

Science and the Scriptures

“In antiquity and in what is called the Dark Ages, men did not know what they now know about humanity and the cosmos. They did not know the lock but they possessed the key, which is God. Now many have excellent descriptions of the lock, but they have lost the key. The proper solution is union between religion and science. We should be owners of the lock and the key. The fact is that as science advances, it discovers what was said thousands of years ago in the Bible.” – Richard Wurmbrand, *Proofs of God's Existence*

Scientific Allusions in Scripture.

The Bible abounds with references to nature and natural processes and thus frequently touches on the various sciences. Those who say the Bible is not a book of science have not read it closely enough.

However, the writers of the Bible do not attempt to formulate these statements in the terminology of a modern chemical or biological treatise. They use every day language comprehensible to all readers, describing the phenomenon in simplest terms.

Nevertheless, they are always amazingly accurate, even when tested by the most rigorous scientific requirements. The so-called scientific mistakes of the Bible are not mistakes at all, nor do they have to be allegorized or explained as cultural accommodations or conventionalities.

METEOROLOGY

Clouds are balanced, spread, and are numbered.

- Job 36:29 Can anyone understand the spreading of the clouds, the thundering of His pavilion?
- Job 37:16 Do you understand how he balances the clouds with wonderful perfection and skill?
- Job 38:37 Who can count the clouds by wisdom, or tip the water jars of the heavens,

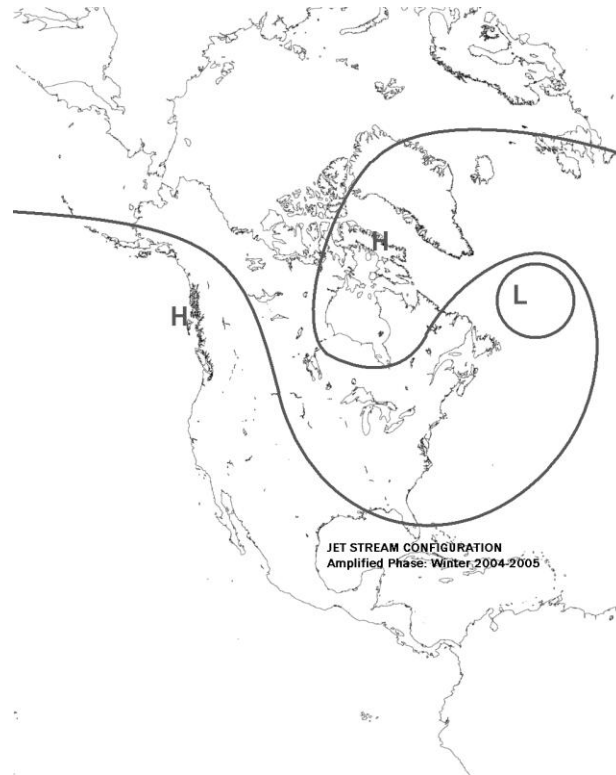
In 1860 A.D. differences in pressure were found to cause wind. It took until 1930 A.D. before it was demonstrated that atmospheric pressure and temperature cause clouds. Twenty years later, in 1950 A.D. thunderstorms were shown to provide the electrical flow to allow the atmosphere to maintain its proper electrical balance. Scientists determined that it requires 1800 thunderstorms at a time to do this. This implied there had to be at least are 1800 thunderstorms at all times. Ten years later, in 1960 A.D. weather satellites observed 1800 thunderstorms at a time. The earth's heat is also properly balanced by storms.

Barometric Pressure

- Job 28:25 When He imparted weight to the wind and meted out the waters by measure. It wasn't until 1643 A.D. that the barometer proved the wind has weight.

Circulation of atmosphere

- Job 37:9 Out of the south comes the storm and out of the north the cold.
- Ecclesiastes 1:6 Blowing toward the south, then turning toward the north, the wind continues swirling along; and on its circular courses the wind returns.



It wasn't until 1820 A.D. that the first weather map was made. And it wasn't until 1940 A.D. that air circulation patterns are discovered. Air warms at the equator, then moves toward the poles. As it cools, it travels south.

In the 1950s and the 1960s, Prof. Ye led a group of Chinese scientists engaging in the study of the dynamics of atmospheric general circulation. Among many others they found the significant differences in the balances of angular momentum, heat and energy between low and high-index circulation. For the first time, they studied thoroughly the formation, development, maintenance, and decay of blocking high in winter season in different regions of the Northern Hemisphere. They showed that the seasonal change from winter state of atmospheric circulation to that of summer was completed in a series of abrupt changes. His book *Some Fundamental Problems of the General Circulation of the Atmosphere* (1958) was one of the earliest publications in the dynamics of the general circulation of the atmosphere. However, the Teacher provides us in this passage a remarkable picture of what was to be a modern discovery - the world's great wind circuits, in the global circulation of the atmosphere.

Oceanic origin of rain

- Ecclesiastes 1:7 The rivers run into the sea, but the sea is never full. Then the water returns again to the rivers and flows again to the sea.

At its simplest level the water cycle is the balance of evaporation and precipitation. The energy from the sun causes water on the earth to evaporate, this vapor moves through the atmosphere and falls as rain, sleet or snow. The oceans which cover 71% of the earth's surface have an average depth of 3500m and contain around 97% of the water on the earth some 1,350,000,000 km³. Obviously this is salt water. Only 3% of the earth's water is fresh but it is not all available to humans since the next largest pool of water is tied up in the polar ice caps and continental glaciers — 33,000,000km³ or almost 2% of the fresh water. Estimates of the amount of ground water trapped below the earth are poor but it may be as much as 15,300,000 km³. Generally this water does not participate in the hydrological cycle but human activities can access it and water that is 1000s of years old such as in desert aquifers can be removed but not replaced thus upsetting the system. Water is also held in the soil around and between the particles — 122,000 km³. Of this, about half is estimated to be

within the rooting zone of plants. We depend primarily on the small pool of water in freshwater lakes and rivers which only makes up 0.3% of freshwater.

One of the smallest pools of water is actually in the atmosphere (13,000 km³) despite what we might think about the amount of rain that falls! This is because water is rapidly cycled through the atmosphere - every 12 days the pool is renewed.

Relation of electricity to rain

- Job 28:26 He made the laws of the rain and prepared a path for the lightning.
- Jeremiah 10:13 When he speaks, there is thunder in the heavens. He causes the clouds to rise over the earth. He sends the lightning with the rain and releases the wind from his storehouses.

Thunderstorms are formed when warm air rises quickly from Earth into the sky. As the warm air cools, it forms rain clouds called cumulonimbus clouds or thunderclouds. As the warm air continues to rise and cool inside the clouds, it drops water and ice. The water and ice then fall to Earth.

Lightning is caused by electricity moving in between clouds or between the clouds and the ground. The electricity is formed when ice and water particles move around rapidly inside the clouds. As the particles move they become oppositely charged and separate. The positively charged particles go to the top of the cloud and the negatively charged particles sit along the bottom of the cloud. The negative particles along the cloud bottoms grow large and are attracted to the positive charges on the ground. When the attraction between the different charges becomes strong enough, electricity flows from the cloud to the ground. This flow of electricity is a lightning strike. So in a very real sense a "way" is prepared for the lightning. (Job. 28:26)

Lightning lasts only a fraction of a second, but it is filled with energy and is very hot. It can reach temperatures that are much hotter than the sun. The heat of the lightning causes thunder. As the hot electrical charge passes through the air, it heats up the air. The heated air expands quickly and makes the loud noise we call thunder.

Fluid dynamics

- Job 28:25 He made the winds blow and determined how much rain should fall.

There are two basic effects on precipitation caused by mountains. There is the "orographic" effect and the "rain shadow" effect. The orographic effect happens on the windward side of a mountain. The rainfall amounts increase dramatically as you move farther up the mountain on the windward side. The orographic effect is why Kentfield, in Marin County can receive 1300mm of rain per year while San Francisco only 500mm.

The dual sword of snow.

- Job 38:22-23 "Have you entered the storehouses of the snow, Or have you seen the storehouses of the hail, Which I have reserved for the time of distress, For the day of war and battle?"

This verse has at times puzzled me. In what way would snow or hail be useful in times of distress or in battle? But then I found out that snow takes the nitrates from the air and deposits them on the soil which makes great fertilizer. However, as every good terrorist knows, nitrates are also used to make gunpowder and explosives.

HYDROLOGY

Hydrologic Cycle

- Ecclesiastes 1:7 The rivers run into the sea, but the sea is never full. Then the water returns again to the rivers and flows again to the sea.

- Isaiah 55:10 "For as the rain and the snow come down from heaven, and do not return there without watering the earth and making it bear and sprout, and furnishing seed to the sower and bread to the eater;

Hydrology is the science that encompasses the occurrence, distribution, movement and properties of the waters of the earth and their relationship with the environment within each phase of the hydrologic cycle. The hydrologic cycle is a continuous process by which water is purified by evaporation and transported from the earth's surface (including the oceans) to the atmosphere and back to the land and oceans. All of the physical, chemical and biological processes involving water as it travels its various paths in the atmosphere, over and beneath the earth's surface and through growing plants, are of interest to those who study the hydrologic cycle. There are many pathways the water may take in its continuous cycle of falling as rainfall or snowfall and returning to the atmosphere. Solomon gives us an excellent summary of the earth's hydrologic cycle, as confirmed scientifically only in modern times. Isaiah gives us an excellent spiritual application of the Spirit's work through the Word as well.

Evaporation

- Psalm 135:7 He causes the clouds to rise over the earth. He sends the lightning with the rain and releases the wind from his storehouses.

