a common source for the Earth's liquid water and the moon's compound water and that both bodies already had their water at birth. Analyses of rocks brought back by the Apollo program show that the moon's compound water shares a common origin with water on Earth. Measurements of the chemical composition of moon rocks suggest that Earth was born with its water already present rather than having the water delivered several hundred million years later by comets or asteroids.

Studies by geochemists have revealed a substantial amount of compound water in the moon's interior. To find the source of the water, researchers relied on a chemical fingerprint — the relative amount of hydrogen and deuterium, a hydrogen isotope that has one extra neutron in its atomic nucleus. In investigating primitive lunar samples carried to Earth by the Apollo 15 and 17 missions, the researchers found deuterium- to-hydrogen ratios that matched the isotopic

ratio in carbonaceous chrondrites, which include some of the most primitive meteorites known. The ratio is also similar to that found in water on Earth. The findings suggest a common source of water for both bodies whatever the initial manner of delivery.

Many astronomers think that Earth's moon is too large to have formed alongside our planet from a shared disk of gas and dust. According to the present leading scientific theory of how the moon formed, a Mars-sized body collided with Earth some 4.5 billion years ago, generating a disk of debris that coalesced into the moon. The simplest explanation for the presence of water on the moon would appear to be that Earth already contained water before the collision. The water could not have been delivered after this because the moon quickly built up a solid, impenetrable shell — the lithosphere — before meteorites could have delivered enough compound water to account for the supply in the lunar interior, the researchers argue. Whatever the origins of the moon might be, and the above theory is by no means certain, for our study of Genesis and science the significant claim, as already indicated, is that the Earth already contained water in its infancy prior to the moon's formation.

As we will see, Earth's initial water was believed by some researchers (and still by some) to later have been swept away along with its primordial atmosphere by T-Tauri winds (see below). The controversy revolves around the question of how powerful were these winds by the time they reached Earth. As we have observed, some scientists theorize that Earth's present water derives from extra-terrestrial sources. Further discussion of the origin of the Earth's water is found in the description of the "second day." In this (verse 2) earliest stage of development, the Earth is shrouded in primordial darkness as the protostar that became our sun is in its initial stage of activation. The verse overall discusses a period of time that runs into billions of years.

It is interesting to note that overall scientific research agrees with what Genesis has been saying all along: abundant water covered a large part of Earth's surface if not all of it from the earliest stages of the planet even from its very birth: "and a ruach elohim [powerful wind] swirled over the surface of the waters." Scientific research affirms the presence of water on infant Earth and in so doing affirms a central point found in the Genesis narrative. Whether Earth's water was stripped away by T-Tauri winds and later replaced by asteroids and comets is a topic for debate among scientists. However, the point is that all indications are that abundant water covered the Earth in its earliest stages. Some scientists suggest that Earth may have had water when it formed. Others argue that it would have been bone-dry and needed a special delivery from comets and/or asteroids to become wet. Still others think that it was a combination of sources from which Earth's water derived.

Genesis describes darkness atop the tehom or premordial sea and not atop the planet. It could not have said: "and darkness over the face of the Earth" simply because at this point there was no dry land on the plant. Darkness (choshech), here a homonym referring to the planets thick toxic atmosphere, and tehom, the primordial ocean covering the entire planet, explain why the Earth was said to be tohu vavohu — barren of all life.

Scientific Findings

According to scientific research:

The first half a billion years of Earth's history — from its formation 4.568 billion years ago to four billion years ago — was a time when water rained down to create the oceans, when first dry land heaved above the surface of the sea to form continents. It was a time when comets and asteroids crashed into Earth and when a failed planet the size of Mars may have collided with ours, creating the moon from the wreckage. But geologists have very few clues about the timing of these events, such as a few specks of minerals that suggest oceans might have formed before the moon….

Did plate tectonics start early on, or did Earth mature for hundreds of millions of years before the continents and ocean crust began moving around? What was the chemistry of the youngest oceans and the atmosphere? And how soon did life emerge after Earth formed?

Rocks on the early Earth were also wiped out by giant asteroids that smashed into the planet and melted large fractions of the crust. About 4.4 billion years ago one collision — called the Giant Impact — hurled a huge amount of material into orbit, which became the moon…. (Carl Zimmer, The Oldest Rocks On Earth, Scientific American (March 2014): 60.

Verses 1:3-5: And God said: "And there will be light." And there was light." And God saw the light, that it was good; so God divided the light from the darkness. And God called the light Day, and the darkness, He called Night. And there was evening and there was morning, one day.

God Speaks

"And God said: 'And there will be light.' And there was light." This is the first time that God speaks in the creation narrative. How should we understand that God spoke? The presumption

is that it is a conventional way of saying that God willed. We are not informed as to what was the process by which light was created out of God's speech.

This light — primordial light — was the light whose creation is described in Genesis 1:3, which was separated from darkness in Genesis 1:4, and which directly or indirectly generated day one in Genesis 1:5. After primordial light is created, God proceeds to distinguish it from darkness. The separation of light and darkness is the first in a series of acts of division that God performed during the creation process. The Torah makes it clear that not only light but darkness too is one of God's creations, and not a mythical negative force or alternative god. Darkness is not indicative, of any limitations to God's absolute power. In the Torah we do not find two opposite deities struggling against each other — a god of light versus a god of darkness, common characters in ancient mythology. The God of Israel alone created light, and then limited this light by creating darkness.

"One Day"

The Hebrew is clear; we are dealing with the cardinal number "one." Only subsequently does the text use ordinal numbers, for the second day, the third day, etc. The Hebrew text is therefore emphasizing that God forged a unit for measuring time. In other words, God initiated time.

This exposition of the first verses of Genesis as showing God's inaugurating time, as well as offering a basic unit for measuring it, sets the Genesis creation account radically apart from other regional creation narratives. In showing time to be a feature of God's own making Genesis explains that since God antedated any mechanism for gauging time nothing could exist before God. As the initiator of time, God can say: "Before Me no god was formed, nor will be after Me" (Isaiah 43:10-11).

The Sun and the Moon

The sun and moon were creations of the period of time prior to and into what is called "one day" and not the "fourth day." The confusion as to the sequence of events is over when there was creation and when there was a designation of certain solar and lunar functions. The textual description is of the newly formed Earth and the presence of the sun and the moon is inclusive as they evolved in the same time frame. But the division of light and darkness is here not exclusively connected to the sun's radiance. The text, covering eons, speaks first of light and

darkness as it pertains to the universe following its creation and then proceeds directly to light and darkness as it unfolds in our solar system.

As scientists theorize cosmic events the transformation from darkness to full sunlight is to be understood in the developmental stages of our sun. Our young protostar was a ball of hydrogen and helium not yet powered by fusion. Over the course of time because of gravitational collapse, the temperature and pressure of the material increased, jumpstarting the fusion of hydrogen that drives the sun today.

The sun began as a T-Tauri protostar, a small red star producing heat and light and then it became the yellow main sequence star we see today. In astrophysical theory, T-Tauri is the stage of a star before the main sequence stage of a star (our sun). This protostellar phase, it is said, lasts about 100,000 years. It starts as a core of increased density and ends with thermonuclear fission. The core collapse in the T-Tauri phase is accompanied by a super solar wind.

T-Tauri stars are a little more luminous than main sequence stars like the sun because of their larger size. They do not have enough core temperature to fuse hydrogen. Instead, they make their power by the gravitational energy released as the star contracts and becomes a main sequence sized star.

As noted, T-Tauri stars blast out extremely intense solar winds. Some scientists speculate that the T-Tauri star that became our sun had winds powerful enough to strip away any primordial atmosphere and water that existed leaving the Earth a desolate ball of rock. Other researchers conclude that these winds did not reach the Earth with that intense of a force. In any case, most agree that asteroids rich in compounds containing water continued to rain down upon the Earth for millions of years after the short-lived T-Tauri phase ended, thus helping to create the oceans.

This description of the sun's development should not be confused with the situation following the Big Bang. A different light existed. The universe was extremely hot and filled with dense and opaque roiling plasma [superheated dense gas cloud of protons, neutrons and electrons, but blindingly bright.] containing both matter and energy. For the first few hundred thousand years after the Big Bang, photons (light particles) of the infant universe stayed trapped in this dense fog of light-suffocating particles. Photons could not travel freely, so no light escaped from those earlier times. The plasma gradually cooled. It was not until approximately 380,000 years after the Big Bang that the universe cooled into something transparent — a void through which we can observe the early universe, but not its earliest moments. It was not until about a billion years after the universe was born that the cosmos is fully transparent.

The first light produced by this plasma is the cosmic microwave background radiation (CMB) that is observable today. Cosmic background radiation is fundamental to observational cosmology because it is the oldest light in the universe, dating to the epoch of recombination. The CMB is

radiation that emerged when the young universe first cooled sufficiently so that protons could capture electrons to form neutral adams, making the universe transparent to light. In this sense it is the oldest visible light in the universe. As we see, the CMD was created when the universe was approximately 380,000 years old. With a traditional optical telescope, the space between stars and galaxies (the background) is completely dark. However, a sufficiently sensitive radio telescope shows a faint background glow, almost exactly the same in all directions, that is not associated with any star, galaxy, or other object. This glow is strongest in the microwave region of the radio spectrum.

The cosmic microwave background is the oldest light in the universe but this light can't illuminate the beginning of time before the plasma cooled. Science can learn a lot from the CMB, but it also blocks the view of the very beginning of the universe. To see beyond the CMB, back toward the dawn of the universe, cosmologists must turn to gravity. A force that leaves echoes of its own across space — echoes that are called gravitational waves. Gravitational waves pass through boundaries that light cannot. Unlike light the universe has always been transparent to gravitational waves. There was no primordial era during which they were hidden by cosmic conditions. They can pass through the cosmic microwave background (CMB) radiation, the barrier of light that will always prevent us from seeing the universe before it turned c. 380,000 years old.

Around 380,000 years after the Big Bang the universe cooled enough for hydrogen atoms to form — an event known as recombination — and some scientist believe all went dark. By about one billion years later, they say, radiation had blown the atoms apart, clearing the way for light to shine again. Scientific speculations aside, the important point in our discussion is that billions of years prior to the formation of our sun and moon there was light as Genesis recounts. It just was not light from our sun, which confuses some people. It is important to remember that during the period that is designated as the first day not only was the Earth in existence but so were the sun and the moon.

The Meaning of "Evening" and "Morning" and Day"

· The word for evening, erev, suggests disorder, mixture, mingling, chaos. The word for morning (especially early morning) is boker, it suggests order, and the ability to discern, a time of distinguishing differences. Genesis 1 describes each day with a transition from disorder (erev) to order (boker). Each time period, stretching out over millions of years went through tremendous turbulent changes until it settled into an orderly situation only to undergo a new phase of change until it reached the level of "very good" (Genesis 1:31). God is positive; everything he creates he deems to be "good" or "very good." Note that the text does not say, shalem, "perfect, "complete" but merely tov meod, "very good."

There is one thing that is not good: "It is not good that the man should be alone" (Genesis 2:18).

· The meaning of day as used in the "creation week" is critical to the understanding of the first chapter of Genesis. The Hebrew word yom, "day," is first mentioned in Genesis 1:5 where it appears twice: "God called the light day, and the darkness, He called night." In this verse, day is contrasted with night, but our twenty-four hour day is not what is referenced, instead it refers to an indefinite continuous period of time designated as one day. The word for day in Hebrew, as in English, has more than one meaning, and "daytime" is only one of them. Yom can even mean "night" as in Numbers 8:17: "On the day that I smote the firstborns," the word day actually means midnight. A day is also a referent for counting a person's age: "And [man's] days shall be 120 years" (Genesis 6:3); "These are the days of the years of Abraham's life" (Genesis 25:7); "And the days of the life of Isaac were 180 years" (Genesis 37:27); "The days of Jacob, the years of his life, [were] 147 years" (Genesis 47:28). The text in Genesis 1 is not referring to either daylight or a period of twenty-four hours. The days in Genesis 1 correspond to periods of time of unspecified length in the Earth's creative process, not a particular day. Similarly, we find the expressions, "the day of the Lord" (Isaiah 13:6) and "the end of days," (Genesis 49:1) which refer to periods of undefined length, and not twenty-four hour days. Thus, in Genesis 1 each "day" opens a new creative period, one in which there is chaos (night) and tranquility (day).

