The Source Workbook - Questions

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The Source Workbook - Answers

CHAPTER 8 - LET THE EARTH SPEAK

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q-99.1 How are we going to "let the Earth speak?"

The Genesis account of creation is written so profoundly that it can be applied to the original sequence God used to prepare the earth for human life or it can also apply to later events that occurred during the recovery of the earth from what can be called a mega disaster. To make our study useful in preparing for discussions with skeptics, we have chosen to focus on how the Bible can be relevant when considering the historical geology of the earth from its beginning. To provide context, we will use the geologic time scale that hypothesizes a universe coming into existence about 13.7 Bya (Billion years ago) with earth being formed about 4.5 Bya. These dates for the earth may vary slightly because they are usually based upon dating volcanic rocks or crystals and determining their chemical composition. Rocks dating back to the earth's very beginning no longer exist and so recovered meteorites are used for determining the age of the solar system instead. By these means, a dated earth-history can be hypothesized that correlates well with the Bible's description of what occurred during each creative day.

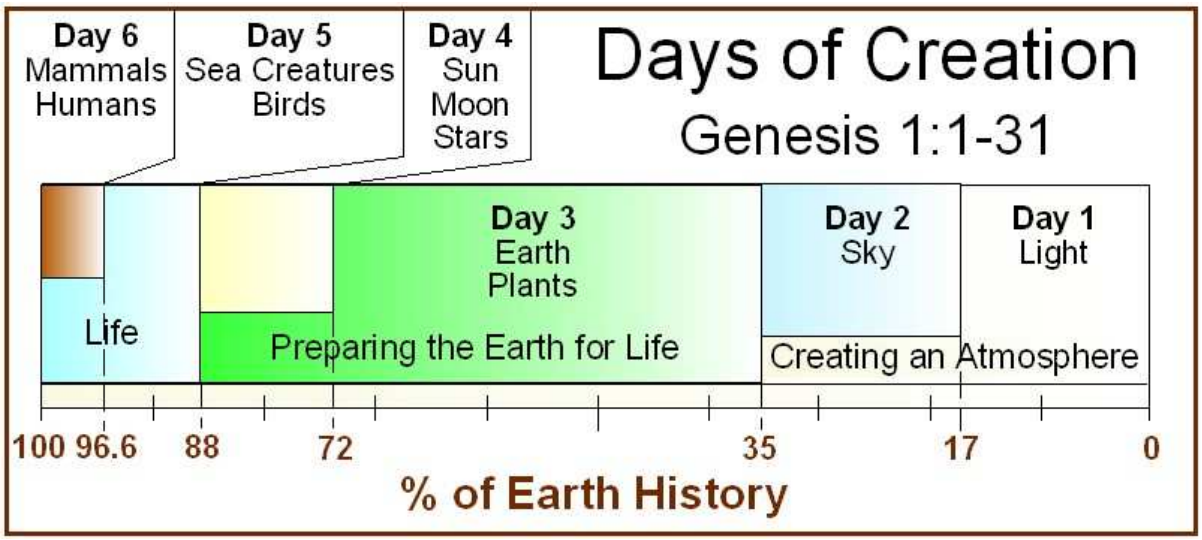

Figure 8.1: These are the approximate time periods for the creative days described in Genesis Chapter 1 of the Bible. Interestingly, the events of each day fit a *repetitive* mnemonic device for remembering the order of creation. It has been long recognized that the creative days can be divided as follows: **D-1**) *Heaven* (light); **D-2**) *Heaven—Earth* (Water in heaven and water on earth); **D-3**) *Earth* (Dry land and plants); **[Notice the repetition] D-4** *Heaven* (Sun, Moon, and Stars); **D-5**) *Heaven—Earth* (Birds and ocean creatures); **D-6** *Earth* (Land animals and Humans). This may mean that the divisions may not be absolutely sequential and have been arranged for convenience. Whether this is a precise observation or not, the Bible is nevertheless an accurate guide for the relative stages of creation.

Page 100 COSMOLOGY IN THE GENESIS ACCOUNT

q-100.1 How does the "Big Bang" theory harmonize with the Biblical description of creation?

The Big Bang theory was originally opposed because, at that time, the majority of cosmologists preferred a steady state concept. The steady state idea suggests that matter is eternal and comes into existence and goes out of existence at a constant rate. The thought of the universe popping out of nothing sounded a lot like a creation scenario and so was avoided as much as possible. This probably explains the cool reception the concept first received among cosmologists in 1927 when it was introduced by a catholic priest named Georges Lemaitre, a professor of physics and astronomer, at the Université catholique de Louvain. Lemetre used Einstein's theory of relativity to mathematically prove that the universe originated from a "primeval atom," and gave a copy of his article to Einstein for review. This led to the somewhat famous but incorrect statement by Einstein, saying "Vos calculs sont corrects, mais votre physique est abominable" (Your math is correct, but your physics is abominable). The main opposition to the concept appears to be its similarity to the Christian/Jewish account of creation found in Genesis 1. The thought that Lemaitre was influenced by his religious beliefs was not without foundation. This thought is embodied in his famous description of the beginning of the universe as "a day without yesterday," which was a clear reference to the creation account in Genesis. Interestingly, this is a good example showing that a believer in intelligent design is capable of making a significant contribution to scientific research though not fully appreciated at the time. A few years later, Lemaitre revised his Big Bang theory of originating from a primal atom to be what we now call a singularity. Though initially at odds with Lemaitre's work, Einstein nevertheless encouraged him to continue his research because of a personal discomfort with what Einstein called his "cosmological constant" and his recognition of the mathematical limitation to how long a static universe could exist. After it was generally accepted that the universe was expanding, Einstein described his cosmological constant as the "biggest blunder" of his life. However, the discovery of cosmic acceleration in the 1990s has renewed interest in his cosmological constant and so Einstein may have been smarter than he thought even if it was for the wrong reasons.

q-100.2 What change of perspective takes place in Genesis 1 between verses 1 & 2?

