The Scientific Evidence for Biblical Longevity

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Fact or Fantasy

The Bible (1) asserts in plain simple language in many places that humans lived for long periods of time. It states that Adam lived to be 930 years old (Genesis 5:5). Others were mentioned as even having lived to a more advanced age. Noah lived to be 950 years old (Genesis 9:29) and Methuselah the longest lived human, according to the Biblical account lived 969 years (Genesis 5:27). The mere mention of these ages approaching the thousand-year mark (2) is to many people ridiculous. Very few people live to be 100 years old today in an age of medical advancements. How was it possible that people in the distant past were able to achieve such longevity?

Figure 1 (above and below). Human ageing and longevity may be related to a wide variety of factors including supernovas and human genetics.

Long life spans are a major stumbling block for those who believe or want to believe in the simple Biblical story as outlined in Genesis. How can anyone logically state that people before the flood and immediately after the flood (Genesis 11) lived for many centuries when no modern documented cases of anyone living over 120 years exist today? If you are a skeptic the answer is easy—the Bible is a book of legends and myths. On the other hand if you are Bible believer then how are these long lifespans explained?

This paper will answer these and other similar questions. Obviously this is a very broad and complex subject and many factors undoubtedly played a role in increasing the life span of the preflood humans. This theme involves concepts from cellular metabolics to genetics to stellar phenomena, see figure 1 (3, 4). Many of these concepts with time may have been changed and or modified. Some of them involve feedback systems, which may never be completely understood or discovered. When God created humans they were efficiently designed with perfect genetics and they were placed in an ideal setting in an idyllic environment—hence they had the potential to live long ages. Present day humans are puny examples of our spiritual and physical forefathers. No one is omnipotent like God therefore many of the things He did to enable man to live as long as he did will probably never be discovered or can be recreated. The point of this paper is to show the feasibility of the concept that there are scientific reasons why men could have lived as long as they did. This paper is not trying to recreate what only God can do. Therefore this paper as well as others written on the subject will never be wholly adequate.

Recently much research has been done on the subject of human longevity. Several factors can shorten the lifespan of humans and these same factors also lengthen human lifespans. These factors can be broken down into two broad categories. The first of these is environmental factors. These factors would include diet, makeup of the atmosphere, etc. The second broad factor is human physiology; including but not limited to genetics, human maturation, etc.

Role of Faith

There are three typical approaches that can be taken when looking at the subject of human longevity. The first approach is to simply believe that the scripture is the inspired word of God and accept these statements at face value. If the Bible says that men lived for centuries then just simply believe and do not question. The second approach would be to relegate the scripture to the position of being a book of myths, legends, and fables. It may or may not have some historical basis but by and large it is simply a collection of uninspired human writing of the Hebraic people. Third, one could claim to be a believer in the writings of the "Book" all the while taking a compromising position or stance on a number of theological positions. This third position of compromise will usually wait for further evidence before making a decision on whether the Bible is really an accurate scientific rendering of what actually has happened. Often the Bible will only be believed if it can be scientifically proved. Thus God's word (John 17:17) is really subservient to the reasoning of humans. Only that part of God's word that can be proven is accepted. Which of these three conventional approaches is correct?

In reality none of the before mentioned approaches is totally correct. Consider the following scripture:

> Revelation 9:16 Now the number of the army of the horsemen was <u>two hundred million</u>; I heard the number of them. And thus I saw the horses in the vision: those who sat on them had breastplates of fiery red, hyacinth blue, and sulfur yellow; and the heads of the horses were like the heads of lions; and out of their mouths came fire, smoke, and brimstone.

This scripture is describing an army of 200 million horsemen that are part of the sixth trumpet blast as described in the mysterious book of Revelation. This scripture could be analyzed using any of the three previously mentioned approaches.

1. Believe—the army of 200 million horsemen is mentioned in the scriptures and therefore believe. Look no further than what the scripture tells us.

2. Myth and legend—there could not possibly exist an army of 200 million horsemen and therefore this is simply another example of how the Bible is unworthy.

3. Compromise—Wait and see if science ever collaborates an army of 200 million horsemen. If science proves it beyond a doubt then belief is possible, but until then other possible interpretations are put forth. Many of these alternate interpretations will cloud the intended and simple meaning of the scriptures.

Of the three above choices number one seems to be correct—but is it? Working from last to first consider the third viewpoint of <u>compromise</u>. If this position were examined from the point of

view of someone living 1,000 years ago the answer would have been easy. Since there are not enough people to field an army of millions at the present time then this is simply a fantastic story. Now as time passed and humanity moved into the 20th century then humanities understanding would change. Now in the modern era it could be stated that since it is scientifically possible to field an army of two hundred million men then belief is now warranted. But the fallacy in this approach is that the people that did not live in the modern age would have scorned and ridiculed the Bible as being unreliable and would have not believed its writings on other subjects. False interpretations may have been promulgated and taken root before scientific evidence upheld God's word. Great masses of humanity living in the past would never have trusted the word of God and its moral principles. Faith that is based on scientific evidence alone is untrustworthy.

The second situation is the myth and legend scenario. If the Bible is simply a book of legends a case could be made for believing that the book of Revelation was simply a book full of imagery and symbolism with no connection to reality. In other words the book of Revelation is basically a symbolic book. Thus using the myth and legend approach can negate God's simple statements. There will never be an army of two hundred million horsemen because the Bible is a fairy tale for adults.

Many would say since the second and third choices are really without basis then the only logical choice is to believe. Although this is the better of the three choices, truthfully faith is simply more than just believing, Sound Godly faith is based on simply believing God's word and partly on very matter-of-fact principles. For example having faith that the sun will come up tomorrow is based on certain astronomical laws; the knowledge that the sun exists is necessary. So faith is important as a foundation but it is built on or added to by acquired knowledge. Consider the first scenario based on believing. Before the modern era faith would be necessary to believe that what God's word said about the army of two hundred million horsemen was indeed correct. It would be very important to have faith as a foundation. Later, as time progressed and it no longer required faith to believe that a literal army of such vast numbers could be fielded faith would be anchored to hard evidence (5). Once scientific evidence allowed that a large army as mentioned in Revelation 9 was possible the historical and political details that would create this army could be examined. By doing this the Bible believer's understanding of prophecy and Biblical history would be augmented and grow with out destroying faith and faith would increase by this approach. Faith is a foundation and knowledge should build or enhance this foundation.

> 2 Peter 1:5-6 But also for this very reason, giving all diligence, add to your faith virtue, to virtue knowledge, to knowledge self-control, to self-control perseverance, to perseverance godliness

When dealing with the subject of Biblical human longevity, or any other Biblical topic that on the surface seems strange the prudent approach would be to believe in faith knowing that eventually modern advances in knowledge will vindicate the scriptures. This will be the attitude taken in this paper.

Biblical Overview of Longevity

The Biblical record reveals that all of the pre-flood patriarchs lived almost 1,000 years. Enoch was a notable exception he died prematurely (Genesis 5:23-24). Figure 2 lists the longevity of

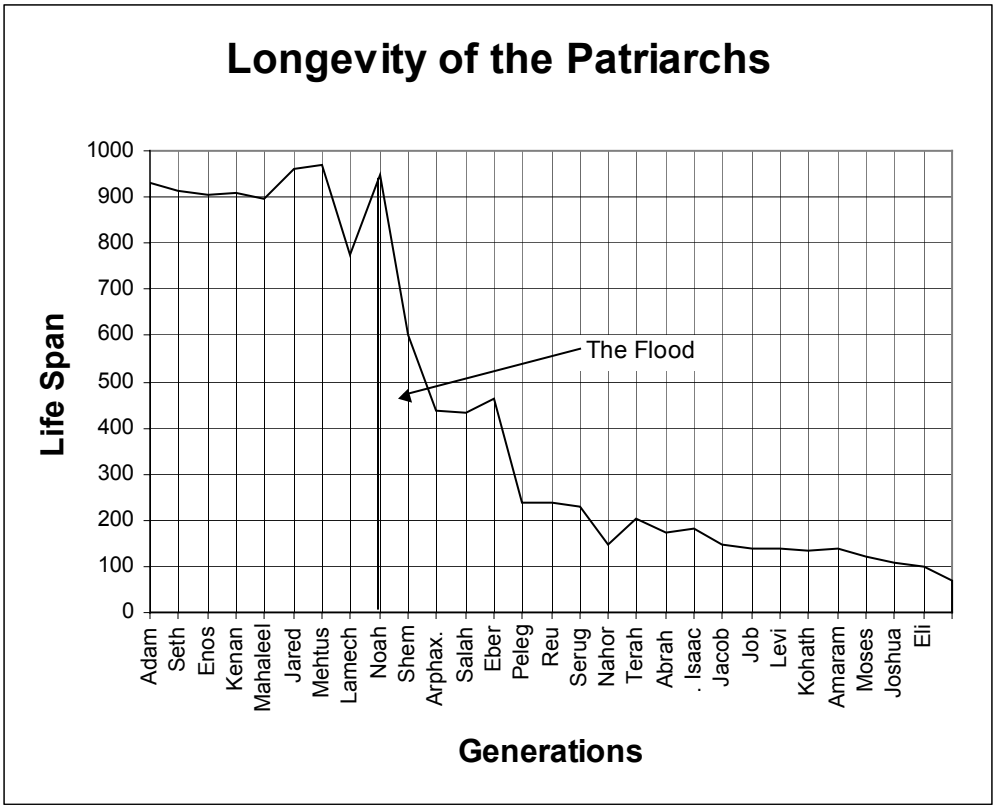

Figure 2. A graph of the life span of the patriarchs. Compare the life spans before the flood with those after the flood. The life span average before the flood was 912 years, after the flood 222 years.

various Biblical characters as mentioned in Genesis 5 and 11. This indicates that the lifespans were quite long before the flood and tapered off quickly after the flood. There seems to be no difference in the first generation, Adam, with the last pre-flood generation of Noah. In fact Noah actually lived longer than Adam. This seems to indicate that the factors that were responsible for the extended lifespans were still functioning at the beginning as well as the end of the pre-diluvial regime.