· Time in Genesis may perhaps be from God's perspective and only encompassing a relatively short period of time, expressed by day and evening and morning. In human terms that length of time may be expressed in eons.

There is no need for Genesis to specifically mention all that was created in our solar system. As we see, the same cosmic forces that formed the Earth also formed the sun. Suffice it to say that when Genesis says there was light on day one then implicitly there was a light source to provide illumination in the universe (Cosmic Microwave Background radiation) even before the formation of our sun and the planets of our solar system.

What is created in any given day does not necessarily appear in an instant but evolves over the entire period designated as day and can still continue to evolve in later day periods.

The biblical description for each day is not the sum total of God's creative activity during any given time period. Genesis is not a history text, its primarily purpose is to teach humanity that God is the Creator of the universe.

Chapter 5

DAY TWO

Verses 1:6-8: And God said: "Let there be an expanse in the midst of the waters, and let it divide the waters from the waters." And God made the expanse, and divided the waters which were under the expanse from the waters which were above the expanse; and it was so. And God called the expanse Heaven. And there was evening and there was morning, a second day.

Expanse (rakia) in Genesis refers to a regional division of space. All super terrestrial space can generally be referred to as expanse or heaven. In verse 8, the text speaks specifically of the layer of atmosphere surrounding the Earth (stratosphere) as expanse and the waters below that are referred to as "under the expanse." We can also speak of "the expanse of the heaven" (Genesis 1:14) as the region of outer space. For the most part we know the waters under the expanse are located in the oceans on planet Earth. But, where are the waters above the expanse? From antiquity into modern times many people have often assumed that the upper waters referred to the moisture contained in the clouds and atmosphere. These are actually included in the waters below the expanse. That is, water in a liquid state, such as the oceans rivers and lakes, and water in a gaseous state, such a, vapor, moisture, humidity and clouds.

Although the text does not mention it, it is probably on this second day of creation activity that the weather system is established in the presence of light and accompanying heat of the first day thereby introducing the water cycle of evaporation leading to cloud formation and eventually to rain — and freshwater. This cyclic process, in turn, generated weather patterns and helped to clear the atmosphere of toxic gases leading to a life-friendly atmosphere containing the basic elements required for life on the third day — freshwater and oxygen (by the process of photosynthesis). Indeed, the text does not say "it was good" on the second day because the work of water was still unfinished. On the third day God separated land from water and the first forms of life appear.

But are there sources of water to be found "above the expanse"? Water molecules are fairly common in the universe, they are generally found in the form of vapor or ice — not liquid. The fact is that there is more ice and liquid than rock in our solar system, including: hot dense soups of protons and oxygen, ions deep under planetary surfaces, rivers and lakes of liquid hydrocarbons and ice geysers.

There are studies that imply an extraterrestrial source for Earth's water. Some research favors the theory that the source of Earth's water is mostly from water-bearing asteroids that collided with our planet. Although ice-rich comets (often described as "dirty snowballs") are believed to have also contributed to Earth's water supply it is the water contained in mineral compounds found in certain types of asteroids that are considered to be a major water source for Earth's oceans. The impact with Earth of those "wet" asteroids caused the reactions that released the water from the mineral compounds contained therein. Some scientific research pushes the influx of water from meteorites to as early as 8 million years after the start of the solar system. (Christopher Crockett, Science News, 5/16/2015: 21)

A study of the clays making up the mineral content of the carbonaceous chondrite meteorites leads to the conclusion that carbonaceous chondrites formed in the asteroid belt between Mars and Jupiter and thought to be among the oldest objects in the solar system are the source of the water found in the Earth's oceans of today. Isotopic measurements add strong support to the idea that those asteroids were the source of Earth's water. (Looking at the ratio of hydrogen to deuterium, its heavy isotope, in chondrites, scientists can determine the distance at which the water formed in the solar system.) Since the water in carbon-rich chondrites have a similar ratio of the hydrogen isotopes deuterium and protium (D/H) as oceanic water it suggests these asteroids are the source of as much as 98 percent of Earth's water. This perhaps gives support to the theory that Earth's water was depleted due to T-Tauri winds. The division of upper and lower waters would then have occurred at the reconstitution of Earth's water from the waters of outer space.

As we have observed, water can be found in abundance in the mineral compounds found on certain asteroids. But, when we speak of the waters above the expanse there is more to be said concerning the location of this water. Water is to be found in carbonaceous chondrite asteroids containing water as part of mineral compounds, but also in comets that are mainly composed of water in the form of ice, in chondrite meteorites and in the rings of Saturn, which are composed of countless small particles, ranging in size from nanometers to meters. These particles are made almost entirely of water ice, with a trace component of rocky material.

Researchers using Cassini, a spacecraft exploring Saturn and its rings (2005), saw plumes of water shooting into space from cracks in the icy surface of Enceladus, one of Saturn's moons. These suggest a vast ocean beneath the icy surface of this little moon. This ocean of liquid water — as big as or even bigger that North America's Lake Superior — is centered at the south pole of Enceladus and could encompass much if not most of the moon. Enceladus is about 310 miles across. At the very least, it's a regional sea some 25 miles deep under miles-thick ice. The water in it, theory suggests, would be kept liquid by tides. On Earth, it would stretch from our South Pole up to New Zealand — at the very least. The ocean is believed to be sandwiched between miles of surface ice and a rocky core.

Enceladus is hardly the only moon in the solar system with a subsurface sea. Titan, the largest of Saturn's dozens of moons, is believed to have a global ocean. Evidence points to oceans inside the giant Jupiter moons of Callisto and Ganymede. And Jupiter's Europa also has a hidden sea similar to that of Enceladus.

These vast amounts of frozen and liquid water found in outer space constitute the waters "above the expanse."

Chapter 6

DAY THREE

Verses 1:9-10: And God said: "Let the waters below the heavens be gathered together into one place, and let the dry ground appear." And it was so. And God called the dry ground Land, and the concentration of the water He called Seas; and God saw that it was good.

Consistent with biblical brevity, nothing is mentioned about how God moved the water, how God brought up the land and how dry land acquired its present topographical features. As we have seen, water covered the Earth from the very beginning. The asteroid bombardment of Earth not only added to the planet's mass, but also helped inundated the entire land surface. With time, volcanic eruptions created new land masses, as did tectonic activity pushing rock upwards. The unique forces that make for Earth being a living planet owe much to Plate-tectonics, a process not detected on any other planet and show God's planning in the formation of this unique planet. In addition, glacial formation would eventually reduce the level of the ocean exposing more of the newly formed land mass.

The Workings of Plate Tectonics

The rigid outermost shell of our planet is composed of different sections that move relative to one another. Plate-tectonics describes this large-scale motion of Earth's lithosphere (the outer part of the Earth, consisting of the crust and hard mantle, approximately 6 to 60 miles thick depending on the geographic location). The lithosphere is broken up into what are called tectonic plates, big crustal slabs that float on a sea of melted rock. Earth currently has seven or eight major plates, and many minor plates. Over ages, this churning sea moves the plates as well as their superimposed continents and ocean basins, tearing them apart and rearranging them like pieces of a puzzle. These plates move in relation to one another at one of three types of plate boundaries: collision boundary, spreading or diverging boundary and parallel movement boundary. Earthquakes, volcanic activity, mountain building and oceanic trench formation occur along these plate boundaries.

Colliding plates grind past one another about as fast as fingernails grow and over time produce mountains and earthquakes as frictional stresses build and release. Meanwhile, parts of the plate plunge back into the hot Earth, melt and rise to form volcanoes on land or at sea. For example, volcanic gashes in the western depths of the Indian Ocean belched molten rock to form the Indian plate. Its collision with the Burma plate created the volcanoes of Sumatra as well as thousands of earthquakes.

The workings of plate tectonics in nature put in perspective the concept of God resting following creation that has much wider application. God created a system that works on its own. On those occasions when He manifests His interference with the natural order it is called a miracle.

The influence of plate tectonics on environment and populations

The forces unleashed by plate tectonics can be the cause of a staggering loss of life. Even so, scientists argue that in the very long run, the global process behind great earthquakes is quite advantageous for life on Earth — especially human life. Powerful jolts like the one that sent huge waves racing across the Indian Ocean on December 26, 2004 are inevitable side effects of the constant recycling of planetary crust, which produces a lush, habitable planet. Regular plate movements occur by the hundreds each day.

The advantages that plate tectonics brings began billions of years ago, when the crustal recycling made the oceans and atmosphere and formed the continents. Today, it builds mountains, enriches soils, regulates the planet's temperature, concentrates gold and other rare metals and maintains the sea's chemical balance. Plate tectonics (after the Greek word tekton, or builder) describes the geology. The tragic negative is that waves of quakes and volcanic eruptions along plate boundaries can devastate human populations.

The type of geological process that causes earthquakes and tsunamis is an essential characteristic of the Earth. As far as is known, it doesn't occur on any other planetary body and has something very directly to do with the fact that the Earth is a habitable planet. Many biologists believe that the process may have even given birth to life itself. Here, we consider the metaphysical reason Earth has such an amazing vitality.

The main benefit of plate tectonics accumulates slowly and globally over the ages. In contrast, its local upheavals can produce regional catastrophe. Despite the tremendous devastation and loss of life they cause tsunamis are an ecological boon over the decades for coastal areas hardest hit by the great waves. Studying the historical evidence from earlier tsunamis suggests that the huge waves can distribute rich sediments from river systems across the coastal plains, making the soil richer. It brings fertile soils into the lowlands. In time, a more fertile forested area also will develop. The study of the aftermath of earthquakes and volcanoes in human history show that great suffering from tectonic upheaval was usually followed by great benefits as well. Nature is reborn as a result of these kinds of terrible events. Scientific studies show that there are a lot of positive aspects that result even when we don't see them. Despite tremendous losses of life, there's no question that plate tectonics rejuvenates the planet. Moreover, geologists say, it demonstrates the Earth's uniqueness. In the decades after the discovery of plate tectonics, space probes among the seventy or so planets and moons that make up the solar system found that the process existed only on Earth — as revealed by its unique mountain ranges.

The slow recycling of planetary crust due to plate tectonics is uncommon in the universe yet essential for the evolution of complex life. It maintains not just habitability but high habitability. Most geologists believe that the process produced the Earth's primordial ocean and atmosphere, as volcanoes spewed vast amounts of water vapor, nitrogen, carbon dioxide and other gases. Plants eventually added oxygen. Meanwhile, many biologists say, the Earth's first organism probably arose in the deep sea, along volcanic gashes. Some scientists, seeking a naturalist explanation for the origin of life on Earth say it is possible life would not have originated without plate tectonics, or the atmosphere, or the oceans. We take the thought further back and ask what made for the Earth's uniqueness in our solar system?

The volcanoes of the recycling process make rich soil ideal for producing coffee, sugar, rubber, coconuts, palm oil, tobacco, pepper, tea and coffee. Water streaming through gashes in the seabed concentrates copper, silver, gold, and other metals into rich deposits that are often mined after plate tectonics nudges them onto dry land. Volcanic eruptions also inject sulfur dioxide into the stratosphere. Tiny droplets of sulfuric acid then reflect away incoming sunlight, helping to cool the planet.