This is a striking anticipation of modern scientific understanding of the hydrologic cycle. The hydrologic cycle describes water evaporation from the oceans, transportation of the waters inland by the great atmospheric circulation and then electricity to activate condensation and precipitation. This verse is almost identical to the last part of Jeremiah 10:13 and Jeremiah 51:16. This suggests the possibility that the prophet Jeremiah may have written Psalm 135.

- Jeremiah 10:13 / 51:16 When he speaks, there is thunder in the heavens. He causes the clouds to rise over the earth. He sends the lightning with the rain and releases the wind from his storehouses.

Jeremiah certainly possessed a sound scientific concept of the atmospheric phase of the hydrologic cycle, involving the worldwide processes of evaporation, translation aloft by atmospheric circulation, condensation with electrical discharges, and precipitation.

Condensation

- Job 26:8 He wraps the rain in his thick clouds, and the clouds do not burst with the weight.

Only in recent centuries has this "balancing of the clouds" (Job 37:16) been explained. It refers to strong updrafts of air providing the force necessary to keep the water droplets in the clouds from falling to earth.

- Job 37:11, 16 He loads the clouds with moisture, and they flash with his lightning...¹⁶Do you understand how he balances the clouds with wonderful perfection and skill?

Although the language is figurative, the meteorology is accurate. The mystery of the "balancing of the clouds", keeping them aloft against the force of gravity, is mentioned in both Job 26:8 and 37:16. This mystery has been solved by modern science, so that it is now understood that the droplets of liquid water in the clouds are kept aloft by the force exerted by updrafts of wind. The droplets coalesce to form large drops of water, however, and their weight can then overcome these forces and the drops will fall to the ground as rain or snow. That is, by increased watering, the clouds become thick and can no longer maintain their stability, being wearied, so to speak (Job 36:27-28). The condensation of water vapor into

droplets and then into raindrops or snowflakes is apparently facilitated by electrical discharges in the atmosphere – the lightning, then thunder, then rain or snow (Job 37:3-6).

Precipitation

- Job 36:26-28 “Look, God is exalted beyond what we can understand. His years are without number. ²⁷He draws up the water vapor and then distills it into rain. ²⁸The rain pours down from the clouds, and everyone benefits from it.

Here is remarkable scientific insight. The drops of water which eventually pour down as rain are, indeed “made small” (KJV), first being molecules in the vapor state, then condensing to tiny liquid water droplets in the clouds. These finally coalesce into drops large enough to overcome the updrafts and fall as rain when “with moisture He loads the thick cloud” (Job 37:11).

In contrast, in 350 B.C. Aristotle started thoughts of water vapor. Even by 1520 A.D. people still thought water from the ocean spilled off the edge of the earth. It was only until 1841 A.D. that clouds were proven to be responsible for collection of water vapor.

Lightning causes rain.

- Job 38:25-27 “Who created a channel for the torrents of rain? Who laid out the path for the lightning? ²⁶Who makes the rain fall on barren land, in a desert where no one lives? ²⁷Who sends the rain that satisfies the parched ground and makes the tender grass spring up?

In 1930 A.D. a high-speed camera showed "J-streamers" coming from clouds forming a path for the lightning. In 1960 A.D. a spark of electricity was found to be required to form water out of vapor.

Hydrologic Balance

- Job 28:24-26 (NASB) “For He looks to the ends of the earth and sees everything under the heavens. ²⁵When He imparted weight to the wind and meted out the waters by measure, ²⁶ when He set a limit for the rain and a course for the thunderbolt.

The fact that air has weight was revealed through Job, but was proven scientifically only about 300 years ago. The relative weights of air and water were carefully placed by God in the precise amounts needed for the most efficient functioning of the world’s hydrologic cycle, which in turn sustains life on the earth.

OCEANOGRAPHY

Ocean currents

- Psalm 8:8 The birds of the heavens and the fish of the sea, whatever passes through the paths of the seas.

This passage was written about 1000 B.C. and was proven true by Matthew Fontaine Maury the "Pathfinder of the sea" in 1855 A.D. Captain Maury charted the trade currents after hearing the above verse read. Fish tend to gather in these paths.

Oceanic Reservoir

- Psalm 33:7 (NASB) He gathers the waters of the sea together as a heap; He lays up the deeps in storehouses.

How interesting that the author of this Psalm used the term “heap” in reference to water. By all common sense, water lies flat, always seeking level. But we all know today what would not have been likely known by a largely landbound person. Water does indeed “heap”. Gravity causes the water to follow the curvature of the earth and so is not always flat as common sense dictates.

Springs in the Sea

- Job 38:16 "Have you explored the springs from which the seas come? Have you walked about and explored their depths?"

Around 2000 B.C. Job stated that there were springs in the seas. We now know that fresh water springs do indeed exist at the bottom of the ocean. But it is only in recent years that springs have been discovered on the sea bottom. In 1930 A.D. fresh water was discovered under the ocean. Large rivers were found to flow underneath the continents.

Many such scientific mysteries as "the breadth of the earth" (Job 38:18) have been explained in recent years by modern science, but many of God's questions remain unanswered today.

Recesses of the deep

- 2 Sam. 22:16 The the channels of the sea appeared, the foundations of the world were laid bare by the rebuke of the Lord, at the blast of the breath of His nostrils.

Samuel wrote around 1000 B.C. In 1504 A.D. Ocean bottoms were thought to be flat and sandy. By 1840 A.D. 12,000' deep was measured. In 1911 A.D. Sonar was invented and we could begin to tell shapes of objects underwater. In 1964 A.D. Men dived over 27,500' deep. Finally by 1971 A.D. the ocean floor began to be mapped

Underground water sources

- Genesis 7:11 When Noah was 600 years old, on the seventeenth day of the second month, the underground waters burst forth on the earth, and the rain fell in mighty torrents from the sky.
- Genesis 8:2 The underground water sources ceased their gushing, and the torrential rains stopped.

In 1945 A.D. Volcanic rock under water was studied. The rock is 1/2 to 1 % water by weight. Just 6% of this water would fill the oceans.

All seas lie in one bed.

- Genesis 1:9 Then God said, "Let the waters below the heavens be gathered into one place, and let the dry land appear"; and it was so.

In 1520 A.D. Magellan discovered all the oceans were connected.

GEOLOGY

Principle of Isostasy

- Isaiah 40:12 Who else has held the oceans in his hand? Who has measured off the heavens with his fingers? Who else knows the weight of the earth or has weighed out the mountains and the hills?
- Psalm 104:5-9 You placed the world on its foundation so it would never be moved.⁶ You clothed the earth with floods of water, water that covered even the mountains.⁷ At the sound of your rebuke, the water fled; at the sound of your thunder, it fled away.⁸ Mountains rose and valleys sank to the levels you decreed.⁹ Then you set a firm boundary for the seas, so they would never again cover the earth.

Isostasy is the condition of relative equilibrium of the earth's crust, presumed to be maintained by the adjustment in density of underlying rock in response to changes in pressure. This series of rhetorical questions – to which the only answer can be the omniscient God – stresses the precise accuracy with which the various components of the creation have been designed. The amount and distribution of the earth's waters (unique to the earth), as studied in such sciences as hydrology, meteorology, oceanography is probably

the most important question. Geophysics is structured around the principle of isostasy (equal weights), the growth and motions of the earth's physiographical features all interrelated with their sizes, densities, etc. Notice the role of the water pressure in keeping the balance in plate tectonics. The water both transmits and dampens the seismic waves keeping everything stable.

Shape of the Earth

- Isaiah 40:22 It is God who sits above the circle of the earth. The people below must seem to him like grasshoppers! He is the one who spreads out the heavens like a curtain and makes his tent from them.
- Job 26:10 (NASB) "He has inscribed a circle on the surface of the waters at the boundary of light and darkness.
- Proverbs 8:27 (NASB) "When He established the heavens, I was there, when He inscribed a circle on the face of the deep,
- Psalm 103:12 He has removed our rebellious acts as far away from us as the east is from the west.

The Hebrew word "khug" is translated "circle" in Isaiah 40:22, Job 26:10 and in Proverbs 8:27. All three, in context, clearly refer to the something that is spherical, rounded or arched; in other words it suggests the sphericity of the earth as opposed to a flat or square earth which was the prevailing theory of the time. "Circle" refers to the global sea level, which defines the "circle of the earth" (Is. 40:22) and the "circle upon the face of the deep" (Prov. 8:27), and which defines the bounds which the waters cannot transgress as long as the earth endures in accordance with the Noahic covenant (Gen. 8:22; 9:11).

"Far as east is from west" is a figure applied to the limitless scope of God's forgiving grace. One can travel east (or west) forever without coming to its end. This perfectly fits the idea of a global earth. If the earth were flat you could only travel so far away from your sin. But the Psalmist is trying to convey the sense that our sins are irretrievably separated from us and that is only possible when used with the concept of a globe.

Isaiah was written sometime between 740 and 680BC. From 384-322 the earth was generally thought to be flat. This is at least 300 years before Aristotle suggested, in his book *On the Heavens*, that the earth might be a sphere. Even by 200 BC the Romans still thought the earth was flat. It was another 2,000 years later (at a time when the majority of the scientists still believed that the earth was flat) that the Scriptures inspired Christopher Columbus to sail around the world. He finally demonstrated the soundness of this ancient biblical principle in 1520 AD.

The Earth has four corners.

- Isaiah 11:12 And He will lift up a standard for the nations and assemble the banished ones of Israel, and will gather the dispersed of Judah from the four corners of the earth.
- Revelation 7:1 After this I saw four angels standing at the four corners of the earth, holding back the four winds of the earth, so that no wind would blow on the earth or on the sea or on any tree.