Many ancient historians state that the pre-flood inhabitants had long life spans. Even though this is the case, many believe that they were simply exaggerations or historical inaccuracies (6).

Exponential Decay Curve Evidence

It can be shown very simply that the long ages were not myths. This can be done by an understanding of the exponential (natural) decay rate. In nature all things decay at a certain rate. For example if a container of living organisms is exposed to a radioactive substance they will die off in what is called a natural decay rate or curve. If their life spans are plotted on a graph this type of curve is shown in fig 3. This is the same type of curve that is produced by the death rate of organisms exposed to lethal doses of gas or other toxins.

If the points of the population in question are graphed this will show how close the actual decay rate or curve fits the exponential decay curve. This will yield an equation and a value that is called the coefficient of determination. This is a mathematical ratio that reveals how close your graph fits the exponential decay curve. This coefficient of determination will have a value of 0-1. If the coefficient is 1 this is considered a perfect match.

The patriarchs before the flood had extremely long life spans. After the flood the life spans decayed until a norm of 70 years was reached. These life spans can be plotted and the decay curve calculated to see how close the actual decay curve is when compared to the mathematically perfect exponential decay curve, which has a coefficient of determination of 1. When this is done it shows that the ages given for the death of the patriarchs after the flood were not fabricated, myths, or exaggerations.

Note in fig. 3 that the coefficient of determination (R^2) is almost 0.89. This means that the decay rate of the patriarch's death after the flood was only 11% from being a perfect match. In other words the decay rate for the declining life span for the patriarch after the flood is very close to being a match to the exponential (natural) decay curve.

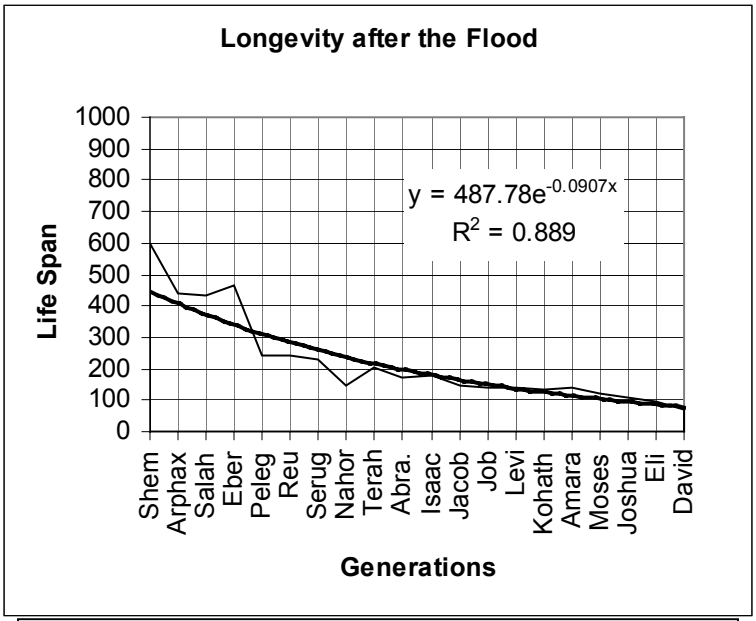

Figure 3. Graph showing the declining life span after the flood. It took 20 generations for a new equilibrium of 70 to be reached. Peleg's brother was Joktan, which means: "he shall be made little or small," notice the life span decline with Peleg!

Implications of the Exponential Decay Curve

- The information source (divine revelation) for the ages of the patriarchs provided ages that closely matches a natural exponential equation.
- It is highly unlikely that people living at this time knew the mathematics of the exponential decay curve.
- It is very unlikely that the ages were fabricated since they closely match the exponential decay curve, which occurs naturally.
- The ages of death show that the post genesis flood world was being affected by some natural factors that were causing the declining life spans.

All of these factor indicate that the ages given were genuine and not fabrications.

Traditions of Longevity

Many ancient scholars had traditions of longevity. These included the Egyptians and the Babylonians to name a few.

The Jewish historian Flavius Josephus writes the following about this subject (7).

> Now when Noah had lived three hundred and fifty years after the Flood, and that all that time happily, he died, having lived the number of nine hundred and fifty years. But let no one, upon comparing the lives of the ancients with our lives, and with the few years which we now live, think that what we have said of them is false; or make the shortness of our lives at present an argument, that neither did they attain to so long a duration of life, for those ancients were beloved of God, and [lately] made by God himself; and because their food was then fitter for the prolongation of life, might well live so great a number of years: and besides, God afforded them a longer time of life on account of their virtue, and the good use they made of it in astronomical and geometrical discoveries, which would not have afforded the time of foretelling [the periods of the stars] unless they had lived six hundred years; for the great year is completed in that interval. Now I have for witnesses to what I have said, all those that have written Antiquities, both among the Greeks and barbarians; for even Manetho, who wrote the Egyptian History, and Berosus, who collected the Chaldean Monuments, and Mochus, and Hestieus, and, besides these, Hieronymus the Egyptian, and those who composed the Phoenician History, agree to what I here say: Hesiod also, and Hecatseus, Hellanicus, and Acusilaus; and, besides these, Ephorus and Nicolaus relate that the ancients lived a thousand years. But as to these matters, let every one look upon them as he thinks fit.

Environmental Factors

The flood was a watershed event as far at human ageing is concerned. There are many environmental factors that could account for the lowering of the life spans after the flood. The Bible states that the flood would not only destroy the land dwelling air breathing animals but it would also destroy the earth. (Gen. 6:13; 9:11)

> Genesis 6:13 And God said to Noah, "The end of all flesh has come before Me, for the earth is filled with violence through them; and behold, I will destroy them with the earth"

After the flood the earth was completely different than the earth before. There were widespread global differences. These would include changes in the climate, composition of the atmosphere, hydrologic cycle, geologic features, cosmic radiation reaching the earth, ozone concentration, ultra violet light, background radiation, genetics, diet, and a host of other subtle and/or profound chemical and physiological changes. These changes caused a rapid decline of the longevity of post flood humanity. This section will discuss some of the environmental factors that could impinge on human longevity.

Supernova Remnant Shell (SNR)

Many scientists believe that life can be shortened by large doses of deadly radiation. At high does radiation is a carcinogen and shortens lifespan. Amazingly current research indicates that low doses of some types of radiation may be beneficial and increase cell function and longevity. This beneficial aspect will be covered later in this paper. This high dose radiation shortens life in many ways but one of the most common is by producing cancers and mutations (8) in the human body. One form of this life shortening radiation is cosmic rays (9).

Cosmic rays (10) are charged particles that enter the earth's atmosphere from outer space. These rays are electrically charge particles that have either a positive or a negative charge. A majority of the cosmic rays (83%) originate from the nuclei of the helium atom that is made up of two protons and two neutrons. A smaller percentage (16%) of cosmic rays are made up of protons that originated from the hydrogen atom that has been stripped of its electron. The remaining percentages of cosmic rays come from negatively charged electrons, positively charged electrons commonly called positrons, and the nuclei of heavier atoms. Cosmic rays formed from heavier nuclei usually occur in the same ratio as their cosmic abundances. Lithium, beryllium, and boron, which also occur as cosmic ray particles, seem to be overrepresented.