In Genesis verse 1, we are made to feel we are seeing the BB occur as if in a movie with the narrator describing the event. However, in verse 2, the earth's surface becomes our stage and the focus of our attention. It is as if we are now suspended just above waters which we sense by the presence of God's Spirit whirling around us like a mighty wind. We can't see anything though, because total darkness engulfs everything. Mingled with these sensations there would probably have been a cacophony of sounds due to an abundance of gasses being released from underwater volcanic vents along with the thunderous blasts of a primitive atmosphere trying to stabilize itself.

q-100.3 Why might we now be interested in what secular geologists have to say about the history of the earth?

We want to know if the Bible is relevant in describing the creation of the heavens and earth. Maybe its only be a metaphor intended to describe the concept of creation in simplistic or poetic form. That is the way other books of the Bible describe some of the creation events. For instance, the Scripture we just considered at Job 38:6, refers to the earth's "foundation." as if it were constructed with masonry blocks. It should be obvious to any of us that the earth does not have a literal cornerstone as a part of its literal foundation.

Page 101 Formation of the Sun; Origin of the Solar System

q-101.1 Describe the "Nebular Hypothesis" regarding how our sun was formed, and what can be said about the details?

The nebular hypothesis (NH) is not new. Emanuel Sweedenbord proposed it for our solar system clear back in 1734. The philosopher, Immanuel Kant (1755), became interested and added his ideas on the mechanics of the process. Currently, planet formation in accord with the NH is said to be supported by astronomical observations and theoretical modeling. Going from a 1 km planetesimal to 1,000 km sized body is fairly well understood. However, for a 1cm particle to coalesce naturally into a 1 km planetesimal is still a mystery.

A small group of particles has very little internal cohesion and would be expected to fly apart at the slightest disturbance. Figure 8.2 uses elements (a) to (e) to illustrate the process by which large clouds of cold molecular hydrogen slowly contract by gravity and other forces into a conglomeration of rocky boulders of various sizes and shapes surrounding a central nucleus. Eventually, after another long period of time, the entire mass collapses into a fully developed star or under some circumstances into a solar system with planets revolving around it, as shown in element (f).

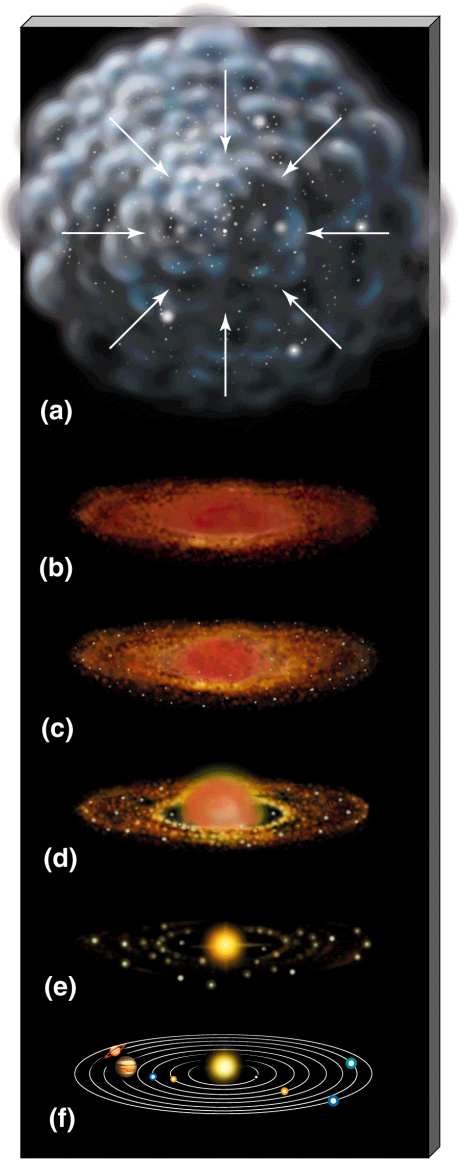

Figure 8.2: The Nebular Hypothesis was first proposed in 1734. Why planets do not form around all stars is still a puzzle.

q-101.2 What are some of the problems that arise when trying to describe how our solar system formed naturally?

Because of the earth's absolutely necessary positioning requirements relative to the sun and moon, the probabilities of a natural formation of our solar system approaches the miraculous. It is now understood that life on earth would probably not have occurred without the moon being exactly where it is. This is due to the moon's influence on the earth's tilt and climate. Since *The Source* was written, the Giant Impact Hypothesis has been developed as a natural explanation for the moon's formation. It is hypothesized that the earth and another planet presently named Theia were forming in a close but slightly different orbital path around the sun. However, Theia's orbit became unstable for various suggested reasons when the planetesimal grew to be about the size of Mars. This instability changed its orbit and speed enough that it collided at just the right angle (another miracle ??) with earth in a "giant impact." It is calculated that this event occurred about 4,533 Mya. As a result of this precise angular collision, Theia split apart with its interior core plunging deeply into the earth but its outer crust was somehow deflected into space and consolidated, by gravitational attraction, into our moon. All of this sounds very iffy, but it is the best explanation available at this time. It would appear to us that this entire series of events was either miraculously done by

being guided directly by the external power of God's creator-Word or pre-determined in advance and mechanized in some way we have yet to discover.

Page 102 Formation of the Earth; Asteroids

q-102.1 How is the earth supposed to have formed?

The earth is said to have formed by accretion, that is, by the accumulation of smaller chunks of mass through the natural effects of gravity. The earth is called a rocky planet as distinguished from "ice planets" and "gas giants." Rocky planets generally form close to the sun because of their higher melting points and greater density. Larger gas and ice planets form in the more peaceful and colder outer regions of a developing solar system where the sun's heat and gravity are less intense.

q-102.2 What happened to the earth's position each time it was hit by an asteroid?

There is a direct relationship between orbital speed, radial distance from the sun, and planetary mass. During accretion, the orbital speed and distance of the growing mass is constantly changing. For instance, if the earth is hit by a large asteroid that changes its mass or speed, then the position of the entire orbit would change except for the original location on the orbit where the earth was hit. If it were not hit again, the earth would continuously return to the exact point in the orbit where the collision occurred, but would follow the new path everywhere else. Each subsequent hit would again relocate the existing path of the orbit, except at the point of collision.

q-102.3 Describe the "continuously habitable zone."