For years, critics mocked these passages. Many theologians tried to say that it was merely an expression, a way to say "from everywhere" rather than a scientific statement. Others tried to explain that it was simply referring to the four cardinal directions – north, south, east and west. However, Johns Hopkins Laboratory reported in 1964 and recorded in the 1966 edition of *Science Digest* that there are four 'bulges' in the globe. The geological 'bulges' are in Ireland, Peru, Australia and South Africa. Four bulges – four "corners" to our globe.

The Earth free-floats in space.

- Job 26:7 God stretches the northern sky over empty space and hangs the earth on nothing.

At a time when it was believed that the earth sat on a large animal or a giant (1500BC) the Bible spoke of the earth's free float in space: "He...hangs the earth on nothing". Science didn't discover that the earth hangs upon nothing until 1650. In fact, it wasn't until 1687 AD that the telescope allowed Newton to prove that the earth was supported by the Sun's gravity.

The molten core of the Earth

- Job 28:5 Bread comes from the earth, but below the surface the earth is melted as by fire.

Three centuries ago, the English scientist Isaac Newton calculated, from his studies of planets and the force of gravity, that the average density of the Earth is twice that of surface rocks and therefore that the Earth's interior must be composed of much denser material. Much has since been discovered, through analyses of earthquake waves; heat flow, magnetic, and gravity studies; and laboratory experiments on rocks and minerals. In the 1900s it was determined that between 100 and 200 kilometers below the Earth's surface, the temperature of the rock is near the melting point and molten rock erupted by some volcanoes originates in this region of the mantle. This zone of extremely yielding rock has a slightly lower velocity of earthquake waves and is presumed to be the layer on which the tectonic plates ride. Below this low-velocity zone is a transition zone in the upper mantle; it contains two discontinuities caused by changes from less dense to more dense minerals. The chemical composition and crystal forms of these minerals have been identified by laboratory experiments at high pressure and temperature. The lower mantle, below the transition zone, is made up of relatively simple iron and magnesium silicate minerals, which change gradually with depth to very dense forms.

The question we must ask ourselves is "How could a shepherd in a geologically stable area in 1300 BC know this?" Yet again the Bible is some 3,200 years ahead of man's science.

Gravitation

- Job 26:7 God stretches the northern sky over empty space and hangs the earth on nothing.
- Job 38:6 What supports its foundations, and who laid its cornerstone
- Job 38:31-33 "Can you hold back the movements of the stars? Are you able to restrain the Pleiades or Orion? ³²Can you ensure the proper sequence of the seasons or guide the constellation of the Bear with her cubs across the heavens? ³³Do you know the laws of the universe and how God rules the earth?"

The "empty place" (Hebrew tohu) probably refers to the just-created earth, which was initially "without form" (Gen. 1:2). As earth received its spherical form, in response to the gravitational force systems activated when the Spirit moved in the presence of the primeval waters, then the north direction was defined when the earth began rotating about its axis. The north was surely "stretched out," without limit, far into the infinite heavens. Not only was the earth rotating, but it also began orbiting in space, suspended from the sun by "nothing" except the mysterious force of gravity, acting at a distance. This verse was written at least 3500 years before Isaac Newton identified and described this force. The Hebrew word "maahannah" is used only once in the Bible. It is sometimes translated "sweet influences" but its basic meaning seems to be "cluster." It is known now that the stars in the constellation Pleiades, known in ancient times as the "seven sisters" (although the telescope reveals many

more stars in this group), are bound together gravitationally. The stars in the bright constellation Orion, on the other hand, are not so bound. Only God can either bind or release the stars, as He is the one who created them and placed them in the heavens.

The earth revolves.

- Job 38:12-14 Have you ever in your life commanded the morning, and caused the dawn to know its place, that it might take hold of the ends of the earth, and the wicked be shaken out of it? It is changed like clay under the seal; and they stand forth like a garment.

Clay was revolved under the signet ring to make a seal. Here God describes the revolution of the earth and the resulting appearance and disappearance of the sun. In 384 BC people thought the sun disappeared at night. Eventually Ptolemy suggested in 146 AD that the earth was the center of the universe and this concept held until 1543 AD when Copernicus showed that the earth revolved around the sun. He was, however, excommunicated by the Pope for doing so.

Night and day happen on earth at the same time.

- Lk 17:31, 34 ³¹On that day, the one who is on the housetop and whose goods are in the house must not go down to take them out and likewise the one who is in the field must not turn back...³⁴I tell you, on that night there will be two in one bed; one will be taken and the other will be left.

Until the time of Columbus, 1520 A.D., people thought the earth was flat. To them the thought that it could be both night and day simultaneously would have been ludicrous. But once again the Bible demonstrates its grasp of scientific fact.

Rock Erosion

- Job 14:18-19 “But as mountains fall and crumble and as rocks fall from a cliff, ¹⁹as water wears away the stones and floods wash away the soil, so you destroy people’s hope.

Mountains falling and crumbling - what an odd concept for a short-lived human to come up with! As far as we can tell with our natural senses mountains are nearly eternal! And yet under the inspiration of the Holy Spirit Job was able to record thousands of years ago that mountains do indeed fall and crumble due to the forces of erosion.

Glacial period

- Job 38:29-30 “From whose womb has come the ice? And the frost of heaven, who has given it birth? ³⁰ Water becomes hard like stone, and the surface of the deep is imprisoned.”

This unusual picture of a sheet of ice slowly coming forward as if emerging from a womb could easily refer to the ice sheet of the great Ice Age that covered the northern latitudes for many centuries. The book of Job has more references to snow, ice and cold than any other book of the Bible. “The deep” almost invariably refers to the ocean and Job and his friends had never seen the “surface of the deep” frozen in their southern latitudes.

Uniformitarianism

- 2 Peter 3:4 This will be their argument: “Jesus promised to come back, did he? Then where is he? Why, as far back as anyone can remember, everything has remained exactly the same since the world was first created.”

The pseudo-scientific rationale for this indifference to the promised consummation of all things when Christ returns is their belief that there was never any real creation of all things in

the beginning. The things that continue today, they say, are the things that have always been and, therefore, always will be. This is the so-called principle of uniformity. According to this principle, it is assumed that the processes that govern nature today have always been the same in the past so that the present is the key to the past. Since no creation is occurring today, it never happened in the past either. "All things continue" – not just after creation was finished, but "from the beginning of creation." Thus, what people have called creation was accomplished by the same natural processes that continue to operate today. This means that creation has been proceeding so slowly over long ages as to be quite unobservable in the mere few thousand years of human records. This remarkable belief is evolutionary uniformitarianism, and it completely dominates the scientific and educational establishments of every nation in the world today. It has been made the basic premise of origins and meaning, not only science and history, but also in the social sciences, the humanities, the fine arts and practically every other discipline of study and practice in the world. This, indeed, is a most remarkable fulfillment of Peter's prophecy, and surely must indicate that these days really are "the last days," unless somehow the Lord brings about a great revival of truth in the world's schools.

However, there have been recent advances, particularly in the area of astrophysics and cosmology, that have allowed people to begin to understand that the laws of physics may NOT have always operated the same way. Even the most adamant Big Bangers are now coming around to an idea called "inflation" during which the physical laws we now consider normal were not working the same way.

Dinosaurs

- Job 40:15-24 "Behold now, Behemoth, which I made as well as you; he eats grass like an ox. 16 Behold now, his strength in his loins and his power in the muscles of his belly. 17 He bends his tail like a cedar; the sinews of his thighs are knit together. 18 His bones are tubes of bronze; his limbs are like bars of iron. 19 He is the first of the ways of God; let his maker bring near his sword. 20 Surely the mountains bring him food, and all the beasts of the field play there. 21 Under the lotus plants he lies down, in the covert of the reeds and the marsh. 22 The lotus plants cover him with shade; the willows of the brook surround him. 23 IF a river rages, he is not alarmed; he is confident, though the Jordan rushes to his mouth. 24 Can anyone capture him when he is on watch, with barbs can anyone pierce his nose?"
- Job 41:1-34 "Can you draw out Leviathan with a fishhook? Or press down his tongue with a cord? 2"Can you put a rope in his nose or pierce his jaw with a hook? 3"Will he make many supplications to you, or will he speak to you soft words? 4"Will he make a covenant with you? Will you take him for a servant forever? 5"Will you play with him as with a bird, or will you bind him for your maidens? 6"Will the traders bargain over him? Will they divide him among the merchants? 7"Can you fill his skin with harpoons, or his head with fishing spears? 8"Lay your hand on him; remember the battle; you will not do it again! 9"Behold, your expectation is false; will you be laid low even at the sight of him? 10"No one is so fierce that he dares to arouse him; who then is he that can stand before Me? 11"Who has given to Me that I should repay him? Whatever is under the whole heaven is Mine. 12"I will not keep silence concerning his limbs, or his mighty strength, or his orderly frame. 13"Who can strip off his outer armor? Who can come within his double mail? 14"Who can open the doors of his face? Around his teeth there is terror. 15"His strong scales are his pride, shut up as with a tight seal. 16"One is so near to another that no air can come between them. 17"They are joined one to another; they clasp each other and cannot be separated. 18"His sneezes flash forth light, and his eyes are like the eyelids of the morning. 19"Out of his mouth go burning torches; sparks of fire leap forth. 20"Out of his nostrils smoke goes forth as from a boiling pot

and burning rushes. ²¹"His breath kindles coals, and a flame goes forth from his mouth. ²²"In his neck lodges strength, and dismay leaps before him. ²³"The folds of his flesh are joined together, firm on him and immovable. ²⁴"His heart is as hard as a stone, even as hard as a lower millstone. ²⁵"When he raises himself up, the mighty fear; because of the crashing they are bewildered. ²⁶"The sword that reaches him cannot avail, nor the spear, the dart or the javelin. ²⁷"He regards iron as straw, bronze as rotten wood. ²⁸"The arrow cannot make him flee; slingstones are turned into stubble for him. ²⁹"Clubs are regarded as stubble; he laughs at the rattling of the javelin. ³⁰"His underparts are like sharp potsherds; he spreads out like a threshing sledge on the mire. ³¹"He makes the depths boil like a pot; he makes the sea like a jar of ointment. ³²"Behind him he makes a wake to shine; one would think the deep to be gray-haired. ³³"Nothing on earth is like him, one made without fear. ³⁴"He looks on everything that is high; He is king over all the sons of pride."