The world ocean passes through the rocky pores of the tectonic system once every million years or so, increasing nutrients in the biosphere and regulating a host of elements and compounds,

including boron and calcium. One vital cycle keeps adequate amounts of carbon dioxide in the atmosphere. Though carbon dioxide is thought to cause excessive greenhouse-gas warming of the planet, an appreciable level is needed to keep the planet warm enough to support life. Having plate tectonics complete the cycle is absolutely essential to maintaining stable climate conditions on Earth. Otherwise, all the carbon dioxide would disappear and the planet would turn into a frozen ball.

The challenge for humanity is to keep enjoying the benefits of plate tectonics while improving the ability to curb its deadly byproducts. Progress is being made. We can predict volcanic explosions and erect warning systems for tsunamis. Humans are beginning to limit the negative effects resulting from the after-effects of plate tectonics.

Verses 1:11-12: And God said: "Let the earth bring forth vegetation: plants that reproduce by seed [and] trees of fruit that produce fruit according to their kind, containing their seed [so that it may reproduce] on the ground." And it was so. And the earth sprouted vegetation: plants that reproduce seed according to their [various] species, and that produce fruit whose seed is inside it, according to their [various] species; and God saw that it was good.

Dr. Elso Barghoorn, investigating plant fossils eventually pushed back the estimates of the origin of life to more than 3.4 billion years ago. In the 1950's he discovered fossilized colonies of cyanobacteria (blue-green algae) and aquatic fungi near Lake Superior. These algae were 2 billion years old. By the 1960's he increased science's estimate of the age of the earliest known fossils by another billion years. In the mid-1970's he and his colleagues assumed correctly that the first forms of life would be small, microbial in size. Using a scanning electron microscope they discovered in South African rocks fossil evidence estimated to be at least 3.4 billion years old. The discovery that fossils of fully developed bacteria were found in rocks about 3.4 billion years old means that life went back still further than previously thought. In fact, evidence based on fractionation between the light and heavy isotopes of carbon, a fractionation found in living organisms, indicated the origins of cellular life at close to 3.8 billion years old, the same time in which liquid water could be found on Earth. Life originated soon after a suitable environment appeared.

It is a scientific hypothesis that before there was life on Earth, there were molecules in a primordial soup. At some point, it is speculated, a few specialized molecules began replicating. This self-replication, some scientists claim, kick-started a biochemical process that would lead to the first organisms. That is, it is speculated that life emerged spontaneously from mixtures of molecules in the prebiotic Earth. But exactly how that happened — how those specialized molecules began replicating — scientists have no idea. Often repeated as if it was a proven fact,

the scientific description of a biochemical process over millions of years leading to the first organisms remains an unproven assumption. Science simply lacks a proven explanation for life's beginning.

All research studies leave unanswered (although laden with speculation) the question of exactly how primitive systems managed to replicate themselves. A major problem with these speculations is that for the hypothesis to be correct mathematical calculations show that it would take much longer than the age of the universe for molecules to evolve sufficiently through trial and error and selectivity to achieve the modern level of sophistication. Given Earth's age of 4.5 billion years, living systems could not have reproduced and evolved either fast enough or accurately enough to give rise to the vast biological complexity on Earth today. It is not even clear that the primitive Earth would have generated and maintained organic molecules. A further problem is that if you take organic material and give it energy, it does not form life. For example, heating table sugar turns it a sticky brown.

In the world of scientific speculation statements are often made as if they were supported by scientifically proven fact. What conditions allowed life to emerge? How quickly after the planet coalesced from primordial dust and gas did chemicals organize themselves into self-replicating, evolving systems, that is, life? Even if these chemicals in the right combination could be produced, there is no satisfactory answer as to how they could have been arranged accurately within a cell wall. The problem with evolutionary models is that they attribute a subtle intellect to mindless chemicals interacting in an imaginary environment. Scientists have speculated that the first biological molecules emerged in deserts, in shallow tide pools, freshwater ponds, freshwater or deep-sea hydrothermal vents (or in speculative desperation even suggest it arrived on objects from space).

Speculations come and go with advocates speaking with voices of scientific authority only to be superseded by new hypotheses that have their day and are then discarded. In any case, as of now, scientists cannot say whether life got a quick start on Earth shortly after the planet formed or if it was delayed for hundreds of millions of years.

It was Charles Darwin who first suggested that life may have begun in a warm little pond. Experiments carried out in volcanic pools suggest they do not provide the right conditions to spawn life. Testing Darwin's idea shows that hot acidic water containing clay do not provide the right conditions for chemicals to assemble themselves into "pioneer organisms." Amino acids and DNA, the "building blocks" for life, and phosphates, another essential ingredient, clung to the surfaces of clay particles in the volcanic pools where the experiments were conducted. The reason this is significant is that it has been proposed that clay promotes chemical reactions relating to the origin of life. However, in these experiments, the organic compounds became so strongly held to the clay particles that they could not undergo any further chemical reactions.

The theory of billions of years of chance reactions in warm ponds possessing the right chemicals leading to life is now superseded. It is now an explanation for the beginning of life mainly held by the devotees of speculative science. Barghoorn had discovered that the complexity of life began with amazing geological rapidity. Statistically, there are just not enough billions of years since the creation of the Earth for random mutations to bring about even bacterial organisms let alone mankind. The simple fact is that at 13.82 billion years, the universe is not nearly old enough for naturalistic evolution to our present degree to have occurred.

As we see, there are many different scientific theories on how life began. The Earth's evolution has ultimately hampered science's understanding of life's origins as it has destroyed the traces of the first forms of life, making it impossible to retrace life's early steps. This means that even the simple systems of life today are still too complicated to bear a resemblance to the first forms of life.

Interestingly, in Genesis the word creation does not appear in relation to the origin of life. The Heavens and the Earth (i.e., matter), Genesis relates, was created from nothing by the word of God, but life came into being through God's utilizing components that were already present following creation The leading scientific theory on how life began is abiogenesis, the hypothetical development of living organisms from nonliving matter, beginning as a chance development. Abiogenesis says that life spontaneously formed from organic compounds, which themselves spontaneously formed. It is a desperate attempt to explain away Genesis. Research findings have led some scientists to conclude that conditions on Earth would have made it impossible for these organic compounds to make the leap to life. Some have therefore concluded that abiogenesis occurred elsewhere in the universe and then was deposited on Earth by a meteorite. This would still not explain the initial formation of life in the universe, merely finding one more excuse to deny intervention of the biblical God.

One can argue that abiogenesis and naturalistic evolution are different but yet they are both speculations pushed by those desperate for an answer to life's origins that does not involve God. Life coming from outer space or through a chemical reaction to random mixtures of organic compounds in shallow pools hit by lightening and overtime evolving into what we see today are theories of life's origins being pushed by science simply to rule out God.

While life probably started simply, it couldn't have been created from a complicated group of molecules already working together. There had to be a step prior to this in which these molecules themselves were created. Life needs order not disorder. Before life can form order must be generated as described in Genesis 1:10. However, this is not as simple as it sounds because the laws of physics state that things will naturally descend into a state of disorder. Life can only be formed by generating order, but it has to do so in such a way that this order doesn't degrade and that the system doesn't ultimately destroy itself. In fact, self-organizing systems tend to destroy the conditions that enable them as fast as possible.

Some of the oldest rocks on Earth, found in Greenland, hold important clues to life's beginnings. The rocks, however old they are, indicate that life already existed at the time they formed. From geological evidence of weathered rocks, we learn that the Earth's crust had cooled and large bodies of water appeared before 3.8 billion years ago.

Rock samples that started out as marine sediment are a good place to look for the remains of past life, as ocean-floor sediments receive a continual layering of matter — both organic and inorganic — from the water. Rocks of this age are not likely to contain conventional fossils — to date, the oldest undisputed fossils appear in rocks from circa 3.2 billion years ago. Fossils in older rocks would have long since been destroyed by eons of heat, pressure and deformation. In searching for the oldest life, you have to look to the chemical record, on the principle that life changes the chemistry of its surroundings in a predictable way.

The chemical record of ancient life, found in so-called "chemofossils," is reflected in the ratios of isotopes, with carbon being particularly useful. Carbon exists in nature in more than one stable form. Normally, carbon-13 (C-13, with atomic weight 13), is much rarer than C-12. Biological processes concentrate C-12, so when organic debris falls to the ocean floor, the C-12 to C-13 ratio rises still further in the sedimentary rock that forms. That ratio is preserved even in rocks that formed billions of years ago. Ancient life is the simplest explanation for these carbon ratios.

Research by Judith Coggon, at the University of Bonn, shows that Earth may have become transformed into a planet with an extensive amount of water just 200 million years after it was formed. Coggon and her team were able to locate rocks in Greenland that had a chemical signature from the mantle dating from about 4.1 billion years ago, which is approximately 400 million years after Earth was formed. Her rock samples suggest that the formation of Earth's oceans occurred earlier than previously believed. In Coggon's estimation this happened earlier than 4.3 billion years ago. Coggon's research indicating an abundance of water on Earth has helped push back the date for the beginnings of life to have taken place. Her research suggests that conditions at the time may have been more like they are today than we expected. (See Colin Barras, "The Planet Earth Was Blue Long Before We Knew," New Scientist, 31 August 2013: 15).

As we have observed, fossil data have demonstrated that the first simple plant life appeared almost immediately after liquid water appeared and not billions of years later. Life on Earth, in the form of bacteria and photosynthetic algae, started shortly after the appearance of liquid water (Genesis 1:9-12) and three billion years later (the Vendian era) marine organisms appear as trace (not body) fossils of worms and soft coral. Later animal life proliferated in an eruption of marine organisms (Genesis 1:20-21) containing all phyla alive today, the Cambrian Explosion (a period lasting about 50 million years).

In reading the account of creation days one should realize that the sum total of what was created in any given creation period exceeded the brief biblical recording. For example, day

three events record major developments but not necessarily all of the evolutionary and geologic changes that occurred in that era. Marine evolutionary developments of life going back to shortly after the first appearance of water is closely associated with the appearance of the first forms of plant life. To skip ahead to day five, what is mentioned there does not say marine life was created on that day but mentions from where various forms of life ultimately evolved (water) and includes the mention of flying species as well as marine life. There is no conflict with the text mentioning vegetation on land before it mentions marine life. It does not mean vegetation was to be found on day three. What is mentioned on day three is the providing of the ability of the Earth to bring forth vegetation and does not necessitate that the vegetation listed appeared on day three. Similarly, for day five the text is not stating that marine life as well as winged insects first appeared on day five. Just as day four mentions the pre-created sun, moon and stars to now explain certain of their functions as they apply to humanity day five is referring to marine life that may have been in existence and evolving for eons.

After the earth's crust cooled and large bodies of water appeared prior to 3:8 billion years ago, this was followed almost immediately by the first forms of photosynthetic bacteria. This first plant life was not very complex, it consisted of single-celled bacteria. Land plants presently appear in the fossil record c. 450-400 million years ago and flowering plants and trees some c. 120 million years ago, but certainly appeared earlier as the fossil record is no indication of initial appearance. The appearance of photosynthetic eukaryotes (algae and plants) dramatically altered the Earth's ecosystem (Photosynthesis produced an oxygen-rich atmosphere.), making possible all vertebrate life on land, including humans. (Eukaryotes are organisms composed of one or more cells which contain well-defined nuclei.)

Cyanobacteria, also known as blue-green bacteria or blue-green algae, is a phylum of bacteria that obtain their energy through photosynthesis. The name cyanobacteria comes from the color of the bacteria (Greek: kyanós = blue). The ability of cyanobacteria to perform oxygenic photosynthesis is thought to have converted the early atmosphere into an oxidizing one. This is thought to have dramatically changed the composition of life forms on Earth, stimulating biodiversity and led to the near-extinction of oxygen-intolerant organisms. According to endosymbiotic theory, the chloroplasts found in plants and eukaryotic algae evolved from cyanobacterial ancestors via endosymbiosis, the uniting together of prokaryotes to form cells.