The "continuously habitable zone" (CHZ) is the precise distance from the sun where life as we know it can survive. To remain within the CHZ, the earth's orbit cannot vary by more than 5%. However, based upon the science of orbital mechanics or astrodynamics, it seems almost impossible for the earth to have ended up with such a well-shaped orbital path by accident, as discussed in Question 102.2.

q-102.4 What do the moon's craters indicate?

Because erosion on the moon's surface is almost nonexistent, we believe that many craters were the result of the "great bombardment" that happened during the conclusion of the formation of the rocky planets. Other factors, such as reduced gravity and faster cooling after impact, have left a visible record on the moon's surface of this planet-building activity. Other planets, such as Mercury, also have similar impact-pocked landscapes. Mercury contains one of the largest impact sites, (the Caloris Basin), ever observed. This is positive evidence that there was a period of time when the mass of the planets was significantly increased by impacting celestial bodies of one kind or another. What happened to the moon must likewise have happened to the earth because of their close proximity to each other. Additionally, such severe activity could not have taken place after the final formation of the earth and moon, otherwise their relative positions could not have been maintained, nor would ecological conditions have been able to continuously support life as we find it in the fossil record. This evidence is very difficult to explain in terms of "instantaneous creation." Evolutionary critics of fiat creationism say that the moon's craters are just another example of God's seeking to mislead us.

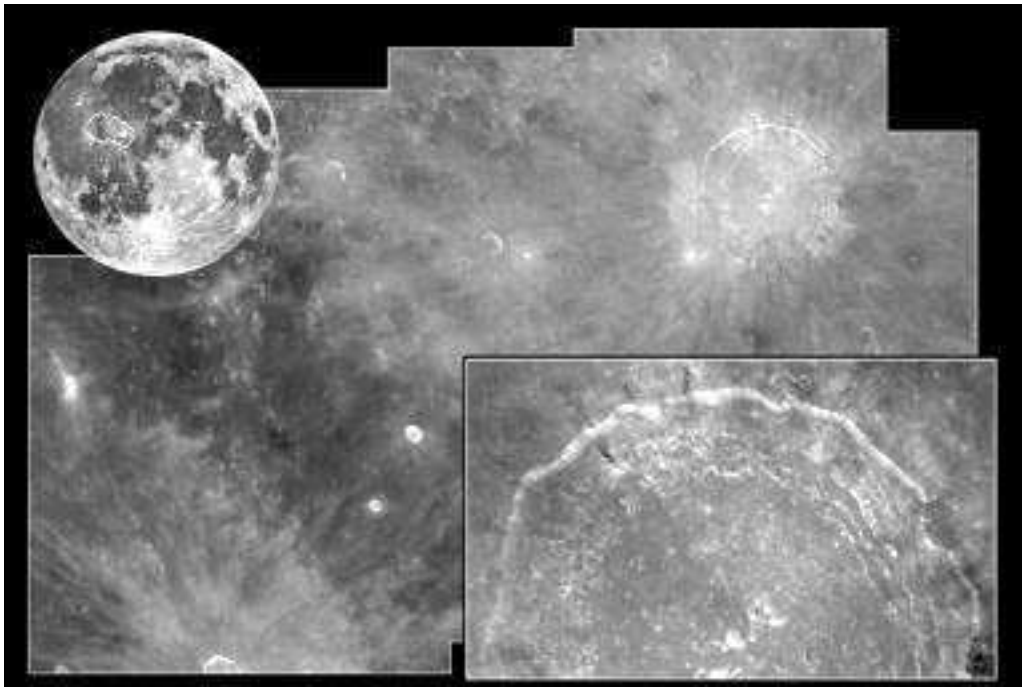

Figure 8.3: NASA Image -- NASA's Hubble Space Telescope was aimed at one of the Moon's most dramatic and photogenic targets, the 58 mile-wide (93 km) impact crater Copernicus. The image creation date is listed as April 16, 1999 and the instrument was the Wide Field Planetary Camera 2.

Page 103 HISTORICAL GEOLOGY IN THE GENESIS ACCOUNT: Comets; Atmospheric Temperature

q-103.1 From where do most comets originate?

Where they come from is largely based upon whether they are short- or long-period comets. Short-period comets visit us in cycles of less than 200 years and are believed to originate in the Kuiper belt, while comets with long periods usually come from the more distant Oort cloud. The Kuiper belt (K) (which rhymes with *viper)* is a large group of potential comets and asteroids similar to the Asteroid Belt situated between the orbits of Mars and Jupiter. However, the KB occupies a position beyond the orbit of Neptune that may extend as far as 55 AU from the sun. (Astronomical Unit is the distance from earth to sun or 93,000,000 miles) The Oort cloud, which is believed to be the source of long-period comets (orbits taking longer than 200 years), occupies an unbelievably large zone that is difficult to define because of its complexity. Its primary location is estimated to be between 2,000 to 5,000 AU but may extend as far as 50,000 AU from the sun. To make matters worse, there is even some evidence that it may extend to the outermost extent of the Sun's gravitational influence or to about 100,000 to 200,000 AU. Even though the number of potential comets and asteroids may number as many as 1 trillion, their combined mass may only be the equivalent to 1 to 3 times the mass of the earth. Both KB and the Oort cloud are thought to be debris left over from when the solar system formed. However, there is still a lot about their development that is hard to explain. Because of the significant role asteroids and comets have played in earth history, one can speculate that God knows their number exactly and purposed to use their practically unlimited interaction potential to accomplish His will for the earth.