"Behemoth" means, simply, "huge beast," and commentators commonly take it to be either an elephant or a hippopotamus. The subsequent description, however, fits neither of these, nor any other living animal. On the other hand, it seems to match the probable description of a great land dinosaur, such as the tyrannosaurus.

No elephant or hippo has a tail like a cedar. This description supports the theory mentioned above that a behemoth may be a dinosaur.

In 40:19 the behemoth was the "chief" of all created land animals, which could only, therefore, have been one of the great land dinosaurs. These, like all other animals, were created on the fifth and sixth days of the creation week.

"Leviathan" was evidently the greatest of the marine reptiles, or dinosaurs, something like a plesiosaur, perhaps, although modern commentators tend to call it a crocodile. Isaiah says that leviathan was "the dragon that is in the sea" (Is. 27:1), and the psalmist said that leviathan "played" in the "great and wide sea" (Ps. 104:25-26).

Whatever the leviathan was, it was not a crocodile. Some descendants survived to and beyond Job's day, giving rise to all the traditions of dragons in various parts of the world. Many of the dragon legends indicate they could breathe fire, and there are indications that at least certain dinosaurs may have been able to produce and expel combustible gases which, upon coming in contact with oxygen, could have ignited.

BIOLOGY

The kingdoms of natural science (mineral, vegetable, animal)

- Genesis 1:3-27

In the cosmologies of most primitive societies, strange and mysterious elements are involved in the creation of the world. Even the Greeks felt that everything was made of combinations of earth, air, fire and water. But around 1500 BC the author of Genesis described the creation of the world and only included three basic types of life in his account.

In contrast, it wasn't until 1786 in his *Traité d'anatomie et de physiologie* that Felix Vicq d'Azyr (Valogne 1748 - Paris 1794) clearly delineated the three kingdoms. After discussing at length the significance of classes in biology, he described the *locus coeruleus* and the red nucleus and several comparative anatomy studies. He then divided natural objects into three kingdoms (minerals, plants and animals) and divided the functions of life into 9 categories (digestion, nutrition, circulation, respiration, secretion, ossification, generation, irritability and sensibility). These functional categories would well serve as a basis for today's discussion on the classification of functions in genomics.

Blood circulation

- Leviticus 17:11 for the life of any creature is in its blood. I have given you the blood so you can make atonement for your sins. It is the blood, representing life, that brings you atonement.

Bloodletting, blistering, enemas, emetics and purgatives were medically in vogue early in our country's history and patients had to overcome these treatments as well as the malady or injury which they supposedly treated.

George Washington, the first U. S. president and "father of our country" is well known for his heroic exploits but little is known of his struggles with his health and the archaic medical practices which led to his death.

Washington is pictured as a strong man of action. Although six feet four inches in height, his life was also a continuous bout with physical problems and the "cures of the day" which most men would not have survived.

Bloodletting as a form of treatment began in prehistoric times. Medical men of the 18th century continued the ancient practice which had its roots in magic and false religion. Supposedly the bad blood or sickness was allowed to escape with the bloodletting. Perhaps originally it was to appease the spirit by sacrificing blood, the fluid of life.

During Washington's day it was felt that one's blood was a carrier of the impurities of disease and with bleeding, new healthy blood would replace what was lost.

'The more serious the health problem the more blood would be taken. It was erroneously felt at the time that the blood would be replaced in the body in a few hours.

Patients were actually bled to death or weakened to the point that death ensued.

"Nearly all men die of their remedies and not of their illnesses," French dramatist Moliere wrote in the 17th century.

George Washington died at the age of 67 due to the mistreatments of the day, mistreatments that were used to treat a throat infection. If only they had listened to Moses.

DNA - The seed of both man and woman

- Genesis 3:15 From now on, you and the woman will be enemies, and your offspring and her offspring will be enemies. He will crush your head, and you will strike his heel.
- Hebrews 7:9-10 In addition, we might even say that Levi's descendants, the ones who collect the tithe, paid a tithe to Melchizedek through their ancestor Abraham. ¹⁰For although Levi wasn't born yet, the seed from which he came was in Abraham's loins when Melchizedek collected the tithe from him.

In 1865 Gregor Mendel Investigated how traits are passed from generation to generation and called them factors. By 1869 Johann Meischer finally isolated DNA from the nuclei of white blood cells. But the Bible has always understood that the potentiality of future generations lays within the "seed" the DNA of humankind. The author of Genesis suggested this concept in 1500 BC and the author of Hebrews more clearly stated it around 60AD presaging the discovery of DNA and the role of genetics by nearly 2000 years.

Psychotherapy

- Proverbs 16:24 Kind words are like honey—sweet to the soul and healthy for the body.
- Proverbs 17:22 A cheerful heart is good medicine, but a broken spirit saps a person's strength.

Clinical observation has demonstrated repeatedly that pessimism is a predictor of poor recovery. Despite numerous technological advances of our era, outcome and survival seem to be more than casually related to one's attitude.

A recent investigation documenting outcomes in 372 stroke victims adds substantial scientific support to the Bible's observations. According to Dr. S. C. Lewis of Western

General Hospital in Edinburgh, Scotland, "Patients' attitudes toward their illness seem to be associated with survival after stroke."

In their study published in the July 2001 issue of *Stroke: Journal of the American Heart Association*, the researchers assessed the attitudes of each patient 6 months after a stroke. They discovered that the most fatalistic individuals were 79% more likely to succumb to stroke within 5 years than people who were positive.

While you might assume these results occurred without taking into account other important factors such as age, stroke severity and the presence of other diseases, think again. The researchers meticulously considered these variables in their final analysis.

Their data still held up to the rigors of exemplary scientific analysis.

Of particular interest is the fact that individuals with a pervasive sense of helplessness were also 58% more likely to die within 5 years than persons with hopeful attitudes. Yet factors such as anxiety, depression and the so-called, "fighting spirit" were not predictive of survival.

Frankly the contention that optimists live longer than pessimists isn't new. A study published in the *Mayo Clinic Proceedings* last year (2000) reviewed survival rates for 839 patients (124 optimists, 518 mixed and 197 pessimists) over a 30-year period. After adjustment for age, sex and 15-year estimated survival, it was shown that increased pessimism was clearly associated with increased mortality.

It's important to realize these findings are suggestive of what appears to be a strong correlation rather than an explanation of "cause and effect." While one can certainly speculate, we still do not understand the precise basis for these findings. From a purely behavioral perspective, perhaps optimistic people try harder, are more committed, or manifest greater engagement in their recovery. Another important consideration is the role attitude plays in biological terms as it affects neurological, endocrine and immune system function.

Animals reproduce after their own kind –

- Genesis 1:11 Then God said, "Let the land burst forth with every sort of grass and seed-bearing plant. And let there be trees that grow seed-bearing fruit. The seeds will then produce the kinds of plants and trees from which they came."
- Genesis 1:25 God made all sorts of wild animals, livestock, and small animals, each able to reproduce more of its own kind. And God saw that it was good.

We all understand instinctively that living creatures reproduce their own kind. Roses do not beget marigolds. Fish do not have leopards for offspring. But we know this because we have millennia of experience teaching us these things. Throughout history various cultures have exploited this understanding in order to improve their livestock and farming techniques. The Babylonians tried to improve their horses through selective breeding. They also attempted cross-pollination of date palms. The Chinese worked at improving the qualities of rice several thousand years ago. The American Indians cultivated and developed better strains of maize. But everyone agrees that the science of genetics (as opposed to general popular treatment and anecdotal evidence) did not begin until 1865 with the famous work of the Augustinian monk Gregor Mendel. The Bible has stated since the beginning, however that animals reproduce their own kind.

The Bible however, is not teaching fixity of the species in this passage. It is simply stating the obvious fact that humans do not have baby whales. This is a simplistic way of presenting to a primitive society the principles of biogenesis and genetics. It does not say that a species that is geographically isolated cannot gradually, over many generations adapt to its environment and yet still be able to breed back into the original stock. The author of Genesis is using "kind" in the same general sense that Paul does in 1 Corinthians 15:39. The biblical

term “kind” must not be misunderstood to be the same thing as the more scientifically narrow word “species”.

There is a difference in the types of flesh.

- 1 Corinthians 15:39 (56 AD) All flesh is not the same flesh, but there is one flesh of men, and another flesh of beasts, and another flesh of birds, and another of fish.

Unbelievers for many years have attacked that verse as being unscientific. Since they were under the impression that all flesh is made up of protoplasm, they criticized the Bible as being wrong in 1 Corinthians 15. They believed there was no distinction between different kinds of flesh. However, today, scientists are well aware of the cytoplasm and the nuclei of cells by which four kinds of flesh can be distinguished. Scientists can now tell the difference between the tissue of birds, animals, fish, and humans under a microscope.