Most radiation is harmless, and in some cases helpful, since they are small particles moving at very slow velocities. Cosmic rays can do much damage to biological systems if they are large sized particles moving at high speed. Many of these cosmic rays are atomic particles that have been accelerated to near speed of light velocities (≈186,000 miles/sec). The cause of their acceleration is still somewhat of a mystery but either or both of two scenarios is the cause. The first is that cosmic rays are simply particles at rest in the vacuum of space that are accelerated when a shock wave from an exploding supernova moves them. This exploding supernova remnant shell (SNR) accelerates these particles much like a strong wind would accelerate ping-pong balls, see figure 4 (11). The other more likely possibility is that the SNR is actually composed of cosmic particles that have originated in the interior of the exploding star and are accelerated in the ensuing explosion. With the explosion of the supernova the cosmic rays particles are sprayed throughout the universe (12).

Figure 4. The Pencil Nebula is part of the Vela supernova remnant shell (SNR). The white area is superheated gas that is on the trailing edge of the Vela remnant shell.

Many scientists have developed theories that deal with the effects of cosmic rays. When the earth encounters cosmic ray showers much damage is done to the ecosystem. Some of this damage would include ozone depletion, a high production of NO_3, large production of gamma radiation (γ), and X rays. An important factor in human longevity would be the overproduction of ultra-violet light and cosmic rays. Both of these types of radiation have been suspected of influencing human longevity due to the damage they do to living tissue and their effect on the production rate of mutations. A paper published by G. R. Brakenridge discusses some of these factors (13).

> Not yet discussed in this paper are the biological effects of increased uv-light penetration to the Earth's surface following ozone layer depletion. These effects offer a third route to test the hypothesis that the Vela supernova influenced the terrestrial atmosphere. The uv increase would have been short-lived but intense: perhaps 2 to 10 times the present level, according to calculations presented by Ruderman (1974) and Reid and others (1978).

Background Stellar Radiation

The earth is constantly being bombarded by stellar radiation. Most of this radiation—cosmic rays—is evenly spread out and is constantly striking the earth's surface in a comparatively steady manner. This radiation is mostly smaller slower moving particles composed of electrons and protons. This radiation is produced by SNR from very distant supernovas; unfortunately not all cosmic rays are this gentle. Other types of cosmic rays exist. These other particles, most moving at high velocities approaching the speed of light, and made up of the large nuclei of iron and oxygen atoms can ravage living organisms. These more powerful cosmic rays are called primary cosmic rays.

Primary cosmic rays, sometimes called galactic cosmic rays, which come from deep space, are rarely encountered on the ground because they usually collide with other particles in the upper atmosphere, which acts as a cosmic ray shield. These high altitude collisions produce showers of slower moving secondary cosmic ray particles. The energy packed into cosmic rays is huge (14). The earth's atmosphere is equivalent to about 14 feet of concrete yet most secondary cosmic rays manage to strike the surface of the earth. Some of these secondary cosmic rays have even been measured thousands of feet below the surface of the earth in mines. The more powerful primary cosmic rays enter the upper atmosphere where they produce showers of millions of secondary particles covering many acres.

Recently scientists studying the background radiation and the radiation from the more deadly heavier particles have come to some very interesting conclusions. These scientists have determined that the earth is immersed in the SNR shell of a very close supernova. The specific stars location, which produced the SNR, has not yet been determined. The reason the supernova remains hidden is that the SNR shell, which it produced, has filled most of the stellar sky and is therefore undistinguishable from the background stellar radiation. Scientists literally cannot see the forest because of the trees. This nearby supernova has showered the earth with deadly cosmic rays at a much higher level than the fairly constant benign level from the supernovas that are at an extreme distance from us. In other words very recently in the last several thousand years the earth began to be bombarded with a more deadly type of cosmic rays from a nearby supernova see figure 5 (15). These bombardments of stellar rays could not only have affected many of the earth's ecological systems but also could have affected man's physiology including changes in genetics, mutations, and the controlling of many bodily functions under genetic control. These could have included hormonal, enzymatic, metabolic as well as genetic functions.

Figure 5. A star goes nova. This artistic rendering of an exploding super nova show the SNR as it arrives in a nearby planetary system.

> Concerning our location with respect to the SNR shell, the analysis suggests that we are close to it-probably just inside. (16)

> Some six years ago, we…proposed the "single-source (SS) model" in which a local, recent supernova remnant (SNR) was responsible for the "knee" in the cosmic-ray (CR) energy spectrum…which drew attention to a possible gamma-ray signature of this local remnant, we now study the situation for the local source and conclude that…the non-observation of this remnant is understandable—at least using our SNR model. It is due to the fact that this SNR, being local, develops in the local hot interstellar medium (HISM) with its low density of gas and also being nearby it will be an extended source occupying up to 40 of the sky and thus indistinguishable from the background. (17)

This local supernova may be the solution, or part of the solution, as to why the longevity of man has recently decreased. The patriarchs living before the arrival of the local SNR shell would have been living in a world that had lower cosmic ray radiations levels. They would have suffered a lower rate of mutations and cancers and would have had less damage to their genetic material. Those living after the SNR shell arrived would have been living in an environment in which higher levels of radiation would have been normal. This increase in radiation would have lowered the life spans. Interestingly the life spans after the flood did not decrease immediately, they decreased gradually (Genesis 9:28-29, Genesis 11). This is what would be expected if the earth's population were suffering from an overexposure of stellar radiation (18) in combination with other causes.

Magnetic Fields and Stellar Radiation

The amount of deadly cosmic rays reaching the earth is dependent on other factors besides the number of supernovas that produce the various SNRs reaching the earth. They are several shielding mechanisms that could produce a barrier to incoming stellar SNRs and solar radiation. These would include the composition of the atmosphere, the magnetic field of the sun, and the strength of the magnetosphere, which surrounds the earth as well as other atmospheric shielding scenarios. Of these factors the last two are very important.

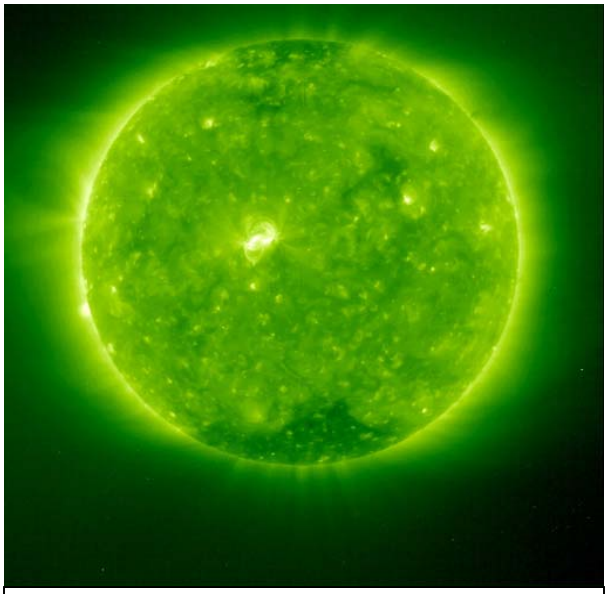

Figure 6. Image of the gas in the sun's thin, outer atmosphere (corona) was taken by the Solar and Heliospheric Observatory (SOHO) spacecraft. Every feature in the picture traces magnetic field structures. The sun's very active magnetic field affects the number of cosmic rays striking the earth.

The sun has a very active magnetic field, which can vary, see figure 6 (19). This field extends out into the interplanetary space of the solar system to form the interplanetary magnetic field (IMF). This magnetic field would also serve as a shielding mechanism for the earth depending on its strength. The strength of the IMF would affect the earthly arrival of cosmic rays and other charged galactic particles (20). The sunspot activity of the sun is a good indicator of the strength of the solar magnetic field and hence the IMF. It would seem that when the sun is covered by fewer sunspots that would indicate a brighter sun. On the contrary when there are fewer sunspots the sun is less

magnetically active and this means a cooler output since the sun's magnetic force is inversely related to heat output.

A few hundred years ago the earth experienced what has been called the "Little Ice Age." This occurred from 1400-1850. During this time period historical records indicate there was a decrease in the number of sunspots (21). This led to a cooler sun and hence a mini ice age.

> The impact of this sudden change of climate was dramatic and global. Glaciers advanced rapidly in Greenland, Iceland, Scandinavia, and the Alps. The Arctic pack ice extended so far south that there are six records of Eskimos landing their kayaks in Scotland. Large tracts of land, particularly at higher latitudes and altitudes, had to be abandoned. In many years, snowfall was much heavier than recorded before or since, and the snow lay on the ground for many months longer than it does today. Many springs and summers were outstandingly cold and wet, although there was great variability between years and groups of years. Crop practices throughout Europe had to be altered to adapt to the shortened, less reliable growing season, and there were many years of dearth and famine. Violent storms caused massive flooding and loss of life. Some of these resulted in permanent losses of large tracts of land from the Danish, German, and Dutch coasts…Climate changes were equally striking in other parts of the world. In Ethiopia and Mauritania, permanent snow was reported on mountain peaks at levels where it does not occur today. Timbuktu, an important city on the trans- Saharan caravan route, was flooded at least 13 times by the Niger River; there are no records of similar flooding before or since. In China, warm weather crops, such as oranges, were abandoned in Kiangsi Province, where they had been grown for centuries. In North America, the early European settlers also reported exceptionally severe winters. For example, in 1607 to 1608 ice persisted on Lake Superior until June. (22)

Interestingly during this mini ice age the rate of atmospheric ^{14}C increased. Since the sun was less magnetically active the IMF was weaker and cosmic rays, which produce ^{14}C, were able to strike the earth with more frequency (23). In other words the sun, depending on the strength of its magnetic field, is able to affect the amount of cosmic rays that reach the earth. The ramification of the IMF on the length of human longevity is not completely known although no doubt it is an important factor.