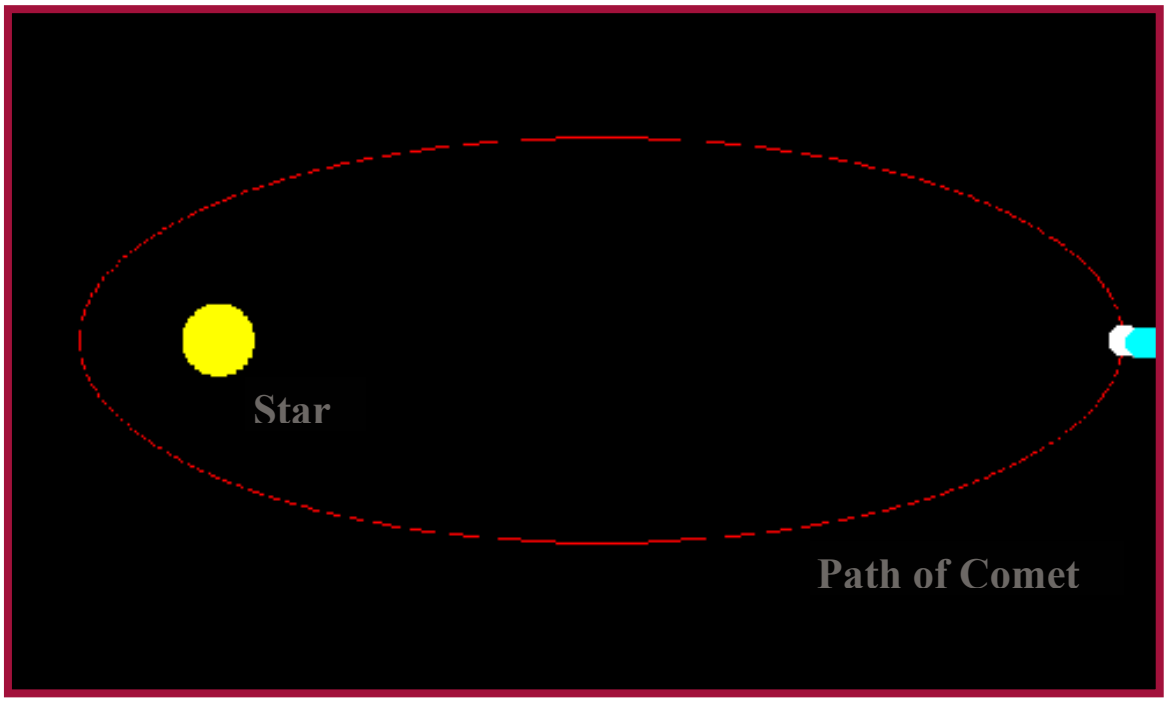

Figure 8.3: Click here to learn more about comets This picture intends only to show the comet's tail pointing away from the sun at all times. The orbit speeds are incorrectly portrayed. The actual speeds are increased as the comet approaches the sun and reduced when leaving.

q-103.2 What factors have helped to regulate the earth's surface temperature?

A combination of factors, which include variable sun energy output, variable heat discharged from the earth, and variable atmospheric components has maintained an environment that was able to support life throughout the earth's history. These compensating factors are evidence of design in maintaining a life-supporting environment for the developing earth, despite conditions that could be very hostile.

Page 104 Figure 8.1: First Event

q-104.1 Why was there darkness over the whole earth?

Because of the sun's dim output, interstellar debris left over from the formation of the solar system and earth's reasonably opaque atmosphere caused by volcanic eruptions and suspended water vapor, the early earth was totally dark at the surface. There may have also been occasional flashes of light from subsurface volcanic eruptions venting to the ocean's surface or from lightning constantly being created by the earth's highly charged atmosphere.

Page 105 Surface Water; Light

q-105.1 Where did most of the earth's water come from?

It is not very likely that much of the water found on the early earth came from the accreted rocks located in the earth-orbit because they would be too close to the sun for water to exist on or within them in free form. Therefore, it is believed that the water must have come, for the most part, from asteroids originating in the outside perimeter of the asteroid belt between Mars and Jupiter. This region is far enough from the sun to allow useful percentages of water to be retained by its rocky components. Chemical analysis of modern water bearing asteroids seems to support this hypothesis. The same chemical analysis excludes most comets from being a significant contributor to earth's original water supply.

q-105.2 What condition is said to have existed about 4.2 Billion years ago?

This date has now been revised to about 3.8 Billion years ago according to the latest evidence involving what is called the "Late Heavy Bombardment." This would likely have been a condition that would agree with the Bibles description of the earth at Genesis 1:2

Page 106 Secondary Atmosphere

q-106.1 What had to happen in order for the sun's light to reach the earth?

This event would appear to describe the transition between what is called the primary and secondary atmospheres that are normal for planetary development. The primary atmosphere is believed to have been much thicker and up to 250 times heavier than today, which partially explains why the earth originally was found to be in total darkness. By this transition time, the interstellar space between the sun and the earth was probably swept clean of the fine residual dust by solar radiation. Additionally, as the primary atmosphere began its conversion into the secondary atmosphere, the sun's light would reveal itself as a progressive illumination of the whole upper regions of an apparently thinning atmosphere. If you were observing these events from the earth, you would find that for the first time, you could start to see a regular cyclic change between night and day with the effect getting brighter and brighter with each passing day. However, despite the increased brightness, intervening atmospheric conditions would still not reveal the exact sources of the light. This seems to coincide with the events described at Genesis 1:3-5, that characterized the First Creative Day. See *The Source* Figure 8.1: First Event.

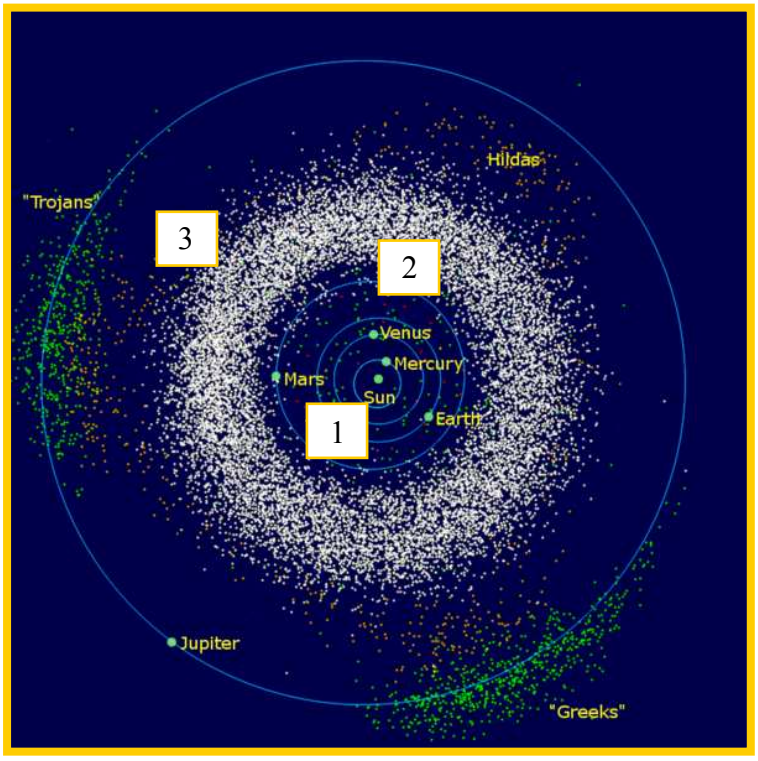

Figure 8.5: The relative location of the Asteroid Belt. **(1)** Earth orbit too close to the sun to allow water in small planetesimals. **(2)** Being closer to the sun, the inner Asteroid Belt has 1/100 the water compared to the Outer Asteroid Belt. **(3)** The Outer part of the Asteroid Belt is believed to be where most of the water-bearing asteroids originated.

q-106.2 What replaced the foggy atmosphere, and what was it called in the Bible?