Prokaryotes are singled-celled organisms that lack a membrane-bound nucleus (karyon), mitochondria, or any other membrane-bound organelles.

As the third day progressed Genesis records that the ground specifically (unlike rock formations) received the capability to "bring forth" vegetation of varied sorts other than algae. This does not mean the ground had a conscious ability simply that the ground was now prepared to grow vegetation. There is an indirect action stated. God does not directly say "let there be vegetation." He first endows the ground with the ability to produce vegetation. It is only at an unspecified later period that the formation of the more advanced vegetation that is described

takes place. The text records the time at which the ground was prepared to "bring forth" vegetation from the soil. It then skips millions of years to mention the vegetation that would be relevant to mankind.

Each of the words used renders specific Hebrew terms. Deshe, a collective noun, along with tadshe the verb derived from it, is a generic term referring to vegetation as a whole. The clause tadshe haaretz deshe ("Let the earth bring forth vegetation") means: Let the earth be covered with a fresh green mantle of vegetation. Thereafter two categories of vegetation are distinguished. Eisev, plants that reproduce by seed (eisev mazria zera), refers to each plant by itself and etz peri refers to any plant (not only to the extant trees to which we are accustomed) bearing a fruit (the fruiting organ of the plant) having within it seeds. Spores are included within the biblical description of etz peri and eisev because the spore is the zera of the fern. This includes the tree ferns and low level ferns of c. 400 million years ago.

In biblical Hebrew, herbage whose stalks, leave, or seeds were consumable by either beast or human was grouped under the term eisev. In Genesis 1:29 people consume it as food. In Genesis 9:3, yerek eisev, "green" eisev, or "green edible plants," is specified as food for Noah and his descendants, while in Zechariah 10:1, eisev bassadeh, "eisev in the field," refers to unharvested edible plants in the field. Psalms 104:14 distinguishes between chatsir labbehemah, "fodder for animals," and eisev la'avodat haadam, "edible plants for the work of a human."

Every seed in plants contains hundreds of thousands of instructions for the production of identical replicas of the parent plant. But not only does the seed possess this information, but it is equipped also with all the apparatus which is needed to carry out these instructions.

Two works are cited as performed on the third day, the separation of the sea from the dry land and the capability of the ground to grow advanced vegetation on its surface. This does not preclude other creative activity which took place during this prolonged period as well.

Did land plants appear before marine animals? Previously, the scientific evidence available showed that animals appeared within the oceans (during the Vendian [sometimes called the Ediacaran period], the latest portion of the Proterozoic Era, late Precambrian, c. 650-c. 543 million years ago.) before primitive plants appeared on the land (c. 450 million ago). However, new findings show that primitive plant life appeared at a much earlier period. It should be noted that in the specific case of land plants, absence of evidence cannot be taken as proof of absence. Plants do not fossilize as easily as the bone and shell structures of animals and even those fossils are not easy to come by.

Beginning in 2009, scientists pushed back the probable development of complex photosynthetic plants on land to c. 850 million years ago through the study of carbon isotope ratios in Precambrian rocks (Knauth, L.P. and Kennedy, M.J., "The Late Precambrian Greening of the

Earth," Nature (2009) 460: 728-732.). In 2011, a study was published that pushed back the date of the origin of photosynthetic eukaryotes on land to at least one billion years ago, with fossil evidence of their existence (Stother, P.K., Battison, L., Brasier, M.D and Wellman, C.H., "Earth's Earliest Non-marine Eukaryotes," Nature (2011) 473: 505-509). These organisms were very different from the photosynthetic cyanobacteria (prokaryotes) that had inhabited the planet since before 3.8 billion years ago. These were true multi-cellular eukaryotes. These algae were much more complex than their prokaryotic counterparts. However, dating algal origins is frustrated by meager finds in the fossil record.

There is direct evidence of eukaryotes living in freshwater aquatic and subaerially exposed habitats during the Proterozoic era. The apparent dominance of eukaryotes (green, red or golden algae) algae in non-marine settings by 1 billion ago indicates that eukaryotic evolution on land began far earlier than previously thought. These findings do not necessarily upset the sequence of the appearance of marine animals followed by the appearance of plant life on land. Marine life did not simply come into existence on day five but had been evolving from soon after water appeared on Earth. Primitive plant-life started evolving on day three followed eventually by the divine command on day five for the marine life then extant to increase exceedingly in a great variety of forms. How marine life suddenly appeared in so many forms during the Cambrian explosion (see below day five) remains a contentious issue.

Rock layers may be deeply buried, twisted, folded and melted by geologic forces. Such changes to rock would destroy any fossils that might otherwise have been preserved. Older layers of rock, such as from the Vendian, which have been around for a longtime, are more likely to have undergone such changes, and are thus less likely to preserve fossils. Previously, with no known fossils from the Vendian little more could be said, but in the 20th century macroscopic fossils of soft-bodied animals, algae and fossil bacteria were found in these older rocks in a few localities around the world. As we shall see, the problem is not what scientists find in this layer but what they don't find. Fossils are found, but none shows any signs of being an intermediary evolutionary development leading to the great diversity of animal life during the Cambrian Period.

Note that fossil data have two significant shortcomings. The first is that fossil dates are always underestimates because the first emergence of a lineage is not likely to be discovered because of the rare and sporadic nature of the fossil record. Second, in the case of unarmored unicellular or filamentous eukaryotes, apart from size, it is very difficult to discriminate some of them from bacteria. As for Vendian organisms their notable lack of hard-body structure explains the lack of body fossils. Most traces of Vendian life is gone. Since the life forms did not develop bones or shells, they would not easily be fossilized and found today. Nevertheless, trace fossils are found, although none that are linked to the Cambrian fauna.

There is molecular evidence for the early colonization of land by fungi and plants. The colonization of land by eukaryotes is thought to have been facilitated by a partnership

(symbiosis) between a photosynthesizing organism (a phototroph) and a fungus. However, the time when colonization occurred remains speculative. The first fossil land plants and fungi are estimated to have appeared in a range of 480 to 400 million years ago, whereas molecular clock estimates suggest an earlier colonization of land, about 600 million years ago. As previously mentioned, the problem with the fossil record is the lack of plant structures that can be fossilized. In any case, protein sequence analyses indicate that green algae and major lineages of fungi were present one billion years ago and that primitive land plants appeared by 700 million years ago, possibly affecting the Earth's atmosphere, climate and evolution of animals in the Precambrian era (580 million years ago). (See, A.H. Knoll, Science, (August 10, 2001) 293: 1129-1133). Note that day three descriptions of the initial appearance of vegetation is one that includes a description of a later stage in the development of Earth's plant life. The phrase, "and it was so" does not necessitate an immediate occurrence. It reflects the hiatus between the endowing of the ground to produce vegetation and the appearance of primitive vegetation and later development of flowering plants.

There is no biblical mention of a special creation for the origin of life. The laws of nature, created along with the creation of the universe, and the very special conditions on Earth, along with divine directing of these conditions, were quite adequate to orchestrate the flow of the universe toward life over an extended period. Genesis clearly places the first life forms in the waters on day five. Indeed, marine life was developing for quite some time prior to their mention on day five.

The fact is that scientific research has shown that life started on Earth much earlier than scientists previously thought. Scientists from the University of Copenhagen and University of British Columbia analyzed 3 billion year–old soil in South Africa and found evidence that low levels of oxygen had already started to accumulate then. That's 700 million years earlier than prior estimates. The South African soils are believed to be Earth's oldest.

It was known that oxygen production by photosynthesis led to the eventual oxygenation of the atmosphere and the evolution of aerobic life. This study now suggests that the process began very early in Earth's history, supporting a much greater antiquity for oxygen producing photosynthesis and aerobic life.

According to scientific research, there was no oxygen in the atmosphere for at least hundreds of millions of years after the Earth formed, but today, the Earth's atmosphere is 20 percent oxygen. This is due to photosynthetic bacteria that, like trees and other plants, consume carbon dioxide and release oxygen. It is assumed that the bacteria laid the foundation for oxygen breathing organisms to evolve and inhabit the planet. (See Nature, September 25, 2013) This slow but steady evolution was not the result of random selectivity but part of the divine selection process of evolutionary development. Science inadvertently has shown that the biblical sequence of events agrees with its findings thereby providing, often unwillingly, evidence of a divine initiative.

Verse 1:13: And there was evening and there was morning, [of] a third day.

In every period, evolving life is expressed through reference to “days” and the changes brought about by “evening” and “morning” — chaos and order.

Chapter 7

DAY FOUR

Verses 1:14-19: And God said: “Let there be luminaries [positioned] in the expanse of the heaven to separate the day from the night; and let them be for signs, and for [determining] seasons, and for [defining] days and years; and let them be for luminaries in the expanse of the heaven to give light on the Earth.” And it was so. And God made the two great luminaries: the greater to rule the day, and the lesser light to rule the night with the stars. And God set them in the expanse of the heaven to give light on the Earth, and [so as] to dominate, [one] by day and [one] by night, and to separate between the light and the darkness; and God saw that it was good. And there was evening and there was morning [of] a fourth day.

The accounts of the first three days of the creation week close with “and there was evening and there was morning” (Genesis 1:5, 8, 13). A question arises when we arrive at the fourth day and find that only now are the sun, moon and stars mentioned explicitly (Genesis 1:14-16). Mention is made of evening and morning on the first three days but, it seems to some people as though the sun, moon and stars are created on the fourth day, is that correct?

What is the role of the sun and the moon as they relate to events recorded for day four? The verb “made” in Genesis 1:16 does not mean that the sun and moon were created on the fourth day. Verses 14-18 restate what was already in existence from day one, namely, the sun, moon

and stars (although not previously mentioned). However, the pre-existent sun and moon are now specifically designated for uses other than to provide illumination. That is, on the fourth day God designates the sun and moon to be used for measuring time and seasons. The stars are mentioned as well for they help in navigating on land and by sea (although not stated as such). The text does not at all say the sun and moon were first created (bara) or formed (yotzar) on the fourth day. The emphasis of day four is on certain assigned functions of the already existing sun, moon and stars. Other activities that took place on day four are not mentioned in the text nor is the fact that the "lesser light," that of the moon, simply reflects the sun's illumination.

It should be noted that not mentioning the heavenly bodies until the fourth day debunks the ancient myths of creation that viewed the sun and other heavenly bodies as gods. In Genesis 1 there is a deliberate opposition to the mythological conception that the sun was the first and most powerful god to appear on Earth.

It is true that the light of the moon is a reflection of the light from the sun, but that doesn't mean it can't be called a light in its own right. We often call something a "light" when it's really just a reflection. For example, the headlight in a car is based on mirrors. It's the reflection you see when a car comes down the road. The same applies to a flashlight. It's the reflection from the mirror in the flashlight that shines the light forward. It's not just the bulb. Therefore, for example, it would be wrong to say that Psalms 136:7-9 is incorrect in referring to the moon as one of the "great lights," since its illumination is only a reflection of the sun.

Furthermore, the light from the moon is not the same as the light from the sun. For one thing, its light doesn't have the same intensity as that of the sun. Secondly, it doesn't have the same temperature, which means it's not exactly the same on the color scale that photographers use (different colors have different temperatures). Photographing a subject in moonlight requires a different kind of setting on the camera. Therefore, moonlight is not a mere reflection of sunlight and they can be spoken of as two separate lights.

Day four does not speak of new creations, but concerns the impact of the sun, moon and stars on what will be mankind. Delineating: day and night, months and years, helpful guides for travelers – those are the functions now assigned to the heavenly bodies already in existence.