The earth much like the sun also has a very active magnetic field. Since cosmic rays are charged ionized particles they will readily interact with the earth's magnetic field. The earth's magnetosphere acting on these charged particles operates as a "force field" and keeps a majority of these rays from making contact with the earth. In the past the strength of the earth's magnetic field has varied (24).

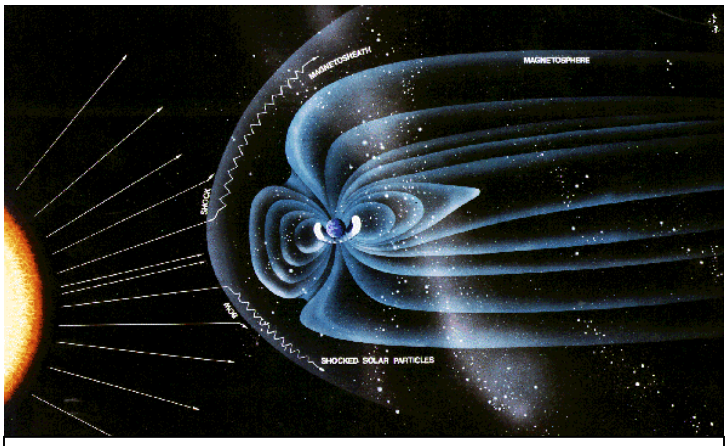

Figure 7. The solar wind flowing around and beyond the earth's magnetic shield. The magnetosphere diverts particles from the sun and also cosmic ray particles produced from the high-energy shells of exploding supernovas.

How does the earth's magnetic field interact with the incoming cosmic rays? Figure 7 (25) shows the solar wind flowing around and beyond the earth's protective magnetic shield. The magnetosphere is torpedo shaped and streams away from the earth in a comet-like fashion. This

comet-like shape is caused by the action of the solar wind hitting the magnetosphere and pressing it into this form. The magnetosphere is where the sun's hot solar wind plasma mixes with the ions that are created by the magnetic flux lines of the earth's magnetic field. This earthly ion flux is called the polar wind. The hot solar wind, which is created by the sun's corona, meets the cool polar wind from the earth. This outward flowing polar wind deflects the solar wind up and away from the earth. This causes the majority of the cosmic rays to be shunted up and away from the earth. The earth's magnetic field therefore acts as a "force field" by protecting the earth's inhabitants from the majority of deadly cancer causing, life shortening, cosmic rays.

Unfortunately a few cosmic rays do leak through this force field, these cosmic rays will enter the earth's atmosphere. Because of the angle of the magnetic lines and because the cosmic rays have much kinetic energy they will usually enter the earth's atmosphere at higher latitudes and they are primarily responsible for the aurora borealis. Also many cosmic rays enter the earth through the cusps at the north and south poles. These cause many geomagnetic storms and sub storms. If it were not for the earth's magnetic field life on earth would not be possible.

It is easy to see that many planetary processes occur that, if changed, could vary the intensity of the cosmic rays that would penetrate the earth's surface. Cosmic rays are a form of radiation and can alter the life span of humans and affect the quality of their lives. From an astronomical point of view the quality of earthly life is very delicately balanced. Slight changes could upset this fragile balance; these would include the output of the sun, variations in the sun's magnetic fields, sunspot activity, the earth magnetic field, the explosion of supernovas and the resultant SNR. Any of these factors could be easily altered and they would no doubt affect human longevity.

Background Earthly Radiation—Large Doses

Background radiation is naturally occurring radiation that is present in our environment. This radiation can come from several sources and can vary widely by location. People living in areas with mineralized soil or in areas high in granite will receive more background radiation than people living in other areas. As a result of this some parts of the United States will have a higher background radiation level than other parts. Most of this background radiation is caused by the breakdown of atomic particles. Most atoms are extremely stable and will resist decaying or disintegrating. Carbon-12 is an atom that is very stable another example is oxygen-16 both of these for all practical purposes will never disintegrate into smaller components under normal conditions. Although most atoms are stable certain atoms will eventually decay into a totally new atom through the emission of particles or energy. Atoms that disintegrate are said to be unstable and are often termed radioactive, an example of this would be carbon-14 (^{14}C), which over times decays into stable nitrogen-14 (^{14}N) by emitting an electron thus changing a neutron into a proton. When an atom decays into a more stable form this process is called radioactive decay.

The most common naturally occurring background radiation can be attributed to two isotopes radon-222 (^{222}Rn) and radon-220 (^{220}Rn). They account for about 66-75% of the background terrestrial radiation. Locations near igneous rock have the highest concentrations of radon. Radon is often concentrated in homes because the radon gas, which is tasteless, and odorless,

moves into the homes through cracks in the foundation, crawl spaces, open tops of block walls, and openings in the basement. It also enters the home through waterborne means, caused by leaky pipes and pumps and off gassings from showers, washing clothes, washing dishes, and faucets. Radon is also inherent in many building materials. Radon comes from the radioactive decay of uranium-238 (^{238}U) found in the soil, see figure 8 (26). Homes and any other closed structure trap radon gases and concentrate them. This would include cave and mines since there is very little ventilation in these closed systems. Radiation from radon has been attributed to high levels of lung cancer in miners and cave employees. It is estimated that between 7,000 and 30,000 Americans die each year by radon caused lung cancer. Smoking is the leading cause of lung cancer deaths radon is the second.

Radon can injure living tissue when the energy from its radioactive decay and the decay of the daughter species disrupts the cellular structure of living organisms. About 1% of the damage comes from the emission of an alpha particle from Radon-222 (^{222}Rn). The other 99% of the damage comes from the decay of the daughter species ^{218}Po, ^{214}Pb, ^{214}Bi, and ^{214}Po. Some of these daughter species emit an alpha particle and have half-lives of less than 30 minutes.

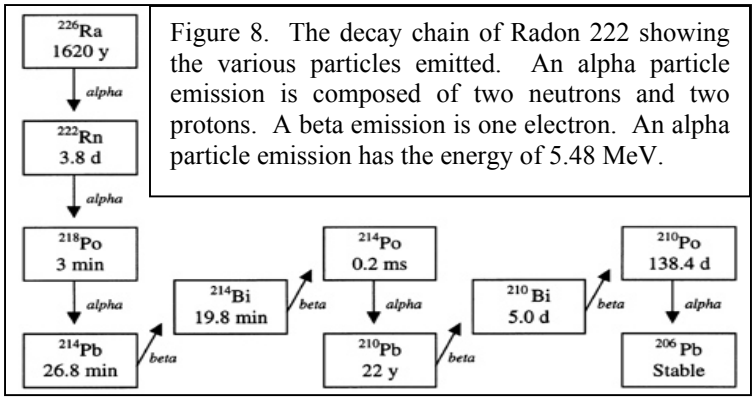

Figure 8. The decay chain of Radon 222 showing the various particles emitted. An alpha particle emission is composed of two neutrons and two protons. A beta emission is one electron. An alpha particle emission has the energy of 5.48 MeV.

Alpha particles are made up of two neutrons and two protons. They are positively charged and because of their relatively large size they can be stopped rather easily by a sheet of paper and do not penetrate deeper than the skin. However if the alpha particles are eaten or breathed then they can do much damage once inside the body. Since they will give up most of their energy in a short pathway alpha particles can only disrupt living tissue in close proximity. As a result the radioactive radon gas and dust lines the lung and causes cancer. The energy in an alpha particle emitted from radioactive decay of a Radon atom into Polonium is about 5.48 MeV. This amount of radiation if ingested internally causes atoms in biological systems to become excited and ionized, which can result in the production of various harmful changes. These can include; production of free radicals, chemical bonds can be disrupted and broken, then these molecules cross bond and produce harmful new molecular and chemical links. They can also disrupt the processes that regulate cell process such as DNA, proteins, enzymes, and RNA. Although cells can repair a certain amount of damage caused by radiation when the levels of repair are too high (27) repair mechanisms cannot keep up and tissue failure rapidly follows.