For 250 years taxonomists have used a classification system for living things which was invented by Swedish botanist Carolus Linnaeus. The system was based upon the understanding of living things at the time; and as evolutionary theory has changed, the system has changed. At one time the tree shrew, which was considered an insectivore at the time, was changed to be a primate because it fit the current evolutionary theory on the origin of man better. Many scientists are now suggesting that a classification system based on similarities without regard to evolutionary theory should be adopted. Several candidates are out there--Cladistic Taxonomy was popular for a while, and now the current theory is Phylocode. It is interesting to watch how the evidence gets the biologists closer and closer to the biblical term *kind* which is a very broad term and avoids much of the problem of modern classification. There are four kinds of flesh, the flesh of fish, the flesh of birds, the flesh of beasts, and the flesh of man

HEALTH AND SANITATION KNOWLEDGE

Medicine in Egypt at the time of Moses

1552 B.C.(Papyrus Ebers) "To prevent hair from turning gray anoint it with the blood of a black calf which has been boiled in oil, or with the fat of a rattlesnake....When hair falls out, apply a mixture of six fats: the horse, the hippopotamus, the crocodile, the cat, the snake, and the ibex.To strengthen it, anoint with the tooth of a donkey crushed in honey."

Both man and woman have "seed" for reproduction.

- Genesis 3:15 And I will put enmity Between you and the woman, And between your seed and her seed; He shall bruise you on the head, And you shall bruise him on the heel."
- Genesis 13:15 for all the land which you see, I will give it to you and to your descendants (seed) forever.

By 1000 A.D. Males were still thought to have the only seed for reproduction and it wasn't until 1880 A.D. that both sexes were shown to have the seed of reproduction.

Life is in the blood.

- Leviticus 17:11 For the life of the flesh is in the blood, and I have given it to you on the altar to make atonement for your souls; for it is the blood by reason of the life that makes atonement.'

Until 1616 A.D. bloodletting was practiced to take diseases out of the body. Finally, by 1900 A.D. the importance of blood was recognized. The practice of bleeding stopped in most places.

Blood should not be eaten.

- Lev 17:12,14 "Therefore I said to the sons of Israel, 'No person among you may eat blood, nor may any alien who sojourns among you eat blood.'... "For *as for the* life of all flesh, its blood is *identified* with its life. Therefore I said to the sons of Israel, 'You are not to eat the blood of any flesh, for the life of all flesh is its blood; whoever eats it shall be cut off.'

The practice can cause disease.

Eating an animal which dies naturally is dangerous.

- Leviticus 17:15 "When any person eats *an animal* which dies or is torn *by beasts*, whether he is a native or an alien, he shall wash his clothes and bathe in water, and remain unclean until evening; then he will become clean.

Some insects can be eaten safely.

- Leviticus 11:22 These of them you may eat: the locust in its kinds, and the devastating locust in its kinds, and the cricket in its kinds, and the grasshopper in its kinds.

Rules for isolation of disease are accurate.

- Lev 13:14-17, 45-46 "But whenever raw flesh appears on him, he shall be unclean. ¹⁵"The priest shall look at the raw flesh, and he shall pronounce him unclean; the raw flesh is unclean, it is leprosy. ¹⁶"Or if the raw flesh turns again and is changed to white, then he shall come to the priest, ¹⁷and the priest shall look at him, and behold, if the infection has turned to white, then the priest shall pronounce clean him who has the infection; he is clean... "As for the leper who has the infection, his clothes shall be torn, and the hair of his head shall be uncovered, and he shall cover his mustache and cry, 'Unclean! Unclean!' ⁴⁶"He shall remain unclean all the days during which he has the infection; he is unclean. He shall live alone; his dwelling shall be outside the camp.

Leprosy is contagious. But the sores and gangrene that often accompany it are even worse. Isolating those with contagious diseases was an advanced idea, not practiced in non-Jewish cultures until almost 3,000 years later! Leprosy spread over southern Europe in the 17th & 18th centuries until the principles of Moses were re-enacted successfully.

Burying biological waste prevents many diseases.

- Deuteronomy 23:12-13 "You shall also have a place outside the camp and go out there, ¹³and you shall have a spade among your tools, and it shall be when you sit down outside, you shall dig with it and shall turn to cover up your excrement.
- Leviticus 17:12 "And this command applies both to Israelites and to the foreigners living among you. If you go hunting and kill an animal or bird that is approved for eating, you must drain out the blood and cover it with earth.

Washing with lye after touching a corpse or sick person is a good idea.

- Numbers 19:17-22 'Then for the unclean person they shall take some of the ashes of the burnt purification from sin and flowing water shall be added to them in a vessel. ¹⁸'A clean person shall take hyssop and dip it in the water, and sprinkle it on the tent and on all the furnishings and on the persons who were there, and on the one who touched the bone or the one slain or the one dying naturally or the grave. ¹⁹'Then the clean person shall sprinkle on the unclean on the third day and on the seventh day; and on the seventh day he shall purify him from uncleanness, and he shall wash his clothes and bathe himself in water and shall be clean by evening. ²⁰'But the man who is unclean and does not purify himself from uncleanness, that person shall be cut off

from the midst of the assembly, because he has defiled the sanctuary of the LORD; the water for impurity has not been sprinkled on him, he is unclean. ²¹So it shall be a perpetual statute for them. And he who sprinkles the water for impurity shall wash his clothes, and he who touches the water for impurity shall be unclean until evening. ²²Furthermore, anything that the unclean person touches shall be unclean; and the person who touches it shall be unclean until evening."

Circumcise on the eighth day.

- Gen 17:12 "And every male among you who is eight days old shall be circumcised throughout your generations, a *servant* who is born in the house or who is bought with money from any foreigner, who is not of your descendants.

Circumcision the eight day is wise because before then, Vitamin K is not present in the baby's blood. Vitamin K allows the blood to clot.

Food contamination –

- Leviticus 11:32-40 "Of the small animals that scurry or creep on the ground, these are unclean for you: the mole, the mouse, the great lizard of all varieties, ³⁰the gecko, the monitor lizard, the common lizard, the sand lizard, and the chameleon. ³¹All these small animals are unclean for you. If you touch the dead body of such an animal, you will be defiled until evening. ³²If such an animal dies and falls on something, that object, whatever its use, will be unclean. This is true whether the object is made of wood, cloth, leather, or sackcloth. It must be put into water, and it will remain defiled until evening. After that, it will be ceremonially clean and may be used again. ³³"If such an animal dies and falls into a clay pot, everything in the pot will be defiled, and the pot must be smashed. ³⁴If the water used to cleanse an unclean object touches any food, all of that food will be defiled. And any beverage that is in such an unclean container will be defiled. ³⁵Any object on which the dead body of such an animal falls will be defiled. If it is a clay oven or cooking pot, it must be smashed to pieces. It has become defiled, and it will remain that way. ³⁶"However, if the dead body of such an animal falls into a spring or a cistern, the water will still be clean. But anyone who removes the dead body will be defiled. ³⁷If the dead body falls on seed grain to be planted in the field, the seed will still be considered clean. ³⁸But if the seed is wet when the dead body falls on it, the seed will be defiled. ³⁹"If an animal that is permitted for eating dies and you touch its carcass, you will be defiled until evening. ⁴⁰If you eat any of its meat or carry away its carcass, you must wash your clothes. Then you will remain defiled until evening. (1500 B.C.)

I personally find it fascinating that the Bible tells us what we only recently discovered – that reptiles are unclean. Recent warnings from the CDC have gone out stating that reptiles are notorious for harboring salmonella. An estimated 3% of households in the United States own at least one reptile. Reptiles, including turtles, lizards, and snakes, can carry germs that make people sick. Of greatest importance is salmonellosis. An estimated 70,000 people get salmonellosis from contact with reptiles in the United States each year. Children under 5 years old and people with weak immune systems (such as HIV/AIDS) should avoid contact with reptiles. These people can get very sick from a germ, called *Salmonella*, that reptiles carry. But the Bible has been telling us this for the last 3,200 years.

It is also important to note that Leviticus teaches that if a dead corpse falls onto a seed that it is not to be considered unclean unless the seed was wet at the time. Now days we understand how the wet environment promotes the growth of various fungi and bacteria.

Water swarms with living creatures

- Gen. 1:20 And God said, "Let the waters swarm with fish and other life. Let the skies be filled with birds of every kind."

The Bible is often subtle in its presentation of scientific fact. Most people would skip over this passage, assuming that it merely comments on the number of fish in the seas. However, notice the phrase "and other life". The fact that water swarms with "other life" was proven particularly true in 1676 A.D. Antony van Leeuwenhoek, the seventeenth-century Dutch microscope maker, was astonished at seeing millions of life-forms in a single drop of water. He had discovered the microbe.

PHYSICS

Mass-Energy Equivalence

- Col. 1:17 He existed before everything else began, and he holds all creation together.
- Heb. 1:3 The Son reflects God's own glory, and everything about him represents God exactly. He sustains the universe by the mighty power of his command. After he died to cleanse us from the stain of sin, he sat down in the place of honor at the right hand of the majestic God of heaven.

Mass-energy equivalence is expressed quantitatively using Einstein's equation: $E=mc^2$ where

- E = energy equivalent to the mass (assuming that it is at rest) (J)
- m = mass (kg)
- c = speed of light ($m.s^{-1}$)

The conversion factor c^2 is $89.88 \text{ PJ/kg} = 21.48 \text{ Mt TNT per kg} = 149.3 \text{ pJ/u} = 931.5 \text{ MeV/u}$.