Explicit mention of the sun and moon was not necessary on day one as they had not reached their full potential. Their explicit importance is highlighted on day four. A detailed chronological sequence of creation is not a major interest in the creation presentation. Only brief excerpts of events that transpired during any given creation day are recorded. What the day four text says in affect is, let the preexisting luminaries now be designated as a means of measuring time and giving illumination upon the Earth. It is only at this point in the narrative where specifically designated functions are listed that the sun, moon and stars made on the first day are mentioned. As such, day one activity is first explicitly mentioned on day four as it features things closely associated with each other.

On the fourth day God delegates the yearly measurement of time to the already formed sun and the moon as a control for the month. Fully functioning, these orbs regulate everything that lives. Henceforth, fish and birds, created on the fifth day, and land animals and human beings, created on the sixth day, will cycle their lives according to the periodic intervals of dark and light, cold and heat, summer and winter, as generated by these celestial bodies. For human beings, moreover, these intervals will specifically establish a rhythm for agriculture and a set-time for festivals.

Day four is not concerned about the creation of light (day one), but about what the sun, moon and stars, as visible entities in the heavens, were for. The Genesis text tells us explicitly: "Let them be for signs and for seasons and for days and years" (Genesis 1:14). Those "lights" help humans find their place and time in space-time. It is the purpose of the sun, moon and stars that is being emphasized in day four, not how and when they came into being. Note what we have said above: On the first day the sun and moon were still in creative transition. A dimmer sun shone down on a young Earth and the moon was closer to earth (It is still moving further away from the Earth.). This has implications for why the sun and the moon are not mentioned until the fourth day. They were not yet developed enough to perform the functions mentioned in verse 4.

But why doesn't Genesis mention the sun, moon and the stars when it mentions Night and Day? There are two things to keep in mind concerning Night and Day. Firstly, Night and Day in the Genesis context refer to periods of chaos and order and not periods of twenty-four hours and secondly that the main purpose of the text is not cosmological but to teach who is the Creator of all that is in the cosmos and only He is to be worshiped. It is only on the fourth day that the sun, moon and stars are mentioned to emphasize they are created and not the creators as so many idolaters believed. They are created by God and serve the purpose that God has assigned to them.

hiph'il

Chapter 8

DAY FIVE

Verses 1:20-23: And God said: "Let the waters swarm with swarms of living scurrying creatures, and let winged creatures fly above the earth in the open expanse of heaven." And God created the great sea-creatures, and every living creature that creeps, wherewith the waters swarmed, according to their [various] species, and every winged creature according to its [various] species; and God saw that it was good. And God blessed them, saying: "Be fruitful, and multiply, and fill the waters in the seas, and let winged creatures multiply in the earth." And there was evening and there was morning [of] a fifth day.

In Genesis 1:20, ocean water explicitly becomes God's instrument in the proliferation of life. Whether the first living organisms originated through the agency of water is not indicated. Animals are first mentioned in Genesis on day five when we are told the oceans swarmed with marine life (Genesis 1:29). It is descriptive of the first multicellular animals with the waters swarming with animal life having the basic body plans of all future animals.

Rashi describes sheretz in sheretz nefesh chayyah ("swarms of living creatures") in terms of physical stature: "Every living thing which is not high from the ground is called sheretz, among the winged creatures, such as flies; among the creeping creatures, such as ants and beetles and worms; among the animals, such as the mole and the rat and the lizard; and those similar to them, and all fish." (Rashi on Bereshit 1:20)

He states further: "Sheretz is a term of creeping and moving, without being visible, and domesticated and wild animals that are high from the found are not in the category of sheretz." (Rashi on B.T. Pesachim 24b; see also Makkot 16b and Eruvin 28a)

Rambam (Maimonides) explains the word sheretz in terms of behavior. Based on Targum Onkelos, he defines sheretz as something that moves with a constant scurrying motion: "… the opinion of Onkelos is that sheritzah is a concept of movement. He says with the sheretz and remes 'a scurrying thing' and he explains well. Sheratzim are thus called because of their constant movement." (Rambam, Commentary on Genesis 1:20).

The taninim ("the great sea creatures") of Genesis 1:21 are describing large marine reptiles, that is, aquatic serpentine or crocodilian creatures.

God's transformative activities during the six days of creation occurred through agents. The hiph'il is the verbal form that indicates a causative. In some cases, A, the subject, is using B to do or to cause C. This verbal form is used to describe God's performance and involvement in nature (because, of course, God is not part of nature). In the creation process, the verbal form hiph'il is widely used, particularly in the creation of life forms.

In Genesis 1:20, use of the Hebrew verbal form hiph'il shows that God used water (or the oceans) as an agent of creation. Here the hiph'il form serves to indicate that God (A) causes the water (B) to produce life (C): "And God said, 'Let the water bring forth [yishretzu hamayim — hiph'il] living creatures." That is, God produced life through the instrumentality of water.

After the appearance of first life forms as single celled organisms (3.5 billion years ago) and the appearance of complex celled organisms (2.2 billion years ago) the next and most important step in creation activity is the multiplicity of complex animal life forms that coincides with the Cambrian Explosion (Approximately 540 million years ago, although opinions among paleontologists differ about the length of this period.). During this period almost all modern phyla of animal life are found in the fossil record. The subsequent history of animal life is basically variations on anatomical structures that appeared during what is referred to as the Cambrian explosion.

It was an amazingly creative explosion of biological innovation. "In a geologic 'instant' of several million years, organisms developed distinctly new body shapes, new organs and new predation strategies and defenses against them. Evolutionary biologists disagree about what triggered this prodigious wave of novelty." According to a hypothesis, advanced by University of Oxford zoologist Andrew Parker, "light was the trigger. Parker proposes that around 543 million years ago, the chemistry of the shallow oceans and the atmosphere suddenly changed to become much more transparent. At the time, all animal life was confined to the oceans, and as soon as the daylight flooded in, eyesight became the best trick in the sea. As eyes rapidly evolved, so did the behaviors responded to them … In his 2003 book, In the Blink of an Eye, Parker argues that the external, hard body parts of fauna responded most directly to the riot of selection pressures of the Cambrian explosion. The sudden transparency of the seas led to the emergence of camera-style retinas, which in turn drove rapid adaption of claws, jaws, shells and defensive body parts. Nervous systems evolved, too, as animals developed new predatory behavior and, in response, methods of evasion and camouflage … [T]he Cambrian fauna invented a bounty of evasive measures and countermeasures, and this arsenal of tricks has grown ever since. Animals have developed camouflage, alarm calls to warn of approaching threats, bright marks that falsely advertise them to potential predators as being poisonous. (See

Daniel C. Dennett, Deb Roy, "Our Transparent Future," Scientific American, March 2015, pp. 66-69)

Day five opens with previously unrecorded information — the waters contain living creatures. But when did these living creatures first appear? The text emphasizes that God commands the multiplication of these creatures on day five. It does not say exactly when the creation of this fauna took place. Their previous existence prior to God's command to multiply is implicit in the text.

Researchers say ancient oceans offer new insights into the origins of animal life. Analysis of a rock type found only in the world's oldest oceans it is said sheds new light on how large animals first got a foothold on Earth. Scientific research analyzing the valence state of chromium in iron-rich sediments formed in the ancient oceans, have inferred oxygen in the Earth's atmosphere at 3.8 billion years ago. Researchers believe that a rise in atmospheric oxygen levels 580 million years ago was closely followed by the evolution of animal life. It is believed that this rise in atmospheric oxygen was the driving force for oxygenation of the oceans 580 million years ago, and that this was the catalyst for the evolution of large complex animals.

Researchers believe this oxygen to be the trigger for the evolution of animals, and have demonstrated that oxygen began to pulse into the atmosphere earlier than previously thought. Oxygen levels actually began to rise 3.8 billion years ago, but instead of this rise being steady and gradual over time, the data has shown short-lived episodes of free oxygen in the atmosphere early in Earth's history, followed by plummeting levels around 2 billion years ago. As we see, the higher levels of oxygen are thought to be the catalyst bringing about these larger complex animals, but the scientific mystery as to what triggered the increase in oxygen levels remains in the realm of speculation. The fossil record indicates that for the first 85 percent of living organisms on Earth there were no creatures that would be called animals. Then, in shallow seas in the space of a few million years life-forms representing nearly every conceivable body plan appeared. A profusion of diverse sea animals appeared within what is considered a short period of time in geologic terms. Whatever hypothesis one turns to: the culmination of billions of years of photosynthetic activity preparing the atmosphere and oceans to sufficient levels of oxygen to support animal life, a change in the mineral content of ocean water, the oceans becoming more transparent and so on, overshadowing naturalistic explanations for the Cambrian event is that mindless natural processes inadequately explain that we find most of the major invertebrate groups in the Cambrian strata and many of them in an advanced state of evolution. This poses a serious problem for macroevolution. The very structure of the first chapter of Genesis argues for the involvement of an outside Creator directing and preparing the world for the appearance of humans.

The fossil record indicates that five previous worldwide extinction events occurred before the human era. More than 99 percent of the species that have ever lived are extinct.

‘oph

Genesis also records the presence on day five of a group of animals referred to as ‘oph. This Hebrew word, often translated as “bird,” or “fowl,” more accurately is a collective noun, referring to winged things. The Hebrew word for bird is tsepor (Genesis 4:7). In verse 20, ‘oph is inclusive of flying insects. Current evidence relates the first appearance of wings in water insects, some 400 million years ago. There is no fossil evidence of primitive wings prior to the appearance of winged insects 400 million years ago.

On the basis of translating ‘oph simply as “fowl” rather than as “winged animals” it is often thought that Genesis says birds were created before insects. But this is not what is stated in the passage. The collective noun ‘oph does not refer only to birds, but is inclusive of all creatures that fly in the air (cf. Leviticus 11:19 f.). Moreover, “every living creature that creeps” may refer, in part, to a lineage whose evolutionary trail goes back to the sea.

The Cambrian Explosion

One of the most significant challenges to random evolutionary theory is the Cambrian Explosion that coincides with day five. Cambrian Explosion refers to the great quantity and diversity of life whose fossils are found in the Cambrian geologic layer (c. 540 - c.500 million years ago). Whatever the reason might be, they are found in the fossil record without any prior evolutionary history.

The Cambrian Explosion was not an instantaneous event; it was rather an “explosion” in cosmic timescale. The scope of cosmic time (in which a million years is considered as if it were a short span of time) makes any thought of the Cambrian Explosion as evidence of instantaneous creation farfetched. It should be understood that what happened during the Cambrian Explosion happened over several millions of years and to envision it as an instantaneous event rather than an explosion in cosmic timescale confuses the evidence.

What is interesting is not just what is found in the Cambrian Period, but what is found in the layers above it, and what is not found in layers under it. The Cambrian layer has virtually every phyla known to man. All major body plans and enormous varieties of each all coexist in this layer. No evolutionary sequence here, they are all coexistent simultaneously — without any evidence of prior ancestral forms. Does the Cambrian explosion, mark the inception of modern multicellular life that has no prior antecedents? Within just a few million years, nearly every major kind of animal anatomy appears in the fossil record for the first time. And we find many

Cambrian fossils already in an advanced state of evolution, the very first time they appear. If numerous species, belonging to the same genera or families, started into life at once, this would contradict the theory of evolution through natural selection. It would be as though Cambrian fauna appeared without any evolutionary history. This is significant because the Precambrian record is now sufficiently documented that one can no longer hope that undiscovered sequences of smoothly transitional forms are still to be found. To the question why we do not find rich fossiliferous deposits belonging to these assumed earliest periods prior to the Cambrian system, there is no scientifically proven answer only speculation. It is as if prior antecedents never did exist.