The increased brightness of the upper atmosphere that ended the First Creative Day was also the starting conditions for the Second Creative Day. The development of the Secondary Atmosphere continued with an increase in daytime surface temperatures causing the formation of an upper cloud cover over a blanket of reasonably transparent air. This new atmosphere was composed of a lot more carbon dioxide and water vapor than we have today, along with some nitrogen' but little to no oxygen as of yet. To an observer below, it would appear as if a thin, transparent, shell of some sort was supporting the clouds or "waters" above, as they are described in the Bible. This support system was called either the "horizon" or "expanse" or "firmament" or "arch" or "dome" or "heavens" or "sky" depending upon which translation you use. This special time period could also be thought of as the start of the transition from the secondary atmosphere to the third and final atmosphere we have today. It developed slowly by

means of the events taking place on the Third Creative Day.

q-106.3 What do laboratory experiments indicate about the impact of the secondary atmosphere?

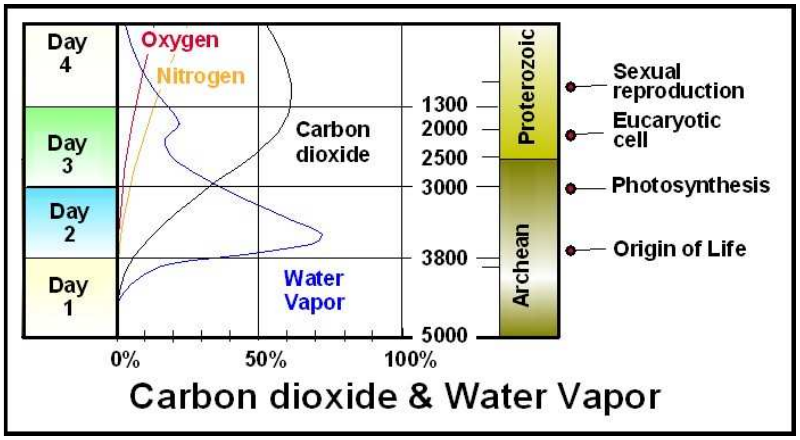

Figure 8.6: The Secondary Atmosphere caused high amounts of Water Vapor and Carbon dioxide to be released because of increased volcanic activity. As shown, this period is believed to have occurred starting approximately 3,800 Mva.

Modern laboratory experiments have shown that amino acids which are necessary components of proteins and life's processes could exist and thrive in this type of environment. However, modern experiments have also shown that it is not considered feasible to be able to naturally develop all of the chemicals necessary for life under these early conditions. The once hailed *primordial soup* as being a place for life to develop is no longer considered a viable option. For instance, the famous Miller-Urey laboratory experiment that produced 13 of the 22 essential amino acids used for making proteins has reached a disappointing dead end. Further experimentation by Miller has shown that finding an earth environment suitable for the natural development of all the life supporting amino acids is unlikely. Miller has determined that the amino acids, *adenine* and *guanine* need freezing conditions to synthesize while *cytosine* and *ureic* need to be boiled to get them to work. These structures form the basis for the DNA molecule and are absolutely essential for cellular reproduction. To date, there is still no agreement regarding where and how life got its start on earth. The current trend being included in recent educational television broadcasts is to suggest that life started somewhere below the surface of the earth in extremely hot conditions. Today, the descendants of these ancestors are called extremophile archaea and can be seen in places like the hot springs of Yellowstone National Park.. This idea is the primary motivation for the current push to explore below the surface of Mars to see if any evidence for life can be found.

Page 107 Figure 8.2: Second and Third Events

q-107.1 Why would an observer say that there were "waters" above and below the "sky?"

From an observer's perspective, the developed cloud cover would appear as if it were a large celestial dome reflecting the ocean's color with its edges resting on the surrounding horizon.

Page 108 Super continents

q-108.1 What likely caused the earth's first "spreading center" to form?

In the 1960s, Harry Hess from Princeton University proposed the idea that the sea floor was moving and carrying the continents along with it. One of the clues that put researchers onto this idea that the earth's crust might be moving was the discovery of bands of alternating magnetic field changes locked within its rocks. It is now recognized that the ocean's supporting crust is moving because of convection currents within the weak semi-solid, upper mantle called the asthenosphere. These movements are caused because hotter interior molten rock rises and churns like a boiling pot of water. When earth's solid crust is encountered, large sections are lifted and split until the upwelling molten rocks are finally forced to slump laterally along the underside of the uplifted crust. Consequently, the overlying broken crustal material is then

carried in the direction of the mantle's churning motion due to the frictional forces developed between the two different materials. This continues until the cooling mantle rocks sink downward toward the earth's interior and get reheated. Then the process starts all over again and develops into what is called a "convection cell." Usually, a long mountain chain grows upward along both sides of where the earth's crust splits apart.

q-108.2 What began to form underwater on the side of the earth opposite the spreading center?

A single mass of land began to accumulate under water as the lightweight crustal material collided and piled up. The colder and more dense mantle material was deflected down into the earth to be remelted as it traveled toward the center of the earth. This hemispheric type of convection cell would be broken up into multiple cells when the developing core finally merged together. This means that oceans and continental crust existed within 150 million years of Earth's formation.