We are all familiar with the famous mushroom cloud of a nuclear blast. We understand that an atom can be split in order to create such a sudden and catastrophic energy release. What we don't often realize is that theoretically any atom should be able to produce similar results. What keeps atoms from flying apart and destroying everything? The Bible indicates that God has, by some as yet undiscovered force or principle, kept all that energy in check.

The universe is decaying –

- Isaiah 51:6 "Lift up your eyes to the sky, Then look to the earth beneath; For the sky will vanish like smoke, And the earth will wear out like a garment And its inhabitants will die in like manner; But My salvation will be forever, And My righteousness will not wane.
- Psalm 102:25-26 "Of old You founded the earth, And the heavens are the work of Your hands." Even they will perish, but You endure; And all of them will wear out like a garment; Like clothing You will change them and they will be changed.
- Heb. 1:10-11 And, "YOU, LORD, IN THE BEGINNING LAID THE FOUNDATION OF THE EARTH, AND THE HEAVENS ARE THE WORKS OF YOUR HANDS; THEY WILL PERISH, BUT YOU REMAIN; AND THEY ALL WILL BECOME OLD LIKE A GARMENT, AND LIKE A MANTLE YOU WILL ROLL THEM UP; LIKE A GARMENT THEY WILL ALSO BE CHANGED. BUT YOU ARE THE SAME, AND YOUR YEARS WILL NOT COME TO AN END."

In 1850 A.D. humanity discovered the Second Law of Thermodynamics which states that in a closed system, the amount of usable energy decreases. The sun is burning hydrogen at the rate of 4,600,000 tons/second. That can't keep going forever. But how would a primitive man like Isaiah have known that?

Atomic Disintegration

- 2 Peter 3:10 But the day of the Lord will come as unexpectedly as a thief. Then the heavens will pass away with a terrible noise, and everything in them will disappear in fire, and the earth and everything on it will be exposed to judgment.
- Heb. 1:10-11 And, "YOU, LORD, IN THE BEGINNING LAID THE FOUNDATION OF THE EARTH, AND THE HEAVENS ARE THE WORKS OF YOUR HANDS; THEY WILL PERISH, BUT YOU REMAIN; AND THEY ALL WILL BECOME OLD LIKE A GARMENT, AND LIKE A MANTLE YOU WILL ROLL THEM UP; LIKE A GARMENT THEY WILL ALSO BE CHANGED. BUT YOU ARE THE SAME, AND YOUR YEARS WILL NOT COME TO AN END."

One of the criticisms atheists have of Intelligent Design is that it has not made any testable predictions. However, in this passage the Bible seems to be indicating that we will discover enough dark matter to cause the universe's expansion to slow and reverse itself. It predicts that the universe will end in "Big Crunch".

The universe is built of things not seen.

- Heb. 11:3 By faith we understand that the worlds were prepared by the word of God, so that what is seen was not made out of things which are visible.

The discovery of atoms proved this passage written around 63 AD true in 1923 A.D.

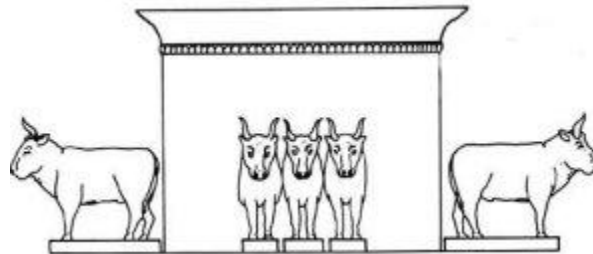
Light can be parted into colors.

- Job 38:24 "Where is the way that the light is divided, Or the east wind scattered on the earth?"

Newton's work with prisms showed this to be true.

MATHEMATICS

The Value of pi



- 1 Kings 7:23-26 Now he made the sea of cast metal ten cubits from brim to brim, circular in form, and its height was five cubits, and thirty cubits in circumference. Under its brim gourds went around encircling it ten to a cubit, completely surrounding the sea; the gourds were in two rows, cast with the rest. It stood on twelve oxen, three facing north, three facing west, three facing south, and three facing east; and the sea was set on top of them, and all their rear parts turned inward. It was a handbreadth thick, and its brim was made like the brim of a cup, as a lily blossom; it could hold two thousand baths.

In describing the temple that King Solomon built for the King of Kings, several articles of furniture are described. One of these pieces is "a molten sea."

- 2 Chronicles 4:2 "Also he made the cast metal sea, ten cubits from brim to brim, circular in form, and its height was five cubits and its circumference thirty cubits."

Ancient standards of measure vary widely but a cubit is generally taken to be about 18 inches, although there are different types of cubits ("common" and "royal", varying from 17 to 22 inches). A handbreadth is taken to be about 3 inches, sometimes being defined as one-sixth of a cubit.

A supposed discrepancy has arisen from this passage concerning the mathematical accuracy of the Bible. The value of π (pi) is known to be equal to the circumference of a circle divided by its diameter,

The accusation is that the Bible teaches that pi (the ratio of the circumference of a circle to its diameter) is only 3 when it ought to have been given as 3.1416. Solomon is charged with saying that the circumference of a 10-cubit diameter circle is only 30 cubits when it should be 31.416 cubits. There are three different ways to deal with this issue.

Significant figures

First, it is quite important that the scientist be accurate in his statement of the precision of measurements. To assure this, he uses a conventional technique called "significant figures." It is only correct to state a measurement to the number of significant figures warranted by the accuracy of the measurement. Thus, if the number is stated as 10 cubits, it is accurate only to two significant figures and might actually be anywhere between 9.5 cubits and 10.5 cubits. If the writer had said it was 10.0 cubits, it would supposedly be accurate to three significant figures.

Similarly, the 30-cubit circumference is accurate only to two significant figures, and might really be anything from 29.5 cubits to 30.5 cubits. It served no purpose to specify the dimensions to a higher degree of precision than two significant figures, and so the writer simply rounded them off.

For example, say the actual measurement of the diameter gave 9.67 cubits, accurate to three significant figures. 3.14 should then multiply this, which is pi to the third significant figure. The result is 30.4 cubits, to the third significant figure. There cannot properly be more significant figures in a product than in any of its factors. It may not even be this accurate (if the diameter had been 9.665 cubits, multiplying by 3.14 would give 30.3 cubits instead of 30.4). It is quite common, for this reason, to retain one more significant figure in each factor than is needed in the product, which is then rounded off to one less significant figure than the factors have.

It would be perfectly proper and scientific, therefore, to round off the diameter of 9.67 cubits and the circumference of 30.4 cubits to 10 cubits and 30 cubits, respectively. Therefore, the writer of 1 Kings was more scientific than his critics.

Inside and Outside Diameter

Here's another way of looking at it. The aforementioned scripture states that the molten sea was "ten cubits from brim to brim" and "a line of thirty cubits did compass it round about;" thus, its diameter was 10 cubits, and its circumference 30 cubits. Dividing this circumference of 30 by a diameter of 10 gives a value of exactly 3. This is where the questions arise. It is commonly known that the value of π is approximately 3.14159265358979. In fact, this value has been proven so exactly, that its value is known to hundreds of thousands of digits.

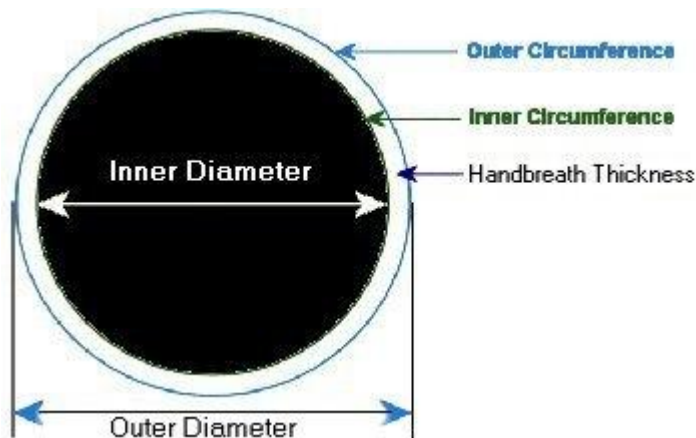
Why then does the Bible appear to give the value of π to be 3? A diameter of 10 cubits should yield a circle having a circumference of more than 31.4 cubits--not 30 cubits. Is the Bible just rounding things off? Are the Biblical values just approximate and not really exact? If we see *here* that the scripture is not exact, what *other* passages also contain words that cannot be received with complete accuracy?

- 1 Kings 7:26 It [the above mentioned metal pool] was a handbreadth in thickness, and its rim was like the rim of a cup, like a lily blossom. It held two thousand baths.

If the diameter of this bowl was 10 cubits, then the circumference should have been 31.415926 cubits, and not just 30 cubits! Any math student will tell you that the circumference of a circle is found by taking the diameter times pi (3.14159265358979...), is commonly approximated by 22/7 if great accuracy is not needed. Is this an error? Think again. The answer is so simple!

The diameter of 10 cubits is from outer rim to outer rim, the way anyone would measure a circular object. The circumference of 30 cubits, however, was of the inner circle, after

subtracting the thickness of the brass (two handbreadths—one for each side) from which the bowl was made. This would be the number needed to calculate the volume of water.



line of thirty cubits did compass it round about

calculation of $\pi = (30 \times 18) / [(10 \times 18) - (2 \times 4.05)] = 540 / (180 - 8.10) = 3.1413613 = 3.1414$

Let's compare our calculated value of 3.1414 to the real value of "pi", which is 3.1415927. Actually, the parameters given in 1 Kings 7:23-26 gives a direct value for "pi" that is within 2 parts in 10,000, which is fairly accurate. Since the outside diameter of the sea is 10 cubits, what is the inside diameter?

inside diameter = circumference / pi = 30 / 3.1415927 = 9.5493 cubits

And, since the inside circumference is 30 cubits, what is the outside circumference?

outside circumference = diameter x pi = 10 x 3.1415927 = 31.4159 cubits.