Precambrian fossils do exist, this has been known for many decades, from fossil localities around the world. It is not that there are no Precambrian fossils, but that there are no clear evolutionary precursors to the Cambrian fauna, where nearly all the major living animal phyla appear in an abrupt fashion without any evolutionary antecedents. Paleontologists do not know of fossils that serve as clear evolutionary precursors to the explosion of biodiversity that appears in the Cambrian period. Nevertheless, the search goes on.

One of the major unresolved problems of geology and evolution is the occurrence of diversified, multicellular marine invertebrates in Lower Cambrian rocks on all the continents and their absence in rocks of greater age. The layers below the Cambrian have practically nothing with regard to fossilized specimens. The few traces of creatures that are found in pre-Cambrian strata are all soft-bodied organisms like worms or bacteria and algae. Essentially there is nothing along the lines of organic complexity and diversity that is Precambrian, and then suddenly everything appears. To compound this problem the number of species fossilized in the layers above the Cambrian period gradually decrease with each successive layer. Once you reach the most recent layers approximately 98 percent of everything that ever lived is extinct. The evidence provided by the fossil record is diametrically opposite what would be predicted by random evolutionary theory.

Darwin and his contemporaries were aware of this problem with the fossil record some 150 years ago, but they believed that the fossil record had not been sufficiently sampled up to that time. Their expectation was that paleontological research in the future would confirm that the fossil record is in line with evolutionary theory. However, exactly the opposite happened. After a century and half of excavation the fossil record depicts exactly the opposite story. As we have observed, most of the animal phyla that are represented in the fossil record first appear, fully formed, in the Cambrian. The fossil record, as presently constituted, is therefore of no help with respect to the origin and early diversification of the various animal phyla.

One expression of evolutionary theory states that everything evolved from a common ancestor that originated through a fortuitous chemical mixture in a primordial pond. This ancient ancestor, it is speculated, gradually evolved. Its presumed evolutionary progress branched out into different paths and these different paths led to the creation of increasingly complex and

divergent organic forms. The paths continued to branch out resulting in the great diversity of life we have today. As such, what we should expect to see in the fossil record is simple organisms in the lowest layers and a gradual increase in diversity and complexity of life as you progress to more recent layers in the geologic time scale. But what we find in the fossil record is the exact opposite. If one grants an evolutionary origin of the main groups of animals, and not an act of special creation or the use of previous life forms dramatically used by an outside agent to develop Cambrian phyla, the absence of any record whatsoever of a single member of any phyla in the Precambrian rocks remains inexplicable. As it stands, the fossil record shows that every species appeared at once suddenly and then the majority gradually died off with the passage of time. Note again that "at once" expresses what could be millions of years in geologic time.

One might come up with all sorts of hypotheses in an attempt to explain away the challenges presented by the Cambrian fossil record. But hypotheses do not prove anything and remain pure speculation until proven to be fact. The fact remains that the fossil record simply cannot be used to document anything relating to the common descent of all life forms as originating in a primordial pond if the Cambrian period is considered as is. That is not to say there is no connection only that that connection is not made by solid scientific fact.

But the most significant point to be made is that day five describes life evolving from the ocean and this was recognized in Genesis long before the scientific discovery of the Cambrian Period. How that life is connected to previous evolutionary periods or to subsequent ones is not discussed in the biblical text. It is simply not its purpose. Day five is inclusive of a variety of upheavals and cataclysmic changes that shaped and reshaped Earth's terrestrial and maritime form and its fauna that science breaks down into various detailed geologic epochs.

For example, the Permian period ended about 252 million years ago, with the greatest mass extinction rate in the past 600 million years. In as little as 100,000 years — the majority of living species on the planet were wiped out of existence. Scientists estimate that more than 95 percent of marine species became extinct and more than 70 percent of land animals. Plants were hit just as hard as animal species. Scientists are unclear about what caused the mass extinction. Some point to evidence of catastrophic volcanic activity causing rapid cooling of the globe others to the results of the impact of a massive asteroid. Whatever the cause, the Great Dying closed the Paleozoic Era. This lead to the advent of dinosaurs and modern terrestrial fauna.

Chapter 9

DAY SIX

Verses 1:24-25: And God said: "Let the earth bring forth the living creatures according to their [various] species: cattle and creeping things, and beasts of the earth [each] according to its kind." And it was so. And God made the beasts of the earth [carnivores] according to their kind, and the cattle [herbivores] according to their kind, and all small-legged mammals that move [and everything that creeps] along the ground according to their kind; and God saw that it was good.

This is not a list of all species evolved by day six. It is a restatement of the evolutionary process of certain species of "living creatures" that had evolved on land (animals were exploring land by 500 million years ago). Through the evolutionary process, God made land animals that are ultimately derived from minerals found in the earth.

Three specific kinds of land mammals are listed: cattle (all domestic animals), beasts of the earth (carnivores wild animals) and small-legged mammals (rodents, hares, etc.). In short, these three categories of land mammals are mentioned as they will play a significant role in human history. Historically agricultural animals provide sustenance for humans, wild animals maintain the vitality of not only domestic animals but of animals in the wild that are hunted for food (some, like dogs, serve in other capacities as well) and small-legged animals have been used for food as well as for their fur. Today medical researchers use rodents, rabbits and other creatures to advance the human quality of life.

(Some commentators understand the Hebrew word remes to refer to things that creep upon the ground, specifically reptiles.)

Paleoecology informs us that following the Cretaceous-Tertiary mass extinction (K-T extinction) about 66 million years ago mammals become dominant along with creeping species. Creeping things would include reptiles and the many types of arthropods. It is near the end of this period that hominoids and then extant humans appear. Hominoid refers to a member of the biological

superfamily Hominoidea, including all modern great apes and humans and their extinct ancestors and relatives.

The conventional scientific wisdom used to be that modern man's extinct "close relatives" were direct ancestors, and as you went further and further back into the past each was less humanlike and more apelike. But genetic studies and fossil evidence show that modern man shared the planet for thousands of years with several of our "close relatives." Furthermore, other fossil discoveries make it clear that much earlier in our prehistory (four to one million years ago) there were periods when modern man's ancestors and several "close relatives" walked the Earth at the same time. This genetic and fossil evidence shows closely related hominin species shared the planet many times in the past few million years, making it more difficult to identify direct ancestors of modern humans. In the case of modern humans and the living apes it is thought that the branch that links us to the common ancestor we share with chimpanzees and bonobos is a creature that lived between eight million and five million years ago.

Each new discovery from before four million years most likely will bring even less certainty as to the direct ancestor of modern man. The closer you get in the split between the human and the chimpanzee-plus-bonobo lineages, the more difficult it will be to tell a direct human ancestor from a close "relative." It will also be harder to be sure that any new species is a hominin rather than an ancestor of chimpanzees and bonobos or even a species belonging to a lineage that has no living representatives.

There is evidence of multiple lineages living in modern man's more recent past. For example, Neandertals have been recognized as a separate species for more than 150 years, and as time goes by researchers discover more and more ways in which they differ from modern humans. A third hominin, namely Homo erectus, probably survived much later than was originally thought and that Homo floresiensis, although it might have been confined to the island of Flores, is thought to be a fourth hominin that lived on the planet within the past 100,000 years. Evidence of a distinctive fifth hominin, the Denisovans, has come from ancient DNA extracted from a 40,000 year old finger bone. And evidence has emerged for at least one more "ghost lineage" in the DNA of living modern humans from 100,000 years ago. There most likely were multiple related species since the fossil record always underestimates the number of species.

It should be noted that the discovery of a shared feature in fossils from two species does not necessarily mean that they are direct taxonomic relatives. Homo erectus (thought to have appeared between 1.9 million and 1.6 million years ago) with its more lithe skeleton was nearly indistinguishable from that of modern man. Nevertheless, there is no evidence of gradual evolution from one species into the other.

Genesis does not give the order in which each pre-adamic hominin species (who were like "beasts of the field") evolved. That simply is not the function of the text.

Verses 1:26-27: And God said: "Let us make man [humankind] in our image, after our likeness; and let them have dominion over the fish of the sea, and over the winged creatures of the air, and over the cattle, and over all the earth, and over every creeping thing that creeps upon the earth. And God created the man in His own image, in the image of God He created him; male and female He created them.

The Rise of Modern Humans

Those who consider the biblical description of the origins of humanity as myth betray their own lack of understanding of its place within the evolutionary narrative. Note that the function of the biblical creation account is not to serve as a textbook of astronomy, geology or anthropology, but as a guide to understanding man's place in the scheme of God's universe. With this in mind, what does the biblical account of the creation of mankind say? How are we to understand the nuances employed in the narrative? God created humans in His image to govern the world (Genesis 1:26-28). God permits us to dominate, but at the same time we depend on Him for basic sustenance.

In studying the biblical text our understanding is often enhanced by scientific advancement, but never hindered by it. At the same time, it should be understood that science should not be a source for reading into the text what is not there. On the other hand, one should also be aware of skeptics who become the most intense of fundamentalists when insisting on what they consider the ultra-literal meaning so as to denounce the text.

"Then God said, 'Let us make man [adam].'" Only in the case of man does Scripture mention specifically God's intention. Why the use of the plural "us" in this verse? It is the plural of majesty (e.g., 2 Samuel 16:20), what is often called the royal "we," which adds to the importance placed upon the occasion. The text does not refer to the making of a totally new being, namely, man. Rather, "God created the man in His own image." It is as if to say: "Let us make the [preexisting] hominoid in our image," in reference to an already existing being. The creature here called adam already existed now having evolved to a desired state and God now announces the intent to change his/her/their image, and so God created "the man": the modern human.

Hebrew has two expressions for the vital forces animating living creatures: "And God created … every living creature" (Genesis 1:21). All animals, humans included, share the life force referred to as nefesh. Whatever the specific nature of the nefesh it is present only in living animals and humans infused somehow in their blood (Leviticus 17:13-14, Deuteronomy 12:23-24). In the case of humans, there is an additional moral and intellectual force, the neshamah infused into

Adam (Genesis 2:7), in which no other species shares. This is expressed in Genesis 1:27 as, "And God created the adam." It is not just the "making" of adam but the "creation" of the (specific) adam: modern human. The creation of the Homo sapiens sapiens adam refers to this infusion of the neshamah ("divine breath") and this neshamah was implanted only when that bodily receptacle of the preadamic adam was complete. The text does not say how long that evolving process took. All that we are told is that the making of adam's body preceded the introduction of the neshamah. This special infusion of "divine breath," unique to extant mankind, is first mentioned in Genesis 2:7. Since God does not breathe it is obvious that divine breath is a figurative description of whatever it is that took place and is not an infusion of so-to-speak part of God.

It should be noted that Genesis 1:27: "And God created [vaiyivra] the man in His own image, in the image of God He created him, male and female He created them," is a recapitulation reviewing the fulfillment of God's intention concerning modern human development mentioned in the previous verse (Genesis 1:26): "And God said: 'Let us make [na'aseh] man in our image after our likeness." In verse 27, the verb created is used not in reference to the adamic anatomy but to the infusion of neshamah that elevated the human to a new creation.

Something was done to this anatomically equal precursor of modern humans that is referred to as creating (that is, establishing a new creature) in the image of God: "And God said let us make adam" in our image (Genesis 1:26). First, God made precursor adam, "a beast of the field," much like the other animals in their behavior and cognitive abilities, then did something that caused him to be significantly different. With the infusion of the neshamah, humans now possessed a spiritual as well as a material aspect. Man was now in the spiritual image of God in addition to simply being a living creature. Along with this infusion of the spiritual aspect of divine breath, man developed a deeper appreciation of his surrounding and his abilities to take control of his environment. As such, the text records that the human collectivity throughout history is to have ascendancy over creation.