How much radon and background radiation is harmful (28)? It is well know that large does of radiation can cause measurable increases in certain types of cancers. These cancers including leukemia which are cancers of the blood these cancers would not be evident until after a delay of many years. Scientists have done experiments on plants and have concluded that high doses of radiation cause genetic mutations in plants. Although no experiments or studies have been done on humans it is suspected that large doses radiation would also cause genetic problems and mutations in humans. When humans are exposed to high levels of radiation sickness or death

can follow in a few days or weeks. What is uncertain is how is longevity affected at lower levels? The amount of damage done to living tissue depends on general health, type of radiation, dose level, and length of exposure. Embryos and developing human fetuses are very susceptible to damage from radiation.

What is the probability of developing cancer from background levels of radiations? For certain type of lung and localized cancers the answer is quite a very high probability. For other types of cancers the chances are quite small if measured annually. Because of ethical, scientific, and physiological reasons an experiment cannot be designed that would measure cancer and longevity rates in our present atmospheres compared to a setting in which there were lower levels of background radiation for an extended period of time (29). Even if it could be done obviously quality of life factors would skew the results. The radiation produced by radon is actually quite small for example the average total dosage for people living in the United States is 3.0 mSv (30). Of this dosage 0.27 mSv is attributed to radon and 0.28 mSv is attributed to cosmic radiation. The average dose of terrestrial radiation although quite small and deemed safe by most authorities still produces many lung cancer deaths per year. The problem is small doses of radiation such as that produced by radon would only produce effects several decades after the exposure. This delay makes it impossible to effectively say how big or how small a role background radiation has on humanity.

Beneficial Doses of Radiation

It has long been thought by the scientific community that all radiation is bad, this would include at low and high doses. Amazingly current research in the last few years has shown that this attitude in incorrect. Although radiation is still a major cause of death, mutations, and shortened lifespan at high doses, it is slowly being understood that radiation at low doses is actually beneficial, see figure 9 (31). In the early 1900s much research was done in the field of low dose radiation therapy. This concept was known as radiation hormesis. Hormesis comes from the Greek word *horomo*, which means to excite. It is the same root word used in the English word hormone. Hormesis is the stimulation of any system by low doses of

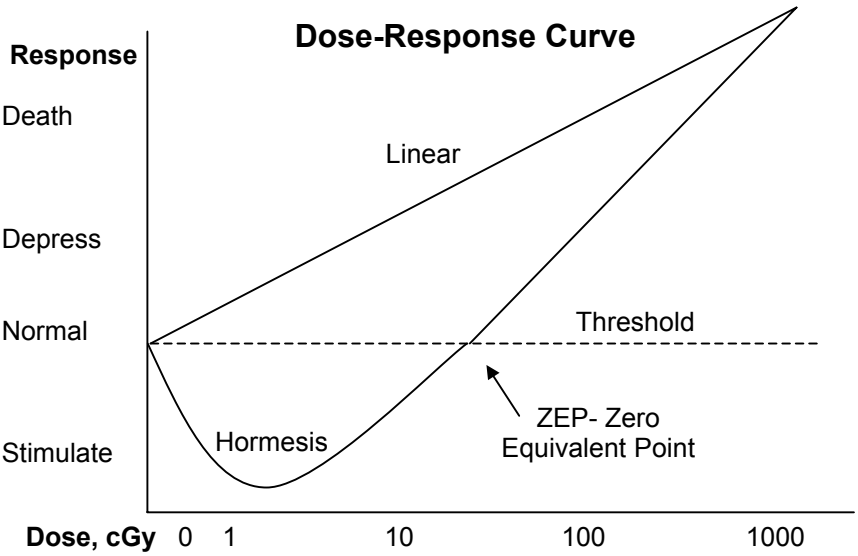

Figure 9. Hormesis curve. Low and moderate doses of radiation impart a resistance to future higher doses of radiation and increase health and longevity. As the radiation dose gets higher, above threshold, the body is overwhelmed and begins to deteriorate. The commonly accepted but incorrect linear graph is shown. The linear model incorrectly states that any dose is harmful.

any agent. Therefore radiation hormesis means to excite or stimulate by the use of low doses of radiation (32).

The human body has been designed with defense mechanisms that deal with toxins, radiation, chemicals, and physical stresses. Just as the immune system develops immunity to infections there are indications that low levels of radiation exposure can sharpen the body's defenses and can help it to defend against more and higher doses of radiation. At very high levels of radiation the body's defenses are overwhelmed and tissues and cells breaks down. The effects of low levels of radiation on the body can be understood by examining what happens when the body encounters low levels of other potential toxins (33). The body's immune system is stimulated whenever a bacteria or toxin is taken into the body. One result is that when the body fights off this smaller toxin it has developed the capabilities to ward off more of the same later. Radiation in low doses works in the same way. Many studies have shown that low doses of radiation helps the body's defense mechanisms by strengthening enzymatic repair processes including DNA and cellular repair functions. Notice what one recent scientific journal article stated. (34)

> Acute subinhibitory low dose radiation (≤250 mGy) stimulates all components of the antimutagenic system, reducing the cumulative mutation load observed in aging, disease, and cancer. All statistically significant, adequately controlled epidemiologic studies of the public, medical cohorts, and occupational workers confirm low doses of radiation are associated with reduced mortality from all causes and decreased cancer mortality and may be protective against accidental high dose radiation. Low-dose body irradiation for cancer immunotherapy has been shown to be effective in rodents and humans.

Another article also confirms that low doses of radiation are beneficial and fine tunes the bodies repair mechanisms. It helps the body fight against free oxidative radicals, it helps repair broken DNA links which cause cancers and mutations, it removes dead cells, and kills damaged cells that may later become cancerous. (35)

> Ionizing radiation causes DNA damage proportional to dose. However, low doses of low-LET (Linear Energy Transfer) radiation but not high doses to cells initiate protective responses (adaptive responses) in the hit cells. Bystander cells may respond similarly. These appear with a delay and temporarily induce: (a) cellular defenses (radical detoxification); (b) DNA repair (various pathways); (c) cell removal (mainly by stimulated immune response); and (d) apoptosis, which also occurs at high doses. Because at low doses endogenous DNA damage far outweighs radiation-induced DNA damage, low doses and dose rates appear to mainly protect against endogenous DNA damage. It is generally accepted that cancer induction appears proportional to the degree of DNA damage. Therefore, low-dose-induced protection mainly against endogenous DNA damage should reduce the "natural" cancer incidence. This supports some epidemiological observations. For these reasons, the LNT (Linear No Threshold) hypothesis on radiation-induced cancer appears invalid and should be reexamined.

The Biblical Implications of Current Research in Radiation

Our understanding of current research in radiation has large implication for the Biblical story of longevity. According to the Biblical record men before the flood lived a long time (Genesis 5). They matured slowly (36) as evidenced as to when the firstborn (actually first mentioned) son was born (Genesis 5:6, 18). Also the life span of the preflood patriarch remained constant. In reality Noah the last of the preflood patriarchs actually lived longer than Adam. Noah lived 950 years and Adam lived 930 years. Shortly after the flood the life span of men began to decay men did not live as long and they had their first born/mentioned son earlier (Genesis 10). In the time of King David life span had reached about 70 years and men were maturing at the present rate.

Although stellar and terrestrial radiation is probably not the whole key to the decline in human longevity it nevertheless is a very important piece of the puzzle.

Before the Noachian flood the following radiological factors would affect human longevity:

- Lower levels of primary cosmic rays before the flood.
- Higher shielding level of the magnetosphere of the earth.
- Higher magnetic activity of the sun increasing the interplanetary magnetic field (IMF) and shielding the earth from incoming primary cosmic rays.
- Possible background radiation, which would be low dose type radiation, which would immunize and strengthen the body from further radioactive assaults.

After the flood the following factors would have changed:

- The arrival of a supernova remnant shell (SNR) with increased levels of primary cosmic rays and other ionizing radiation. This may have been intense and short-lived and caused specific life shortening mutations which were passed on to succeeding generations even after the stellar radiation fell to normal levels.
- A lowering of the shielding effect of the magnetosphere of the earth as the field varied due to increase tectonic activity.
- Variations in the output of the sun especially the IMF, which would allow more cosmic rays to reach the earth's surface.
- Radiation would be brought to the surface of the earth due to the earthquakes and volcanoes produced by the flood.
- A change in the type and strength of the terrestrial background radiation and more importantly the human bodies reaction to this new form and strength of background radiation. The post flood background radiation may have been harmful because of its high dose or type.

Composition of the Ancient Atmosphere

Man lives in a sea of gases called the atmosphere. The present day atmosphere has the volume composition of elements shown in Table 1. This atmosphere is not only a blend of different gases but also exists in a pressurized state with a mix of water vapor and various other constituents. Some gases are out of proportion to their importance for humanity. For example ozone is represented as a small part of the total atmosphere but without this small proportion of ozone earthly life could not exist. The atmosphere in comparison to the oceans and the crust of the earth is actually the lightest in weight and the most easily changed. Although the atmosphere is small in comparison to the other parts of the earth it is the most important since man lives and breaths within it. Any small change to the atmosphere would affect the longevity and quality of life of humans living in it.