God makes no mistakes, mathematical or otherwise. The Scriptures do not contain error.

The value of the word "circumference" itself

I am not a follower of numerology. But I believe that the following fact is very interesting. If you take the etymology of the words π and π (the Hebrew word used in this verse, versus the usual word for circumference), you'll find that the ratio of their numeric value (via Gematria) $[(5 + 6 + 100)/(6 + 100)]$ is 1.0471698, which multiplied by 3 is π accurate to within seven decimal places!

By the way, Solomon built this sea in 1000 B.C., long before the Greeks rediscovered Pi (p). We may not understand some things at first glance, but the problem is with us, not with the Bible.

ASTRONOMY

Size of the universe

- Job 11:7-9 "Can you solve the mysteries of God? Can you discover everything there is to know about the Almighty? ⁸Such knowledge is higher than the heavens—but who are you? It is deeper than the underworld—what can you know in comparison to him? ⁹It is broader than the earth and wider than the sea.
- Job 22:12 "God is so great—higher than the heavens, higher than the farthest stars.
- Isaiah 55:9 For just as the heavens are higher than the earth, so are my ways higher than your ways and my thoughts higher than your thoughts.
- Jeremiah 31:37 Just as the heavens cannot be measured and the foundation of the earth cannot be explored, so I will not consider casting them away forever for their sins. I, the LORD, have spoken!

The Bible repeatedly uses the size of the universe to describe the love of God or the knowledge of God or the distance of our sins upon God's forgiveness – all clearly meant to imply infinitude. The Bible seems to indicate that the universe is limitless.

Expansion or inflation of the universe

- Isaiah 40:22 It is God who sits above the circle of the earth. The people below must seem to him like grasshoppers! He is the one who spreads out the heavens like a curtain and makes his tent from them.
- Psalm 104:2 you are dressed in a robe of light. You stretch out the starry curtain of the heavens;
- Job 9:8 He alone has spread out the heavens and marches on the waves of the sea.
- Isaiah 42:5 God, the LORD, created the heavens and stretched them out. He created the earth and everything in it. He gives breath and life to everyone in all the world.
- Isaiah 44:24 The LORD, your Redeemer and Creator, says: "I am the LORD, who made all things. I alone stretched out the heavens. By myself I made the earth and everything in it.
- Isaiah 45:12 I am the one who made the earth and created people to live on it. With my hands I stretched out the heavens. All the millions of stars are at my command.
- Isaiah 48:13 It was my hand that laid the foundations of the earth. The palm of my right hand spread out the heavens above. I spoke, and they came into being.
- Isaiah 51:13 That you have forgotten the Lord your Maker, Who stretched out the heavens, And laid the foundations of the earth; That you fear continually all day long because of the fury of the oppressor, As he makes ready to destroy? But where is the fury of the oppressor?
- Jeremiah 10:12 But God made the earth by his power, and he preserves it by his wisdom. He has stretched out the heavens by his understanding.
- Jeremiah 51:15 He made the earth by his power, and he preserves it by his wisdom. He has stretched out the heavens by his understanding.
- Zechariah 12:1 This message concerning the fate of Israel came from the LORD: "This message is from the LORD, who stretched out the heavens, laid the foundations of the earth, and formed the spirit within humans.

Over and over again the Bible emphasizes the fact that the "heavens" (the biblical term for space) has been "stretched." Before 1800AD the prevailing concept was that of a limited universe. Even by as late as 1917 Einstein believed the universe to be limited. This expansion was not discovered by man until the 1920s and 1930s when Edwin Hubble noticed the redshift of the light coming from stars and deduced that they were all moving away from us. Mr. Hubble discovered that the universe is expanding, with galaxies moving away from each other at a velocity given by an expression known as Hubble's Law: $v = H \cdot r$. Here v represents the galaxy's recessional velocity, r is its distance away from Earth, and H is a constant of proportionality called Hubble's constant. The exact value of the Hubble constant is still somewhat uncertain, but is generally believed to be around 70 kilometers per second for every megaparsec in distance, km/sec/Mpc. In 1950 telescopes at Mt. Palomar showed galaxies moving away from ours very rapidly.

Since many scholars place the book of Job around 1300 BC, that would make the Bible at least 3,220 years ahead of its time in this particular case.

Numbers of stars

- Genesis 22:17 I will bless you richly. I will multiply your descendants into countless millions, like the stars of the sky and the sand on the seashore. They will conquer their enemies,

- Jeremiah 33:22 And as the stars cannot be counted and the sand on the seashores cannot be measured, so I will multiply the descendants of David, my servant, and the Levites who minister before me.”

Again the Bible indicates that the number of stars is without number. Yet Ptolemy counted 3,000 stars. Finally Galileo, in 1600 AD announced that there were too many stars to count. By 1924 100,000,000,000 stars were counted in our galaxy alone and it was determined that there were billions of galaxies. In fact, the Hubble telescope with all its scientific technology is even causing many scientists to think that the galaxies cannot be numbered either!

Uniqueness of each star

- 1 Corinthians 15:41 The sun has one kind of glory, while the moon and stars each have another kind. And even the stars differ from each other in their beauty and brightness.

All stars look alike to us. Even if we use the best telescopes, stars are so distant that the view does not change much. But we now know that their light spectra are all very unique. Each has its own distinctive ratio of apparent brightness to temperature. But how would Paul have known that unless it had been revealed to him?

Stars produce sound.

- Job 38:7 as the morning stars sang together and all the angels shouted for joy?

If you think about it, the concept of stars making sounds is not intuitively arrived at. However in 1942 A.D. Sun spots jammed U S Army radio signals and by 1963 A.D. quasars were discovered. These stars can be heard at ultra-high frequencies.

Stars are their own light.

- Genesis 1:16-17 God made the two great lights, the greater light to govern the day, and the lesser light to govern the night; He made the stars also. God placed them in the expanse of the heavens to give light on the earth.

Before 1650 AD people worshiped stars, and thought that they reflected our sun's light. But in 1859 AD It was proven that stars produce their own light.

Stability of the Laws of Nature

- Jeremiah 31:36 “I am as likely to reject my people Israel as I am to do away with the laws of nature!

In both our everyday experience and in the studies of physics we see that it would be a lot easier to believe in chaos than in order. Yet we have consistently discovered that what God says is true – there are fundamental laws that govern the universe and they do not change.

The north is empty.

- Job 26:7 God stretches the northern sky over empty space and hangs the earth on nothing.

Except for the north star, one could travel literally billions of light years north without meeting any stars, yet towards the south there are billions.

OTHER

Cave-men

- Job 30:1-8 “But now I am mocked by those who are younger than I, by young men whose fathers are not worthy to run with my sheepdogs. ²A lot of good they are to me—those worn-out wretches! ³They are gaunt with hunger and flee to the deserts

and the wastelands, desolate and gloomy. ⁴They eat coarse leaves, and they burn the roots of shrubs for heat. ⁵They are driven from civilization, and people shout after them as if they were thieves. ⁶So now they live in frightening ravines and in caves and among the rocks. ⁷They sound like animals as they howl among the bushes; they huddle together for shelter beneath the nettles. ⁸They are nameless fools, outcasts of civilization.

This passage describes cavemen not as people that preceded modern man but as people who were dispossessed for one reason or another from society. We need to be careful in pronouncing every skeleton found in a cave to be a cave man in the sense the world usually uses. To this very day there are people living in caves all over the world. Some do it because they are social outcasts, some do it for economic reasons, and some do it simply because they enjoy the coolness!

Were there ancient groups of people that preceded the historical record? Absolutely. But we must not fall into the interpretive trap of associating every cave dweller with a primitive society.

Worldwide Simultaneous Communication

- Rev. 11:8-11 And their bodies will lie in the main street of Jerusalem, the city which is called “Sodom” and “Egypt,” the city where their Lord was crucified. ⁹And for three and a half days, all peoples, tribes, languages, and nations will come to stare at their bodies. No one will be allowed to bury them. ¹⁰All the people who belong to this world will give presents to each other to celebrate the death of the two prophets who had tormented them.

Millennia before mass communications were invented the Word of God predicted a day when the combined masses of Earth’s population would be able simultaneously view one event in real time. This did not become possible until the advent of satellite communications and the Internet.

Mining and Run-off

- Job 28:6-11 “People know how to find sapphires and gold dust—⁷treasures that no bird of prey can see, no falcon’s eye observe—⁸for they are deep within the mines. No wild animal has ever walked upon those treasures; no lion has set his paw there. ⁹People know how to tear apart flinty rocks and overturn the roots of mountains. ¹⁰They cut tunnels in the rocks and uncover precious stones. ¹¹They dam up the trickling streams and bring to light the hidden treasures.

Job 28:6-11 is a lyrical description of ancient mining techniques. An eighth-century BC inscription found at Jerusalem’s Pool of Siloam testifies to the sophistication of ancient tunneling technology. In an interesting aside Job mentions the necessity of damming and redirecting underground water sources - a thorny problem even today.

Rocks are worn away.

Job 14:19 Water wears away stones, Its torrents wash away the dust of the earth; So You destroy man's hope.

In the process of erosion wind, water, and slight movements wear rock away.