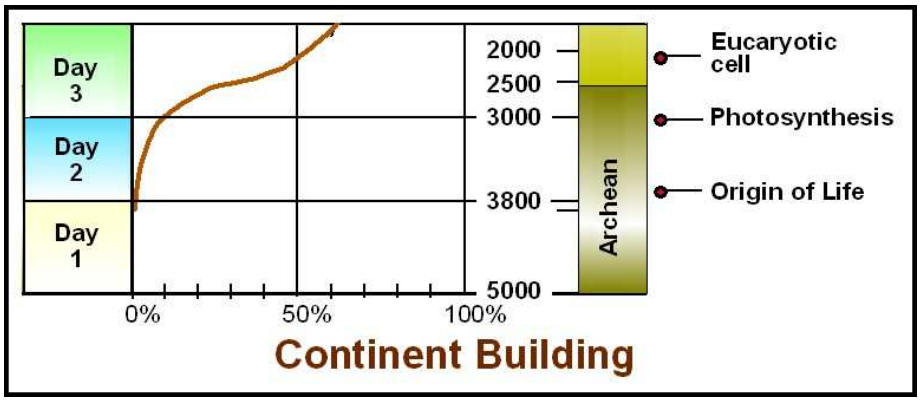

Figure 8.7: Some of the oldest rocks to date found in Australia indicate that deep water oceans existed and continental building was in full progress between 3,400 to 2,800 Mya. Based upon the chart above, up to about 50% of today's continental crust was developed by 2,100 Mya.

q-108.3 Why would the ocean be shallow over the spreading center region?

The spreading center is uplifted and grows into a mountain chain. This increased bottom elevation is closer to the ocean's surface, causing the depth to actually decrease. The excess water flows out of the area laterally as the bottom rises.

Page 109 Figure 8.3: Fourth and Fifth Events

q-109.1 What entity did God command to produce vegetation?

God said "*let the earth put forth [tender] vegetation: plants yielding seed and fruit trees yielding fruit whose seed is in itself, each according to its kind, upon the earth. And it was so." (Genesis 1: 11).* This indirect command could have significant implications. How can the earth produce all the varieties of plants we see today? One way would be by plants adapting to the various environmental niches in accord with the prevailing weather conditions. This has caused some plants to develop so uniquely that they are not found anywhere else on earth. Though it may not be apparent, when this command was first given by God, it was the start of a long process. When land first appeared, it was probably solid rock. Before the type of plants we are familiar with could grow, topsoil had to be developed. So one could naturally anticipate that the first plant life would be mineral digesting bacteria and other related species that can eat rock and convert it into useful byproducts. True to this expectation, that is what we actually find in the fossil record. These microscopic plants and bacteria were also absorbing carbon dioxide and producing oxygen, which had a clearing effect on the atmosphere. We will talk more about the results of this cleansing activity during Creative Day Four.

Figure 8.8: A good example of the earth producing unique plants can be found in the western part of the Indonesian archipelago called Sundaland. Of the 25,000 different species of plants found there, 15,000 of them cannot be found anywhere else. This is also the home of the largest flower in the world, the rafflesia arnoldi, which weighs 15 pounds (7 kg). Its petals grow to 1.6 feet (1/2 meter) long and 1 inch (2.5 cm) thick. There are 16 species of rafflesia, found in Sumatra, Malaysia and Borneo. The species is named after the naturalist Sir Stamford Raffles, who founded the British colony of Singapore in 1819. Raffles discovered the parasitic plant with his friend Dr. Joseph Arnold during their travels in May 1818. Rafflesia arnoldii shown here is the largest species and its blossom can attain a diameter of nearly 3 feet and can weigh up to 25 (11 kg) pounds. Not only is it the world's largest flower, it is one of the most bizarre and improbable organisms on the planet.

Page 110 First Plant Life

q-110.1 Why is the Bible's description of how "land appeared" remarkable?

It is remarkable because, normally, you envision the original creation of land as a large mass rising up from the sea. There would have been no problem with God just saying, "Let the dry land appear." However, the Bible offers more technical information by implying that the land formed underwater and wasn't exposed until the ocean was drained away. Geologically speaking, this makes better sense than just saying the dry land suddenly appeared without further explanation. We now understand that when a continent-building spreading center develops, it pushes the underlying mantle rock up which would cause the ocean depths to change around the world. As a result, the depth of the ocean on the opposite side of the earth, where the extruded mantle mass collides to form a continent, is made considerably deeper. However, when a different convention cell begins to operate in a new location, the ocean depth is again changed all over the world. In the process, the water covering the developing continent opposite the spreading center gets much shallower until it eventually drains off the land just as the Bible describes. Geologists have named the first super continent formed, Ur. For more information about Ur, Click Here. Figure 8.9 illustrates the concept and you can see the process dynamically illustrated by selecting the animation.

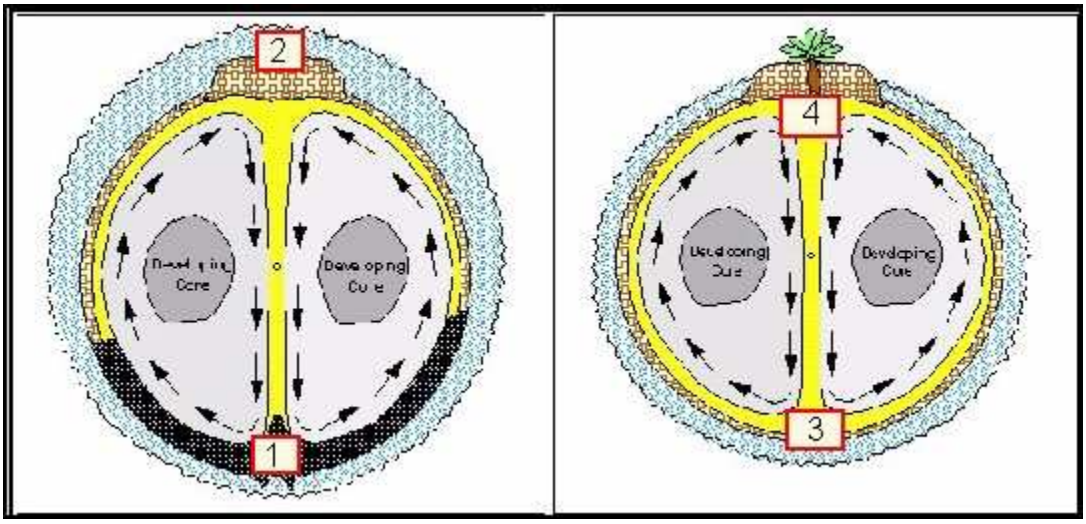

Figure 8.9: Click here for Animation of Process. (1) The extruding magma at the spreading center bulges the earth's surface, causing water to move to area (2). (2) The ocean gets deeper in this area and covers the developing continent. (3) When the spreading center eventually becomes inactive, water flows back into this area causing the local depth of the ocean to rise. (4) At this location, when the water flows back into area (3), the continent that was growing beneath its surface is exposed. This is just as the Bible says at Genesis 1:9, *And God said, "Let the waters under the heavens be collected into one place [of standing], and let the dry land appear."*