Table 1. Average Volume Composition of the Atmosphere

Nitrogen	78.1%	Helium	0.0005%
Oxygen	21%	Methane	0.00015%
Argon	0.93%	Krypton	0.0001%
Carbon dioxide	0.03%	Ozone	0.00004%
Neon	0.002%	Xenon	0.000006%

The Noachian flood affected the atmosphere in many ways and these changes along with many others caused a lowering of the lifespan and quality of life of the surviving humans. The atmosphere was affected in the following manner by the flood:

- A change in the composition of the atmosphere and its mix of gases.
- A lowering of the barometric pressure of the post flood atmosphere.
- A change in the mixing of the various gases both horizontally and vertically.
- A modification in the intensity of the radiation reaching the earth's surface.

Did the Earth Have a Protective Water Canopy?

Many creationists believe that the earth had a water vapor canopy before the flood. It is their contention that this canopy provided part of the water that made up the flood and that it protected and shielded the earth from various harmful effects. Is this contention correct?

Basically there are many problems with a water canopy surrounding the earth (37, 38). Many of the creationists understand that the water canopy theory has these difficulties. If even a small percent of the water covering the earth originated from a falling water canopy several problems would be unavoidable. This would include very high atmospheric pressures caused by the weight of the suspended water. It is estimated that these pressures would approach 100 to 200 times the present pressure, which would effectively kill all surface life. Also in order for the water to be suspended in the atmosphere heat is required and even for a few inches of suspended water in the form of water vapor this amount of heat would be more than 100º C or more than the boiling point of water. In other words all water canopy models that contribute more than a few inches of water to the surface of the earth would produce unacceptable temperatures and pressures (39).

The dictionary defines a canopy as a covering. Therefore, in a technical sense the earth has several types of canopies that cover its surface. These canopies are the various gases and other components that are a buffer between outer space and the surface of the earth. Although there are technical problems with a water canopy other types of atmospheric canopies or coverings presently exist. Some of these atmospheric coverings would affect the longevity of the pre-flood population. For example, there is much scientific evidence to support the earth in the past being covered by an atmosphere that contains more carbon dioxide (40) mixed with small amounts of water vapor (41). This would cause a more stronger than present greenhouse effect and would moderate temperatures. This would allow for the growing of more luxuriant vegetation, which is supported not only by the Biblical record (42) but also the geologic record. Various other types of atmospheric buffers would exist which could impinge on the longevity of humans and their quality of life. One of the most effective would be the ozone shield.

The Ozone Shield

Most oxygen in the lower atmosphere is diatomic. It is made up of two oxygen atoms bonded together, O_2. The oxygen—oxygen bond is very strong (120 kcal/mole). At higher altitudes because of the action of ultraviolet radiation (hV) in the 135-176 nm and 240-260 nm wavelength

ranges O_2 disassociates to produce O. This happens when the O—O bond is broken to form O. Because of the amount of energy from ultraviolet rays in the upper atmosphere diatomic O_2 is practically nonexistent. This is shown by equation 1 below.

$$O_2 + hV \rightarrow O + O \qquad \text{(eq. 1)}$$

Then the monatomic oxygen atom combines with another diatomic oxygen to create ozone O_3, see equation 2 below. Ozone is made of three oxygen atoms bonded together. M is another atom such as N_2 or O_2, which absorbs the excess energy and keeps the created bonds from rupturing.

$$O + O_2 + M \rightarrow O_3 + M \text{ (increased energy)} \qquad \text{(eq. 2)}$$

Later because of the action of more ultraviolet light the molecular bonds holding the ozone molecule are broken. This dissociation produces monatomic and diatomic oxygen see equation 3. The cycle then repeats.

$$O_3 + hV \rightarrow O_2 + O \qquad \text{(eq. 3)}$$

Because of the chemistry involved most ozone is contained in the upper atmosphere, or more specifically the stratosphere. Most ozone is concentrated in the stratosphere at an altitude of 25-30 km where it may reach 10 ppm. Very little of the ozone finds its way down to the lower atmosphere where all animal and human life exists. If not for the ozone in the upper atmosphere life could not exist. Ozone absorbs harmful radiation in the stratosphere and serves as a radiation buffer. It protects living things on the earth's surface from the bombardment of high levels of bond rupturing ultraviolet light (43). In essence the ozone acts as an invisible protective canopy.

Thus the creation of ozone is a combination of incoming solar radiation and the chemical makeup of the atmosphere. It is delicately balanced and the change in any one of several factors will cause more or less ozone to be formed. The amount of ozone in the upper atmosphere has great implications for the quality and longevity of life on the surface of the earth.

Although ozone in the upper atmosphere is essential for the existence of life on the surface of the earth, any ozone found at lower atmospheric levels is toxic to organisms that breathe it. The toxic effects of ozone are numerous. Even at low levels of less than 1 ppm ozone has a distinctive odor. This odor is common after lighting storms, which create ozone due to the generation of high coronal electrical charges. Inhalation of low doses of ozone causes headaches, eye irritations, and pulmonary edema, which is an accumulation of fluids in the lungs. Chromosomal damage also occurs in organisms that have been exposed to low levels of ozone. This damage is very similar to the damage done by high doses of radiation (43, 44). This chromosomal damage and mutations would be passed on to the subsequent generations. Plants and trees grow to a larger size (45) in an environment that had lower ozone levels (46). Ozone produces free radicals in living tissue. These reactive radical species can cause lipid peroxidation and the breaking of the sulfur-hydrogen bond (—SH) in various metabolic processes. Ozone is an oxidizing molecule. Supernovas in the past have been associated with lowering the concentration of the upper atmospheric ozone (47, 48, 49, 50).

In the past, in the world before the flood, the earth and as a result the atmosphere was much different than the present day atmosphere. These conditions produced an environment that allowed humans to live a long time. The scriptures and fossil record indicates that previous to the flood the earth was more tropical and warm. Fossil evidence reveals that even near the present day polar ice caps once lush vegetation covered the earth (51). Mountains were much smaller and the present day mountain systems (52) were the result of tectonic activity, which was produced by the flood episode. Because the earth's temperature was more uniform over its surface there was less horizontal mixing of the atmosphere. Wind systems caused by heat imbalances between the polar and equatorial regions and the earth's coriolis effects were nonexistent or subdued. This meant that large wind systems including the Trade winds and the Westerlies did not exist. Monsoons and hurricanes, which are, heat-moderating wind mechanisms did not exist in the preflood world. There was therefore less mixing of the atmosphere not only horizontally but also vertically. When the flood came the very efficient production of the upper atmospheric ozone, which is delicately balanced, was disrupted. Probably less ozone is being produced now than in times past. The formation of the post-flood wind systems forced some of the ozone that was produced to be brought to the lower levels of the atmosphere. The flood caused the thick ozone concentration in the upper atmosphere to be reduced and also brought toxic levels of ozone to the living biosphere, the lower atmosphere primarily by the increased atmospheric turbulence and wind. These atmospheric changes caused humans living on the surface of the earth to be exposed to more toxic chromosomal damaging ozone and also since there was less upper atmospheric ozone the surface dwelling humans were also exposed to more ultraviolet and stellar radiation. This would contribute to reduced life spans probably due to chromosomal damage and mutations that were inherited by the post-flood people.

Increased Atmospheric Pressure and Oxygen Concentration

There is much evidence that two very important atmospheric constituents have changed—atmospheric pressure and oxygen concentration. It is probable that the ancient atmosphere contained more oxygen at a higher pressure. The present atmospheric pressure is about 14.8 pound per square inch (psi), or about 15 psi. Humans can easily live at pressures greater than this with out any apparent side effect. This is evidenced by studies done in submersible vessels, pressurized jobsites, pressurized aircraft, and pressurized space vehicles. At pressures less than 15 psi, for example at elevations greater than 14,000 feet, the problem is not the lower pressure but the fact that the lungs cannot inhale enough oxygen. At high altitudes there is plenty of oxygen but not enough of it is mechanically forced into the lungs because of the lack of pressure and the design of the human lungs. Humans it seems were designed to work at pressures slightly greater than the present atmospheric levels.

What happens when a person is working or living in an environment of higher pressures and more oxygen content? Because of the greater pressure and the availability of more oxygen the human body receives more oxygen in two ways. First, the lungs inhale more oxygen with each breath. This oxygen is then available for use by the human body. It is delivered via the lungs and bloodstream to all parts of the body. The body is more efficient aerobically and metabolically. Secondly oxygen is absorbed through the skin into the surrounding tissue. This oxygenated tissue is then able to heal quicker and more completely and metabolic biological processes are more efficient.