COSMOLOGY – THE CREATION ACCOUNT

I believe that God created the universe - all of it. In the words of John,

- “*He created everything there is. Nothing exists that he didn’t make.*” (John 1:3).

The two books

I believe that God gave us two inerrant books in which to discover Him. The first is, of course, the Bible

- *“Above all, you must understand that no prophecy in Scripture ever came from the prophets themselves or because they wanted to prophesy. It was the Holy Spirit who moved the prophets to speak from God.”* (2 Peter 1:21-22).
- *“All Scripture is inspired by God and is useful to teach us what is true and to make us realize what is wrong in our lives. It straightens us out and teaches us to do what is right. ¹⁷It is God’s way of preparing us in every way, fully equipped for every good thing God wants us to do.”* (2 Timothy 3:16-17).

The second book, equally inerrant, is nature.

- *“The heavens tell of the glory of God. The skies display his marvelous craftsmanship. ² Day after day they continue to speak; night after night they make him known. ³ They speak without a sound or a word; their voice is silent in the skies; ⁴ yet their message has gone out to all the earth, and their words to all the world.”* (Psalm 19:1-4)
- *“But God shows his anger from heaven against all sinful, wicked people who push the truth away from themselves. ¹⁹For the truth about God is known to them instinctively. God has put this knowledge in their hearts. ²⁰From the time the world was created, people have seen the earth and sky and all that God made. They can clearly see his invisible qualities—his eternal power and divine nature. So they have no excuse whatsoever for not knowing God.”* (Romans 1:18-20)

The proper attitude

Nature, being both mindless and yet governed by strict laws, is inextricably bound to the truth. Nature cannot lie. As a Christian I believe that the Bible is divinely inspired and inerrant in the original and thus is equally incapable of lying. Therefore if there seems to be a contradiction between the two, it is not that one or the other is incorrect but simply that I am not yet wise enough to reconcile the difference.

The relativism of time

It is interesting to note that in physics time is always measured from the point of view of the observer. Tell me – who was present at creation? Certainly not man! In fact, the planet itself was not formed until “day“ three. So how do we understand “evening and morning day...” when there was no planet, no horizon over which the sun could set or rise? Time (up until “day” three at least) must be measured by the observer and that observer was God.

The style of writing and presentation in the first two chapters of Genesis are utterly different than all the other styles in the entire Bible. Once we reach chapter three, “biblical time” and “historical time” coincide quite nicely. But those first two chapters are notoriously controversial. My contention is that if we understand the relativism of time as it is measured by the observer then the entire issue goes away.

DAY ONE:

In the beginning God created the heavens and the earth. ²The earth was empty, a formless mass cloaked in darkness. And the Spirit of God was hovering over its surface. ³Then God said, “Let there be light,” and there was light. ⁴And God saw that it was good. Then he separated the light from the darkness. ⁵God called the light “day” and the darkness “night.” Together these made up one day. (Genesis 1:1-5)

Black hole - I further enjoy the fact that the phases of creation the Bible describes and those we see in the fossil record match perfectly. For example the Bible says that before creation “The earth was empty, a formless mass cloaked in darkness.” The terms used here

are “tohu” and “bohu”. They literally mean “without form” and “void”. What an apt description of a singularity. Everything – even clouds have a shape. It may be amorphous but it’s outline can be traced. A black hole however, with its infinite negative curvature is truly without form and void.

Fluctuation – The Bible further describes the initial condition of the universe as being characterized by the Spirit of God “hovering”. This word in Hebrew literally means “to vibrate”. How interesting that modern physics describes the initial impetus of the Big Bang as being a “quantum fluctuation.”

Sonic wave – The Scriptures say that the universe was begun with a sound – the sound of God’s voice. Just recently they have determined that the Big Bang was characterized by acoustic waves approximately 50 octaves below the threshold of human hearing. When brought up the requisite number of octaves so that we can perceive it, it sounds rather like a hissing roar. Go through the Bible and see how many times God’s voice is described as the sound of many waters or as a roar and then think about how far ahead of its time the Word actually is!

DAY TWO:

And God said, “Let there be space between the waters, to separate water from water.”⁷ And so it was. God made this space to separate the waters above from the waters below.⁸ And God called the space “sky.” This happened on the second day. (Genesis 1:6-8)

Energy spike - Everything began suddenly with a great spike of energy that it refers to as light. Ancient Jewish commentators like Maimonides and Nahamihud taught that the word for light there was not to be understood as that which falls within the human visible spectrum but that it was understood to be energy.

Cool down - Then, as the energy cooled down, it began to coalesce and become translucent in places. The Bible describes this as light and dark being divided.

Accretion of matter - Then chapter one describes the energy as being in a liquid state and coalescing in space creating semi solid areas divided by spaces. Sounds like matter beginning to accrete to me!

DAY THREE:

And God said, “Let the waters beneath the sky be gathered into one place so dry ground may appear.” And so it was.¹⁰ God named the dry ground “land” and the water “seas.” And God saw that it was good. (Genesis 1:9-10)

Pooling of liquid water - After that the point of view zooms down to one individual planet. As it began to cool, the liquid water pooled in the low spots

Then God said, “Let the land burst forth with every sort of grass and seed-bearing plant. And let there be trees that grow seed-bearing fruit. The seeds will then produce the kinds of plants and trees from which they came.” And so it was.¹² The land was filled with seed-bearing plants and trees, and their seeds produced plants and trees of like kind. And God saw that it was good.¹³ This all happened on the third day. (Genesis 1:11-13)

Vegetative life – The Scriptures then describe life as first being vegetative, grasses coming before plants and trees.

DAY FOUR:

And God said, “Let bright lights appear in the sky to separate the day from the night. They will be signs to mark off the seasons, the days, and the years.¹⁵ Let their light shine down upon the earth.” And so it was.¹⁶ For God made two great lights, the sun and the moon, to shine down upon the earth. The greater one, the sun, presides during the day; the lesser one,

the moon, presides through the night. He also made the stars. ¹⁷God set these lights in the heavens to light the earth, ¹⁸to govern the day and the night, and to separate the light from the darkness. And God saw that it was good. ¹⁹This all happened on the fourth day. (Genesis 1:14-19)

Atmosphere becomes translucent – As the planet continued to cool down and the geological processes calmed, the atmosphere would have become more translucent and the sun, stars and moon would have appeared.

DAY FIVE:

And God said, “Let the waters swarm with fish and other life. Let the skies be filled with birds of every kind.” ²¹So God created great sea creatures and every sort of fish and every kind of bird. And God saw that it was good. ²²Then God blessed them, saying, “Let the fish multiply and fill the oceans. Let the birds increase and fill the earth.” ²³This all happened on the fifth day. (Genesis 1:20-23)

Oceanic life preceded that of birds – The Bible agrees with the fossil record that life began in the oceans. The next thing we see after that is birds in the air. Again, the findings of the paleontologist and the theologian can agree.

DAY SIX:

And God said, “Let the earth bring forth every kind of animal—livestock, small animals, and wildlife.” And so it was. ²⁵God made all sorts of wild animals, livestock, and small animals, each able to reproduce more of its own kind. And God saw that it was good. (Genesis 1:24-25)

Land animals soon followed – It is fascinating to watch this continual progression, this vast panoply of life as it passes before our eyes. We now get to see (through the eyes of the inspired prophet) that land animals came after the fish and the birds. We must note, however, one subtle difference. All of these forms of life reproduce “after their own kind.” This is a serious difference between the biblical view and the current evolutionary view. As a Christian I must believe that all life was created to reproduce after its own kind. I believe in great evolutionary changes, both natural and artificial. After all, look at the continual mutations of viruses. Observe the resistance insects develop to our poisons. Consider the man-made difference in dogs: they range from the teacup Chihuahua to the Mastiff! However, a dog is a dog. We’ve not been able to make an animal so different that it no longer was able to breed with others of its own species. Every time we reach that barrier and try to cross it, they become sterile. Again – the Bible and science agree.

Then God said, “Let us make people in our image, to be like ourselves. They will be masters over all life—the fish in the sea, the birds in the sky, and all the livestock, wild animals, and small animals.” ²⁷So God created people in his own image; God patterned them after himself; male and female he created them. (Genesis 1:26-27)

Human life finally arrives – The Bible recounts that humans came last and that there is a unique difference between humans and animals. God tells us more about it in the complementary account in Genesis two. He breathes the breath of life – the “nephesh” – into us. We are uniquely different from the animals. Not in our ability to think for many animals do; not in our ability to emote for again many animals experience fear, joy, sadness etc; not in our ability to be self-aware nor in our ability to lie or deceive because many animals are very cunning and will both escape from and lay traps. No – the unique difference is in our spirituality. Our ability to sense and communicate with God. Therein lies the great difference. And when we deny that capability, when we say like the fool in Psalms “there is no God” we descend to the state of animals.

Conclusion

Do I believe in six literal days of creation? Yes. But literal days as measured on Mars are different from literal days as measured on Earth. Days as measured by the universe are yet another thing entirely! Do I believe in an evolutionary process? Yes. But I believe that the evolutionary process does not allow the crossing of species boundaries. I believe in a meddling, tweaking, fiddling God who created - not just once, but continuously. I believe in an Artist who designed His work to be constantly changing and growing – not just humans but all of creation.

Whether you believe in fiat creationism ex nihilo or in theistic evolution or progressive creationism or simple evolutionary processes, the fact remains that behind it all is God. The question of how He chose to create is simply not as important as the question of why He created. Answer the first and you simply have an interesting theory. Answer the second and you have a life-changing metaphysical outlook!