q-110.2 How far back do the earliest trace fossils of living cells date?

The current view is still about the same as when *The Source* was written. However, these are not actual fossils of dead organisms. The proposed dates for the first life forms are determined through a chemical analysis of very old rocks that appear to support the theory that life may have already existed on earth as far back as 3,850 Mya. This is based upon an isotopic fingerprint of the carbon atom found in reformed melted sedimentary rocks. This combination can only exist if living metabolic processes are present when the semi-liquid rocks solidified. The specimens currently used for analysis are from the recrystallized Isua Greenstone Belt in Western Greenland and from similar formations in the nearby Akilia Islands. These are sedimentary rocks that had been involved in early continent building. This means that oceans and continental crust material existed within 150 million years after Earth's official formation. This early emergence of complex life can be considered remarkable and is a challenge to the idea that life developed naturally. With regard to fossils of living cells, the earliest preserved stromatolites made up of cellular life date to 2,724 Mya. (http://en.wikipedia.org/wiki/Stromatolite) However, according to an article in Nature magazine in June of 2006, tests are being conducted on a 3,430 million-year-old chert believed to contain fossilized living cells.

Page 111 Precambrian Era

q-111.1 How complex was the first life to appear?

Today we have knowledge of 24 cyanobacteria whose genomes have been sequenced and compared. These various organisms occupy a wide variety of environmental niches and play major roles in regulating global carbon and nitrogen cycles. Many of these structures have remained unchanged from the first time they were observed in the fossil record, which may extend clear back to the beginning of life on earth. The smallest and most abundant today is Prochlorococcus, which also has the smallest genome size of 1,700,000 nucleotides (the basic

four chemical structures that make up the DNA molecule). This is the minimum size genome known for a photosynthetic organism. So, as you can see, the first life forms were by no means simple.

q-111.2 The relatively quick emergence of complex life forms has caused Dr. Crick to make what suggestion?

Dr. Crick has theorized that life must have come from outer space. That is the only way he can conceive of having enough time for life to develop naturally. The observed time period in the fossil record for the natural development of life is far too short.

q-111.3 Though the first life was actually a "bacteria," why might an observer call it a plant?

First of all, we do not know what God considers to be a plant compared to what we consider to be plants. Many bacteria behave like plants and can produce oxygen by photosynthesis. Also, many of these bacteria look like green grass because they link together into long strands. If we saw the land completely covered by a form of cyanobacteria, it would probably look like it was covered with thick green fuz This may have been what was meant by the Hebrew word "deshe" translated as "tender grass" or herb. The large amount of oxygen needed to support higher life forms is considered to have been first created by the activities of ancient cyanobacteria. This was due to their ability to initially fix nitrogen without oxygen being present. These prokaryote cells have DNA but no nucleus. They were the earliest life forms on Earth, and they still make up the bulk of the Earth's biomass of life. Over time, this new life began to transform the Earth's atmosphere into what we have today.

Page 112 Figure 8.4: Sixth Event

q-112.1 Where did the sun, moon and stars of Genesis 1:14 come from?

The sun, moon, and stars were all created "in the beginning" as stated in Genesis 1:1. Since they were already existing, the logical conclusion is that they became visible during the Fourth Creative Day. This explanation, however, is seriously contested by those who identify themselves as Young Earth Creationists. They believe that the sun, moon, and stars were literally created on the fourth day. For the preceding three creative days, they say, the earth existed all alone in space. In fact, in the book *Refuting Compromise*, the author Jonathan Sarfati, observes, "the creation of the sun after the earth also fatally undermines progressive creationists' attempts to harmonize the Bible with billions of years." He then employs what can be simply described as using the science of linguistics to disprove the science of physics. After a lengthy discourse, Dr. Sarfati concludes by saying that he checked 20 major Bible translations which "all clearly teach that the sun, moon, and stars were *made* on the fourth day." While one can admire his diligence, we believe he overlooked a significant detail that, in our opinion, will require many more volumes of language science rhetoric to explain how it was that God placed the sun, moon and stars **under** "the waters above."

Genesis 1:6-7 And God said, Let there be a firmament [the expanse of the sky] in the midst of the waters, and let it separate the waters [below] from the waters [above]. (7) And God made the firmament [the expanse] and separated the waters which were under the expanse from the waters which were above the expanse. And it was so.	**Genesis 1:16-17** And God made the two great lights--the greater light (the sun) to rule the day and the lesser light (the moon) to rule the night. He also made the stars. (17) And God set them in the expanse of the heavens to give light upon the earth,	**Table 8.1:** You will note that in ***Genesis 1:7***, the "*expanse*" or arch separates the waters below and above. However, in ***Genesis 1:17*****,** we are told that God set the sun, moon and stars *"in the expanse."* This places them below the *"waters which were above the expanse."* How do you explain that?