There are several indications that the earth had greater oxygen content and more pressure in times past. Large bodied animals especially reptiles, mammals, and insects are common in the fossil record. The fossil record reveals dragonflies with wingspans of more than 24 inches, crocodiles more than 40 feet long weighing almost 9 tons (53), and large bodied rodents. Other examples include giant beavers more than 8 feet long, giant cave bears, giant sloths, giant saber tooth tigers, giant dire wolves, giant mammoths, and recently a giant guinea pig the size of a modern day rhinoceros. There were also giant sharks, giant turtles some more than 14 feet long, and a large selection of giant birds including penguins more than 6 feet tall. Reptiles and some fish, e.g. catfish, continue to grow as long as they are alive. This would indicate that the large reptiles and fishes in the fossil record were also long-lived.

Much of the scientific data is beginning to show a correlation between gigantism and composition of the atmosphere. Consider a few of the scientific articles quoted below on the fascinating subject of gigantism in various prehistoric insects.

> We obtain strong relations between external oxygen concentrations and length…Oxygen supply may have lead to insect gigantism in the Carboniferous period, because oxygen was 30-35%. The demise of these insects when oxygen content fell indicates that large species may be susceptible to such change. (54)

> Uniformitarian approaches to the evolution of terrestrial locomotor physiology and animal flight performance have generally presupposed the constancy of atmospheric composition. Recent geophysical data as well as theoretical models suggest that, to the contrary, both oxygen and carbon dioxide concentrations have changed dramatically…Hyperoxia in the late Paleozoic atmosphere may have physiologically enhanced the initial evolution of tetrapod locomotor energetics; a concurrently hyperdense atmosphere would have augmented aerodynamic force production in early flying insects. Multiple historical origins of vertebrate flight also correlate temporally with geological periods of increased oxygen concentration and atmospheric density. Arthropod as well as amphibian gigantism appear to have been facilitated by a hyperoxic Carboniferous atmosphere and were subsequently eliminated by a late Permian transition to hypoxia. (55)

> However, flight metabolic rate was affected by ambient oxygen levels…suggesting that ambient oxygen level influences flight muscle oxygen partial pressure and the vigour of flight. These are the first data to show oxygen limitation of flight metabolism in a free-flying insect. A low safety margin for oxygen delivery during dragonfly flight is consistent with a previous hypothesis that atmospheric hyperoxia facilitated gigantism in Paleozoic protodonates. (56)

The present day oxygen level is about 20-21% of the total atmospheric volume. Much scientific data indicates that in the past the oxygen level could have easily climbed to about 32-35%. Gigantic dragonflies like all insect breath through osmotic pressures. This means that dragonflies literally inhale oxygen through the pores of their skin. They do not have the equivalent of lungs. Large bodied insects common in the past could not survive today because of the lower oxygen level. Greater air pressure would be need to not only allow these large insects to fly but also to force oxygen into the pores of the skin. The fact that large insects existed in the past indicates that the earth's atmosphere had more oxygen and it was under greater pressure.

What would be the ramifications from a health perspective for humans living in an atmosphere that had more oxygen available at higher pressures? Hyperbaric therapy is a medical treatment in which the patient is placed in a compression chamber, often raised to twice the atmospheric

pressure, and breathes a higher than normal concentration of oxygen, usually 100%. Sometimes the treatment will only consist of placing the affected part in a sealed system with a mixture of 100% oxygen. In almost all examples the benefits are dramatic. This is a common treatment for people suffering from diabetic complication brought on by poor circulation. The extremities will usually not get enough oxygen and amputation and gangrene are common. Hyperbaric therapy is also used when a patient suffers from poor oxygenation of tissue, common in many types of tissue death including chemical, thermal, and radiation burns.

Consider three examples from the medical literature. In the first example two cases of severe foot ulcers (wounds) were treated with hyperbaric therapy. In this case it was a topical treatment, which consisted of simply placing a plastic bag over the wound and filling it with 100% oxygen. The results were dramatic. Both of the ulcers, one that had been treated previously for seven years by standard medical therapies but to no avail, healed up completely. This article contains graphic pictures that show the open ulcers and their later complete healing (57). The second example is a study of a diabetic group suffering from foot ulcers, which was undertaken. 76% of those receiving HBO therapy had completely healed as compared to only 48% of those that received conventional medical treatment. Of the HBO group only two went on to amputation as compared to seven amputations for those receiving standard medical care (58). In the third example a case study of a boy with severely frostbitten fingers is detailed. This article contains explicit pictures at the beginning of treatment and also a few weeks after treatment. The boy made a complete recovery with no scarring or abnormal effects. Notice what the abstract of this medical journal article (59) states:

> An 11-year-old boy in good general health conditions suffered deep frostbite on six fingers while he was working without gloves as a beater during a hunt in Poland at an outdoor temperature of -32°C over a 4 h-period. Three days later he was first seen by a physician who planned to amputate the affected fingers. The patient was transferred by his family to our University Hospital in Aachen, Germany. We found third degree frostbite on four fingers of the right and on two fingers of the left hand. Because of the late beginning of the therapy, the patient was treated by HBO2 according to the Marx-schema for problem wounds (2, 4 bar, total time at depth: 90 min, alternations of 100% O_2 and air breathing). HBO_2-treatment was repeated daily for 14 days. No adverse events were recorded during the course of therapy. A total recovery of the severe frostbite was observed after 14 days of HBO_2-treatment. Twenty-eight months after the injury the patient reports fully regained sensibility and no pain. The plain X-ray after this period showed no premature closure of the epiphyses or sclerosis of the metaphyses. Conclusions: Because of the low risk associated with HBO_2, and its potential therapeutic efficiency, HBO_2 should be recommended as adjunct therapy in the treatment of deep frostbite.

Many studies have also been done on the efficiency of the human body during endurance tests while breathing higher oxygen levels. During some of these test the athletes breathed 100% oxygen as they exercised usually on a treadmill. In one test human endurance time during work to exhaustion increased an average of 41% in men and women when working in a greater than normal oxygen environment. The test participants breathed 51% oxygen as compared to the normal 21% oxygen of the atmosphere during the course of the study (60). In another test participants breathing 100% oxygen increased the oxygen reaching the leg muscles by 8.1% and total oxygen delivery by 10.9%. This proves that the amount of oxygen reaching the leg muscles is limited by the oxygen supply and not the respiratory system (61). What limits human endurance is not only the lungs and human physiology but also the lack of adequate oxygen reaching the body. Theses problems in human endurance would be eliminated if more oxygen

were available at slightly greater pressures (62). Human are capable of performing better if the environment did not limit them.

The Biblical record indicates that not only did men have long lifespans before the flood but also that they were able to perform at peak physical conditions and were powerfully built.

> Body mass then seems to have increased through time, with late archaic *Homo sapiens*…often collectively called 'Neanderthals'—being about 30% larger than the living worldwide human average (or about 24% larger than living high-latitude humans). But modern humans…show a decrease in body mass…Other data show that archaic *Homo* had a more strongly constructed skeleton than all but the very earliest modern humans, and the pronounced muscle markings on the bones are believed to indicate great strength. (63)

> The vertebral columns of the Shanidar Neandertals are similar to those of modern man but with a marked tendency to robustness. The ribs are thick. The upper limb bones disclose a pattern of morphology close to that of other Neandertals of the Near East and of Europe. This pattern includes powerful shoulders, arms and hands built for grasping, pulling and lifting. The lower limb remains conforms to the pattern of Neandertal man in that they are robust, powerfully muscled and in keeping with upright posture and bipedal gait. In addition it seems that the distribution of muscularity is such that powerful acceleration would have been possible in running, jumping or climbing. (64)

Notice how this agrees with the Biblical record.

> Genesis 6:4 There were giants on the earth in those days, and also afterward, when the sons of God came in to the daughters of men and they bore [children] to them. Those [were] the mighty men who [were] of old, men of renown.

The fossil record and scientific studies indicate that the preflood world had an atmosphere that had more oxygen at greater pressures. This is evidenced by the gigantism that was evident during this time period and supported by the properly interpreted fossil record. This would make an ideal environment for the healing of wounds, infections, and would probably have many unknown metabolic and physiological benefits, which would allow men to live longer and more active lives.

Physiological Factors

There are many other environmental factors that would affect the longevity and the quality of life of the preflood peoples. These would include trace metals in the environment, the quality and biological composition of the food, and a host of various other factors. All of these environmental factors combined or modified in various combinations could have induced or modified the longevity of man. There are also hundreds of other environmental factors that have not even been discovered, discussed, or considered. Environmental factors are factors that exist outside of the human body. Interestingly science has discovered many physiological and genetic factors that exist within the human body that could also be implicated in any discussion about human ageing.

Reduced Metabolism and Caloric Intake

Reducing the amount of calories is one technique that modern researchers have used to extend the lifespan of laboratory animals. These laboratory animals range from yeast, nematodes, and

other small organisms, to a select group of mammals. It was found when calories were reduced 30 to 50% that the test subjects lived almost 40% longer. Not only did they live longer but they also were more active then their better-fed siblings (65).