That adam was first "made" (Genesis 1:26) and only later "created" (Genesis 1:27) introduces a subtle nuance. The description is of adam being made and then subsequently something is done to adam that is referred to as his being created. The precurser adam who is made is different in some significant non-anatomical way from the later adam who is created, that is, made into a completed and finalized creation. Adam, the human species, was formed from existing raw materials in that they evolved from the initial creation of life and then one branch of this adam eventually became what is known as Homo sapiens sapiens. Homo sapiens (Latin: wise man) is the scientific name for the human species that includes Neanderthals and other extinct species of hominins. Modern humans are the only extant Homo sapiens group and are specifically designated as Homo sapiens sapiens

There are evolutionary steps in between initially taking the pre-existing adam, a beast of the field and making that Homo sapiens species into a new creation, the adam made in the image of

God. In Genesis 2:7, we will see that the adam whose ultimate origins is the minerals found in the ground and like all other creatures is brought to life through a divine process is the only species to receive at some point the divine breath. That species, still called adam, evolves into a unique being that while a living soul like other species evolves differently to become to a living soul in a more profound sense of physical and intellectual ability. That is, the addition, in the text, of the seemingly superfluous preposition "to" in the Hebrew text shows that adam goes from one step to another in its development into modern mankind. The living soul that is adam is uniquely different from the living soul that is animal life.

In Genesis 1, God creates man and woman at the same time. We are not told what they are made from, only that they are in the image of God. Genesis 2 explicitly states that the body of man was formed from the ground. Simply said, God took a clump of dirt from the ground and formed man. The dirt clod here refers to the inorganic material that the human body consists of when broken down to its basic chemical composition. The word 'afar, in Genesis 2:7, is the same word used in Genesis 3:17 to describe the material from which thorns and thistles will grow and to which men will return when they die (Genesis 2:7, 3:19).

The Hebrew word for man, adam, derives from the Hebrew word adamah, "ground" or "soil": "And the Lord God formed the adam [of] a clump of soil from the adamah" (Genesis 2:7). This does not indicate that adam is formed directly from a clump of soil. It shows that the evolutionary origins of mankind and indeed all species goes back ultimately to the inorganic compounds that if analyzed make up a body's composition. Concerning the human body, approximately 96 percent of body weight consists of only four elements: oxygen, carbon, hydrogen and nitrogen. Calcium, phosphorus, magnesium, sodium, potassium, chlorine and sulfur are macronutrients or elements the body needs in a significant amount. The full process from inorganic matter to life in all its forms is not mentioned. Genesis is simply not a biology text book and was never meant to be such. It simply credits God with the creation of life.

As we have observed, the biblical text is so structured that the term adam need not refer to a specific male being but can refer to a group of beings, male and female. Nevertheless, it does not rule out that there was a further specification of a first man and a first woman (represented allegorically as Adam and Eve) designated from the Homo sapians sapiens that had evolved from the hominin population anatomically resembling modern humans. Their story appears in allegorical form in Genesis 2-3 as a teaching tool outlining the human condition. It is a literary product captivating readers by its rich and vibrant creativity.

God made humans (adam, used here as a collective noun) in His "image." Mankind is made in the image, that is, a reflection of the divine, not as a duplicate or exact copy of God. The word "image" does not describe the physical form of humanity following the infusion of the neshamah. It refers to the cognitive moral discernment thought processes of man after his/her receiving the neshamah. "Image," tselem, and "likeness," dimut, the descriptive language used in the text, are essentially synonymous terms, their meanings overlapping. Both indicate

qualities that God and man alone possess. If, indeed, adam, is used here as a collective noun it suggests that at some point God infused the neshamah into every Homo sapiens sapiens in the world as a hereditary factor. In itself, this does not contradict the concept that all modern humans derive from a common ancestry.

Modern man developed from a lesser being that physically looked like him but did not possess the "image of God" and so is considered like the "beasts of the field." The addition of the preposition to in Genesis 2:7 indicates that modern man did not obtain this transformation all at once but rather in stages of development. Note that the text may be read with the understanding that adam does not refer to a single individual or a single pair: male and female.

Nouns used for a male or female animate, or for a mixed group, are called epicene. For example, in the phrase dov shakul "a bear robbed of her whelps" (Hos 13:8), though both noun and adjective are masculine in form, a she-bear is in view (cf. also Isa 49:15). Epicene nouns in English include "sheep" (in contrast to "ewe/ram"), "secretary" (in contrast to "male secretary/female secretary"), "dog" (in contrast to "bitch, female dog/male dog"). In Hebrew an epicene may be of either gender; an epicene feminine singular may form an epicene masculine plural. (Waltke, Bruce K, O'Connor, M., An Introduction to Biblical Hebrew Syntax, Winona Lake, Ind.: Eisenbrauns 1990, p. 107).

Further examples are: zev, "wolf," (masculine); yonah, "dove" (feminine) The Hebrew word adam rendered as "man" in Genesis 1:26-27 is a common gender noun referring to humanity, male and female, and not to one male individual named Adam. Moreover, the use of "them" in the description is significant in that it does not necessarily refer to two individuals alone but that God created extant humanity.

Genesis also states that the bodies of animals were formed from the same material as adam, the earth: "And the Lord God had formed from the adamah every beast of the field" (Genesis 2:19). Although mankind and animals may share a common physical origin, there is an unparalleled difference that distinguishes humanity from all other forms of life. The neshamah, the spiritual soul of modern man, is the factor that separates man from beast. Thus, although the Hebrew word for living being, nefesh, also describes what sea and land animals possess (Genesis 1:20-21, 24) there is a difference. What ultimately distinguishes modern man from animals is that man alone has that added feature that he is created in the image of God.

Humans are different from animals in the most profound of ways. For example, our molecules (DNA, RNA, etc) are most similar to those of our closest living "relatives," the great apes. Yet the physical characteristics that differentiate between man and chimpanzee and bonobos, our closest "relatives" on the evolutionary scale, are extensive — from our ability to run long distances and our throwing arm to our outsized brain. Unlike chimpanzees humans have a

flexible waist, a less twisted upper arm bone and a shoulder socket that faces out to the side rather than upward as it does in apes. This greatly enhances our upper body's range of motion. Significant for the difference in longevity is that despite the fact that the chimpanzee and human genomes are almost identical the uniquely human difference shows a high number of genes that had undergone positive selection and that played key roles in immunity in fighting off microbial threats. But if the physical differences are great, the mental differences are little short of infinite.

Why alone among the animals have human beings acquired in-depth language abilities or a refined appreciation of art, architecture, music, dance or mathematics, etc? Was there divine evolutionary interference that alone adequately explains the organ of speech and articulation, the human hand, and the external human form, with its upright posture and bipedal gait? No other living primate even comes close to mankind's level of continuous running ability. It is only human beings who can rotate their thumb and ring finger in what is called ulnar opposition in order to achieve a grip, and a degree of torque missing in the abilities of the great apes. Human beings are connected physiologically to the rest of the animal kingdom but the great biological and mental differences between humans and animals are overwhelming.

Most evolutionary biologists do not claim that humans evolved from chimpanzees or any other living apes. Instead, it is proposed that humans and the great apes all evolved from one now extinct common ancestor through independent evolutionary lines. The claim that the DNA of chimpanzees and humans are nearly identical is an over-simplified claim as the genetic differences between humans and chimpanzees, our closest living relatives, are far more extensive than previously thought. Their genomes are not 98 percent or 99 percent identical as some would have it. Even the more conservative claims of genetic similarities of 95 percent or 96 percent are too high. But there is an aspect to the relationship of humans and great apes that is more significant than genome comparisons. Chimpanzees, bonobos and gorillas reason; they form plans; they have preferences; they are cunning; they have passions and desires; and they suffer. But beyond what humans have in common with the apes, we have nothing in common, and while the similarities are interesting, the differences are profound. There is very much more to what it means to be human than what is in the genes. Furthermore, the fact that we have genes in common with a squirrel, or an apple says nothing about human nature.

Nevertheless, if we were unrelated to apes, why would we share any percentage of our genome with the chimpanzee? Did God create it to look that way? Indeed, did He create star light reaching us appear to have travelled billions of years already (that is, was it created that way)? The simplest and most profound interpretation is that the molecules tell God's truth: life has a common origin and exhibits a pattern of ancestry and descent. Studying humans and other primates leads us to the conclusion that we are very similar, anatomically and biologically, descendants of a common ancestor and through that being connected with the rest of the animals. But the dividing line between man and beast is the profound truth that while humans and animals both have an animalistic aspect to their being only humanity possesses an

intellectual and moral aspect. Humans are not the only beings with personalities, reasoning powers and emotions like joy and sorrow. We are not the only beings capable of mental as well as physical suffering. But our intellect involves a complexity unrivalled by any other being. Only humanity has developed sophisticated spoken language, has the ability to teach its young about objects and events not present, to pass on wisdom gleaned from the successes — and the mistakes — of the past, to make plans for the distant future, to discuss ideas with others so that they can be developed into things unimagined before through the agency of combined wisdom of the group. What guided evolution from the common ancestor of apes and humans to anatomically modern humans in whom there was eventually infused a special behavioral modernity that divides extant humanity from all other beings?

It is not by chance that the brain, above all else, is what identifies us as human, for it is the repository of thought, language and emotion. The functions we share with lower animals, such as walking, digesting and excreting, are much simpler to understand, the one that makes us uniquely human, the brain, divides us in the most profound of ways from all other creatures.

The Ultimate Common Ancestors Question

There are a number of scientific theories as to the ultimate common ancestor of all modern people. But studies provide an incomplete picture and sometimes conflicting results leading to different estimates of how old common ancestors really are. Gene studies always rely on a sample of DNA and, therefore, provide an incomplete picture of human history. For instance, in two separate studies one lab sampled a different group of men than the other lab did, leading to different estimates of how old common ancestors really are.

Such studies also assume that there was a constant rate of mutation. But the rate of inheritable mutations for a species or a population is not governed by a constant rate of mutation. The rate of inheritable mutations can vary due to a number of factors including generation time, the efficiency of DNA repair within cells, ambient temperature, and varying amounts of natural environmental mutagens. In addition, some kinds of DNA molecules are known to be more subject to mutation than others, resulting in faster mutation rates. This seems to be the case with the Y chromosome in human males.

To get down to just two ancestors, some scientists claim, you would have to postulate that there's been this absolutely astronomical mutation rate that has produced all these new variants in an incredibly short period of time. Those types of mutation rates, in their estimation, are just not possible. But, if one considers Homo sapiens sapiens as originating 200,000-150,000 years ago from adam (a term used in this context for pre-modern humans consisting of a multiplicity of males and females alike), and the unpredictability of mutation rates the two

ancestor model for modern humans is possible. Note that Genesis does not give a timetable for the appearance of modern humans and is not affected by studies researching the emergence of Homo sapiens sapiens.

Scientists working on the human genome conclude that given the genetic variation of people today it is not likely that humanity all descended from a single couple. Resolution of the issue of the earliest human population numbers may never come. This aspect of early humans is mostly a matter of scientific speculation. Undoubtedly, population density was low, but how low is unknown. Solid evidence of how many humans were around may always elude science's grasp. It should be understood that the scientific conclusions include not only verified research but also subjective ever-changing interpretative opinions. Approximations fluctuate as new hypotheses are developed. The Genesis description of modern human evolution is in stages, leading from adam who was as a beast of the field through to adam made in the image of God.