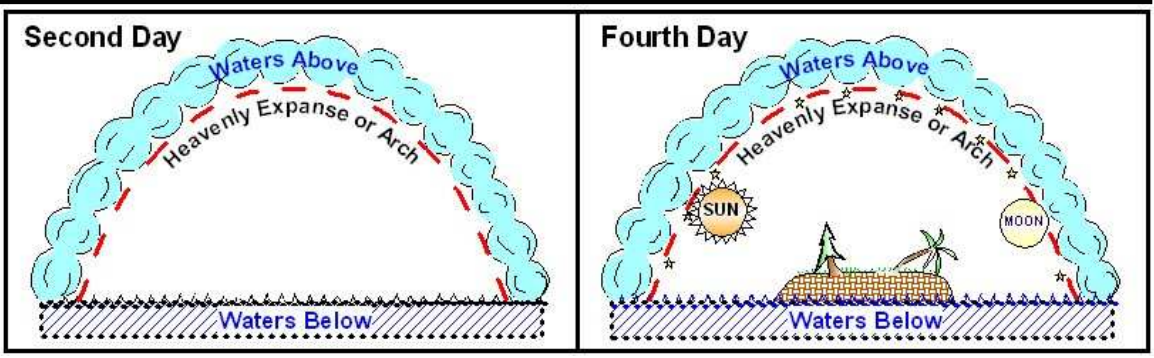

Figure 8.10: *The Bible in Basic English* says at ***Genesis 1:7*** *"And God made the arch for a division between the waters which were under the arch and those which were over it: and it was so."* And then at **Genesis 1:17** *"And God put them [the sun moon and stars] in the arch of heaven, to give light on the earth ..."*

Page 113 Anaerobic Cells; Aerobic Cells

q-113.1 About how long was the "Precambrian era?"

The Precambrian makes up most of earth's history. Within the last 10 years, more discoveries have occurred in China that push the Cambrian period back from 550 to 542 Mya. Nevertheless, it still appears that Precambrian occupies about 87 to 88 % of earth-history.

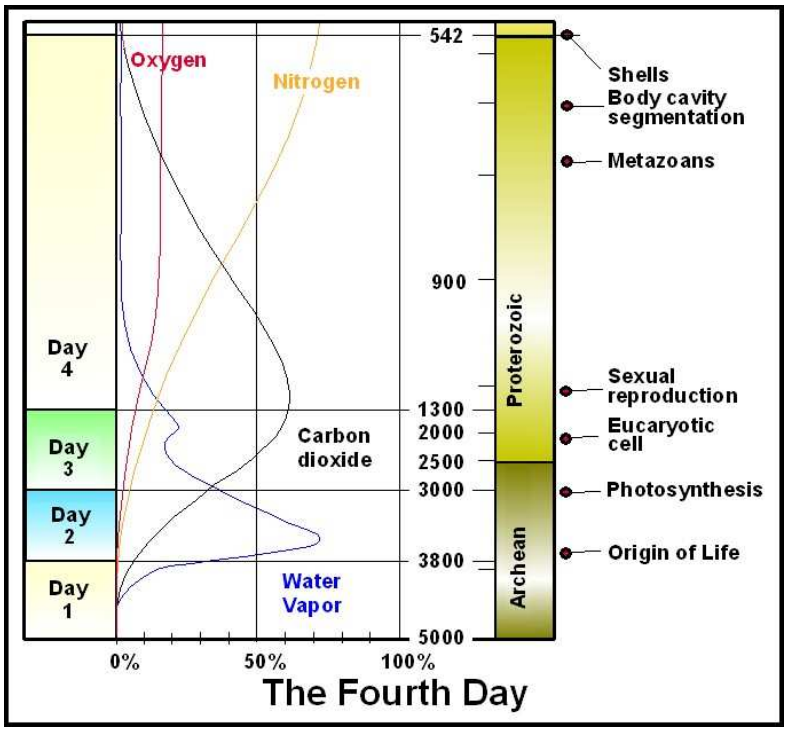

Figure 8.11: The microscopic life that was the beginning of what God called plants on Creative Day 3, began to clear the atmosphere by removing the excessive carbon dioxide and generating the oxygen and nitrogen we need today to live. Oxygen breathing life as we know it could not begin until this was accomplished. The job was completed at the conclusion of Day 4, or about 543 Mya. This preparation time was known as the Precambrian period and it comprised about 88% of the earth's history.

q-113.2 What factors restricted the immediate development of numerous life forms?

The atmosphere had to be generated to protect the earth from the harmful effects of the sun and to provide air to be used to support living creatures. The earth also needed a good layer of topsoil before any plants (as we know them) could grow.

q-113.3 How could the first living cells survive with no "oxygen?"

The first forms of life were "anaerobic" and didn't need oxygen. Instead, they were used to produce oxygen.

q-113.4 When did the direct production of oxygen begin and with what results?

Oxygenic photosynthesis was the biggest boost for the creation of oxygen. However, such oxygen producing life could not start immediately because it also needs oxygen to live. So before there was sufficient atmospheric oxygen, major photosynthesis could not begin. When such plants finally did arrive, the oxygen content of the atmosphere increased more rapidly. In nature, free oxygen is produced by splitting the water molecule during photosynthesis. That is one very important reason why plants need water. Fortunately, most of our oxygen supply comes from plants that are always in water. This is because green algae and cyanobacteria that live in the ocean along with other marine environments provide about 70% of the free oxygen produced on earth with the rest being created by land plants.

Page 114 Balanced Atmosphere

q-114.1 As the cloud cover became increasingly transparent, what would an observer notice about the heavens?

With the introduction of life, the earth would start developing its third and final atmosphere (which still exists today). At some point in time, the protective cloud cover developed on Creative Day Two dissipated and the actual sun, moon and stars became visible and could be seen more regularly from the earth's surface. By these means, for an earthly observer, these bodies came into existence in a functional way. The earth was being made ready for supporting life forms that would use these light sources as guidance beacons.

q-114.2 How have some geologists viewed the ability of the earth to control its surface temperature?

They marvel at how stable the atmosphere appears to be despite being under constant contamination pressures both past and present. This stability is achieved by a built-in check and balance system that carefully monitors carbon dioxide and maintains just the right level for all occasions. That is one reason why the "Global Warming" issue may take care of itself without human interference.

q-114.3 What is the difference between the Biblical and geologic records of creation?

The Bible tells us the "who and why" about the earth's creation. The geologic record can be said to tell us "how and when" God created the earth.

Page 115

q-115.1 What conclusions can we draw from letting the earth speak?

We should be grateful and fascinated that God has left a record of His handiwork for us to study. The more we learn about the universe and its complexities, the more we appreciate how much work God has done to provide us with a comfortable home in which to live.

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End of Chapter 8