All people today are classified as Homo sapiens. Based on ever-changing research studies of human genomes scientists suggest that there is evidence that the approximate time of divergence from the common ancestor of all modern human populations was c. 200,000 years ago. Modern humans are theorized to have evolved from archaic humans. Archaics are distinguished from anatomically modern humans by having a thick skull, prominent brow ridges and the lack of a prominent chin. The emergence of archaic humans is sometimes used as an example of punctuated equilibrium. This is said to occur when a species undergoes significant biological evolution within a relatively short period. Subsequently, the species undergoes very little change for long periods until the next punctuation. But phyletic evolution (gradualism) may account for much of the genetic variation among humans. The regional anatomical differences that are now seen among humans evolved mostly in the last 200,000 years. After 60,000-40,000 years ago the archaic varieties of Homo sapiens were gradually marginalized. Non-modern varieties of Homo sapiens survived until 30,000 years ago, and perhaps until as recently as 20,000 years ago. Which of these, if any, are included under the term archaic human is a matter of definition and varies among scientists. Genetic studies seem to suggest that modern humans bred with at least two contemporary groups of ancient humans: the Neanderthals and the Denisovans. Evidence suggests another group may also have been extant as recently as 11,500 years ago, the Red Deer Cave people of China. Eventually, all other lines of humans other than Homo sapiens sapiens became extinct leaving only a few of their genes.

What Makes Modern Humans Different from Neanderthals?

Even closer in relationship to modern present-day humans than chimpanzees are the extinct Neanderthals who are 99.84 percent identical genetically — the two species' genomes differ by a fraction of a percent. The question becomes, if they are so close why the differences between

them? Researchers believe that the answer lies in the cellular equivalent of "on"/"off" switches that determine whether DNA is activated or not. Hundreds of Neanderthal genes were turned off while the identical genes in today's humans are turned on. It was also found that hundreds of other genes were turned on in Neanderthals, but are off in people living today. Among the hundreds were genes that control the shape of limbs and the function of the brain, traits where modern humans and Neanderthals differ most.

This discovery underlines the power of those on/off patterns. Together, they add up to what is called the human epigenome, to distinguish it from the human genome. The genome is the sequence of three billion molecules that constitute all of a person's DNA while the epigenome is which bits of DNA are turned on or off even as the molecular sequence remains unchanged.

The epigenome exerts such powerful effects that it is often called the "second genetic code." It may explain anatomical differences between archaic and present-day humans, including Neanderthal's shorter legs and arms, bowleggedness, large hands and fingers, and curved arm bones. The epignome has offered clues to what makes modern humans distinct. When a gene is silenced, it does not produce the trait it otherwise would.

One caveat about the research is that one person's epigenome can vary markedly from another's due to diet, environment and other factors. It is therefore impossible to know whether the on/off patterns found in Neanderthal genes are typical of the species overall or peculiar to the individual remains studied.

When dozens of brain-related genes became more active in today's humans, the main effect might have been the astonishing leap in brain development that most distinguishes modern Homo sapiens from extinct species of Homo sapiens. Perhaps this correlates with the infusion of the neshamah.

Some fossil and ancient DNA analyses seem to suggest that Neandertal brains were different — and less capable — than those of modern man. Yet mounting archaeological evidence indicates that Neandertals behaved in many of the same ways that their anatomically modern contemporaries did. Some experts think Neandertals were just another population of Homo sapiens. Studies of skull shape in Neandertal speciments representing a range of developmental stages indicate that the Neandertals attained their large brain size through a different developmental pathway than that of Homo sapiens. Although Neandertal brains started off growing like modern brains in the womb, they diverged from the modern growth pattern after birth, during a critical window of cognitive development. Neandertals and modern humans were in contact with each other for some 2,600 to 5,400 years before the Neandertals finally disappeared around 39,000 years ago. That lengthy overlap would have left plenty of time for mating between the two groups. DNA analyses have found that people today who live outside of Africa carry an average of least 1.5 to 2.1 percent Neandertal DNA.

What was it that distinguished modern man from the rest of the human family — and set anatomically modern humans on the path to becoming the enormously successful species they are today? Does Genesis provide the answer?

Genesis 1 offers a simple concise account of modern human origins. In Genesis 2-3 we will find that there is a more elaborate allegorical account of mankind's origins and development, the purpose of which is to delve into the developing roots of human behavior and humanity's interaction with its surroundings.

Verse 1:28: And God blessed them; and God said to them: "Be fruitful and multiply, and fill the Earth, and subdue it; and have dominion over the fish of the sea, and over the winged creatures of the air, and over every living thing that creeps upon the earth."

Although Homo sapiens were slow and weak in comparison to most other animals they also proved to be clever and collaborative and able to take advantage of opportunities for obtaining nourishment from a variety of sources giving them a competitive advantage. However, it is only when they were made in the image of God that they began to take control of their environment and eventually developed farming and other skills for subduing the land and animal husbandry.

Of all living beings, only man is sufficiently free to exercise real choices rather than be governed by instinct and to have significant purposes and goals in life; appreciate art and music; make advanced tools; be truly educated rather than merely trained, use oral and written symbols to communicate abstract concepts to others; accumulate knowledge and build upon the wisdom of previous generations; make judgments of moral right and wrong and deliberate over decisions of conscience.

Modern humans are commanded to "fill the Earth," that is, not to live only in one area but to disperse throughout the globe. In spreading throughout the world they are to replenish the void left by extinct archaic Homo sapiens. The whole world is meant for them. Humans are thus one of the few species that can acclimatize and thrive in any part of the globe. They are to "subdue the Earth," that is, to conquer and master the land. Humans are to "have dominion over," that is, to rule over the animals and have them serve mankind.

The fossil record shows that this is what humans did. Between 60,000-40,000 years ago, Homo sapiens — anatomically modern humans — traveled from Africa through the Middle East to Eurasia, gradually replacing all other human groups during this period in human evolution. The so-called "out of Africa" theory contends that modern humans evolved in Africa before radiating around the globe. The theory speculates that they left Africa, and over tens of thousands of

years reached every corner of the world. Wherever they settled modern humans eventually developed agriculture and domesticated animals.

In 2008, a skull discovered in northern Israel's Manot Cave locates an area where anatomically modern humans lived with and interbred with Neanderthals, filling in a crucial gap in the fossil record. Uranium-thorium dating conducted on the skull confirms that it is about 55,000 years old, and the shape of the skull indicates that it belonged to an anatomically modern human. (Nature, January 2015)

At some point, physically modern humans received neshamah that elevated their mental and moral capacity so that they evolved beyond merely being a "beast of the field."

Verses 1:29-31: And God said: "Behold, I have given you every plant that reproduces by seed, which is on the face of the entire earth, and every tree that has tree fruit which reproduces by seed — to you it shall be for food; and for every animal of the earth, and to every winged creature of the air, and to everything that creeps upon the earth, wherein there is a living soul, [I have given] every green herb for food." And it was so. And God saw everything that He had made, and behold, it was very good. And there was evening and there was morning [of] the sixth day.

God tells mankind that they are permitted to make use of the living creatures and their services and are allowed to exercise power over them so that they may promote their subsistence. The emphasis here is on a diet of vegetable food. There is no prohibition directly forbidding the eating of meat. Perhaps, God seeks to convey the message that in principle man should refrain from eating meat. Nevertheless, flesh will be consumed by humans as life needs to be sustained, but it will be governed at various points by prohibitions such as the eating of limbs of live animals, eating the blood and not eating animals whose diet consists in whole or in part of eating other animals, for the blood represents the life-force. In a sense, this prohibition of blood is a reminder that rightly all parts of the flesh should have been forbidden. In the perfect world of the messianic era even the carnivorous beasts will feed only on vegetation (Isaiah 11:7, 65:25: "the lion shall eat straw like the ox).

God says of the world He created that it is "very good." What is left is the implication that it was deliberately not made perfect! Directed natural selection with its mechanisms enabling change preprogrammed allows for the imperfections that need to be studied and addressed by humanity. With the abilities given to human's to take control of their environment through physical and intellectual pursuits there comes a realization that humanity has a responsibility in perfecting creation. Creation was perfect in the sense that reaching the level of "very good"

was exactly what God intended. It left the door open for humanity to strive to do its part to better the world.

Chapter 10

Day Seven

The next three verses belong to the preceding chapter (Genesis 1).

Genesis chapter 1 ends at verse 31, which refers to the end of the sixth day of creation. The chapter break after this verse unnaturally severs the narrative about the seventh day in Genesis 2:1-3 from the story of the first six days of creation in Genesis 1:1-31. The chapter division lop off at the end of the story, about the Sabbath day of rest and its sanctification as holy time was due to Christian influence on the first printed editions of the Bible, which have continued. When read liturgically in the synagogue, the creation story from Genesis 1:1 through Genesis 2:3 is read straight through as a single unit.

Verses 2:1-3: And the Heavens and the Earth were finished, and all the host of them. And on the seventh day God finished His work which He had made; and He rested on the seventh day from all His work which He had made. And God blessed the seventh day, and hallowed it; because that in it He rested from all His work which God had created to make.

The Week

The seventh day introduce the last of the calendric units associated with creation — the weekly measure of time. Having generated all that there was cosmically to be in six days, God selected the seventh and last day on which to commemorate the cessation of the creative process. The

verbal form yishbot, He [God] ceased" (Genesis 2:2), from the same root as Shabbat (Sabbath) appears here. This notice about the seventh day was by no means an afterthought, for it had been anticipated throughout the text of Genesis 1, where crucial sentences and word had been couched in sevens or in multiples of seven. For example, the first verse of the chapter has seven words. The second verse has 14 words, a multiple of seven. There are many other such examples in this chapter.

However, unlike the year, the month and the day, each of which has a connection to some celestial motion, the week is a very artificial construct. Like the hour and the second, the week is based on no recurring stellar or planetary interval. Despite scholarly attempts to link the Jewish Sabbath to Mesopotamian institutions the seven day unit that ends on the Sabbath remains unique to Israel.

The concept of Sabbath rest is the final creative act of the week. The cosmic creation story is not only about the heavens and the Earth but also about the inhabited world, the creation of humans who inhabit it, the establishment of the seventh day as a Sabbath, a day when no creating occurred, and about the sanctification of time.

During the six "days" of creation, the world was in different stages of incompleteness. God was engaged in a process of molding and acting upon the universe, transforming it from more primitive to more advanced states — light and darkness, Heaven and Earth, water and dry land, plants, aquatic life, terrestrials and at last man.

When the seventh "day" of creation arrived, God's work was completed. Everything the world required and would ever require existed and had been put into place ready for man to eventually discover. God had only to leave the universe as is, allowing all its components to function according to the laws He created for them.

It was not, of course, that an all-powerful God was "tired" and had to rest from His work. It was that God had brought the world to a state where it was to His satisfaction and purpose. He therefore proclaimed it "very good." The world was never meant to be created perfect. The Genesis creation narrative is carefully crafted. When it says "very good" rather than "perfect" there is a subtle reason. God created adam "in His image" to improve an imperfect world. This message is found at the very end of the process of creation (Genesis 2:3). Most English translations render this verse as: "And God blessed the seventh day, and hallowed it; because that in it He rested from all His work which God in creating had made," or in a similar fashion. However, the last word, la'asot (to make), is an infinitive. The correct rendering should rather be "which God had created to make [or to be made]." This is instructive that there is to be a continued action. Even after the process of creation is over, the world is not complete, God created the wheat but bread is still waiting to be made — by humans. God created the grapes, but wine will be developed — by man. Accordingly, Genesis 2:3 is saying that God envisions that man will still further improve His creation. God already did His part. He created (libro) the raw

materials and fashioned (la'asot) the world. From now on, man is expected to continue, in partnership with the Creator, the infinite process of improving and further developing God's creation.

Life is often a struggle and this is the lesson allegorized in events that occurred as a result of disobedience. Subsequently, following the expulsion from the garden, humans would have to work to subdue nature and eat bread only through hard work and ingenuity.

Genesis 2:1-2 summarizes the first six days before introducing the concluding Sabbath theme. The reference to "Heavens and Earth" in Genesis 2:1 echoes the introductory sentence of the creation story in Genesis 1:1-3.

By opening the history of the world with a creation that was complete within a seven-day week, a calendric unit known only among the Israelites there is forged a special link between them and God.