> One of the best indications that the ageing process is subject to regulation is that life span can be extended by caloric restriction. Caloric restriction typically refers to a diet in which calories are limited by 30–40% compared with animals fed *ad libitum*. Caloric restriction extends life span in rodents, worms, yeast and probably primates. (66)

What causes this increased life span? During normal cell activity the cell produces rRNA. Then during cell process the rRNA malfunctions and produces extraneous intercellular pieces of DNA. These pieces of DNA link up in a circular fashion and are called extra-chromosomal DNA circles or EC for short. These ECs, which are housed in the nucleus reproduce, grow, and compete with the cell's normal DNA for enzymes and cellular energy. This competition destroys and kills otherwise normal cells. Hence ECs are toxic and they reduce the longevity of the cells. When an organism is under a restricted calorie diet an enzyme named Sir2 is produced. This enzyme affects the chromosomes in the cell nucleus and causes certain chromosome in the nucleus to be silenced or switched off (67). One of these chromosomes the enzyme affect is the ECs. Since the ECs are silenced they no longer compete with the nuclear DNA and the cell's longevity is extended (66).

Although these experiments have been carried out in nematodes, mice, some monkeys, and yeast cells the implication for humans longevity is certainly important, especially since humans cells also manufacture the Sir2 enzyme. The people that lived before the flood had a primarily vegetarian diet, meat was probably eaten as part of a sacrificial system (68) and its quantity would have been greatly reduced compared to today's standards. They probably lived under a condition of slightly reduced caloric intake. Notice how after the flood humans were commanded to eat animal flesh. This would have increased their caloric intake since meat is more calorie rich food. The preflood diet along with other biological feedback factors would have caused them to live longer.

> Genesis 1:29 And God said, See, I have given you every herb [that] yields seed which [is] on the face of all the earth, and every tree whose fruit yields seed; to you it shall be for food.
>
> Genesis 9:3 Every moving thing that lives shall be food for you. I have given you all things, even as the green herbs.

Reactive Oxygen Species (ROS)

Reactive oxygen species (ROS) often called free radicals are derivatives of oxygen molecules that have an unpaired electron in the outer shell. Most stable molecules have paired electrons in the outer shell. Free radicals are not as stable because of these extra unpaired electrons. These negatively charged free electrons serve as bonding sites for other electrons. Therefore ROS seek out and aggressively bond with other molecules and atoms that have an unbonded electron. Some examples of ROS are the hydroxyl free radical (·OH) and hydrogen peroxide (H_2O_2). The human body through ingestion—eating and breathing—and metabolic synthesis fabricate ROS. It has been shown that most intercellular ROS production is derived from the mitochondria, which are organelles that produce cellular energy. The ROS kill bacteria and inactive proteins

unfortunately they have been associated with many diseases and development of cancers. They have also been implicated in the formation of atherosclerosis, the destruction and modification of mitochondrial and nuclear DNA, and suspected as being one of the factors in ageing (69).

These unstable oxygen molecules react with neighboring molecules. They donate, share, or steal the outer electrons from other molecules. These reactions chemically change both the ROS and the neighboring molecule and this change may completely alter the chemical and physical nature of the new molecules in profound ways. Often there will be unpaired electrons produced as a result of these reactions. These unpaired electrons bonds to other nonreactive molecules converting them into free radicals or ROS. This causes the effects of just a few ROS to be amplified in biologic systems and therefore the cycle continually grows. ROS can have large effects on the functioning of tissue. For example, they can destroy or rearrange the structure of proteins and lipids (fats), which are important components of metabolism. They can also destroy and alter human genetic material. This destruction is often referred to as oxidative stress.

Because of the damage and oxidative stress that is caused by ROS the human body has defense mechanism to counter these effects. Some of the body's defenses include the production of enzymes such as superoxide dismutase (SOD) and catalase, hormones, and other molecules. These molecules include vitamin E and C; these molecular compounds and others are able to absorb the extra electron(s) that give the ROS its destructive qualities. This effectively stops the chain reaction of more ROS being produced. These defensive compounds and molecules are often called free radical scavengers—because they scavenge or eat free radicals. (70)

Human ageing was once considered to simply be the effects and accumulation of wear and tear over many years. It was once thought that simply replacing worn out human parts could prolong human longevity. Much like what is done when the life of an automobile is extended by the replacement of faulty or worn parts. It is now realized that this concept is incorrect. Ageing is actually a series of many biologically controlled processes. Many scientists reason that if ageing is a process then it can be manipulated and controlled. For example free radicals oxidize lipids, therefore one aspect of ageing is simply the cumulative effect of oxidative stress on lipids. This oxidative stress affects many other types of cells and process and therefore scientists believe that if the stress can be relieved then longevity will be affected. Or simply put—*remove the oxidative stress and longevity increases*.

> If oxidative stress and the ability to respond appropriately to it is important in ageing, then it follows that factors that increase resistance to stress should have anti-ageing benefits and lead to enhanced life span. In support of this claim, genetic links between stress responsiveness and longevity have been established in *C. elegans*, *Drosophila* and mice (Table 1). (69)

Scientific studies on mice, fruit flies (*Drosophila*) and nematodes (worms—*Caenorhabditis elegans*), have shown that using enzyme mimetics on biological processes to control oxidative stress can lengthen their life spans. Enzyme mimetics are synthetic enzymes that imitate the action of natural enzymes. The life span of nematodes was greatly extended using this technique

> Additional evidence for a link between longevity and oxidative stress resistance in the nematode has recently been obtained using a pharmacological approach to boost antioxidant defences. Treatment of wild-type *C. elegans* with synthetic SOD/catalase mimetics was shown to extend the mean life span by 44%. Moreover, the agent was also effective in restoring normal life span to *mev-1*mutants. (69)

A table included with the above article from the prestigious journal *Nature* showed that some nematodes had life span increases of 100%, mice had an increase of 30% and flies had an increase of 35%.

> In summary, although ageing is likely to be a multifactorial process, there is now significant evidence implicating the generation of ROS and the corresponding response to oxidative stress as key factors in determining longevity. Much of the early evidence was correlative, such as the relationship between metabolic rate and life span, and the observed increase in oxidative damage as a function of age. However, the more recent identification of longevity-influencing genes, first in lower organisms and subsequently in mammals, significantly strengthens the mechanistic connection between oxidants, stress and ageing. (69)

One of the keys to human ageing is the production of ROS and the body's response to them. It seem that God immediately after the flood limited the life span of man from an average of more than 900 years to a maximum of 120 years. This could easily have been done by slightly changing the human genome, the production of ROS, and the human bodies response to these factors via enzymes and free radical scavengers. ROS are simply harmless oxygen molecules that have an extra electron. They are a brought into the body by breathing oxygen. These ROS are produced naturally but they can be affected by several factors including environmental pollution, ultraviolet light, and ionizing radiation to name but a few. All of these factors could have been accelerated or slightly modified by God in order to limit the lifespan of man.

Changes in the Cell's Telomere

At the end of each chromosome are caps called telomeres, which are made from a sequence of repeating DNA that protect the ends of the chromosomes from damage. Each time a cell reproduces and divides its telomeres get shorter. Most human cell can only divide 30 to 50 times and with more and more cell division the telomeres become so short that the cell ceases to divide or do so only with get effort and accumulative damage to the chromosome. This keeps damaged cells from dividing which can lead to cancerous cells. These old cells then die. This means that telomeres play a role in determining the life span of a cell, its health and how many times it can divide. These all affect tissue health and the longevity of the organism. Telomerase is an enzyme that replenishes telomeres as they continue to divide. Oxidative stress from ROS is also a factor in the shortening of the cell's telomeres.

How does the length of the telomere affect the organisms ageing? When the telomere cell is long during its youths "ageing genes" are located close to the telomere but not near its then long end at this position the "ageing gene" is switched off. As the cell continues to divide the telomere shortens and then the ageing gene get close to the telomere's end, this then switches the "ageing gene" on and the cell then begins to show signs of age. Because of the length of the cells telomeres and it relation to viability it is often used as an indicator of health in cloned animals (71). Cancer cells, which are basically long-lived or immortal cells, have the telomere function disabled or switched off. They therefore continue to divide and reproduce endlessly by this means impairing normal cell function. Cancer cells continue to divide because they produce a protein-derived enzyme called telomerase (72, 73). The telomerase continually lengthens the telomeres in the cell and thus cancer cells do not age. If the action of telomerase in cancer cells is genetically blocked the cancer cells will begin to shorten with each cell division and the cancer cell naturally ages and dies.

In an experiment published in *Science* (74) telomerase was introduced into older human cells. The cell began to produce elongated telomeres and began to divide vigorously. They also did not show the effects of an aged cell. These cells treated with telomerase showed longer lifespans as compared to control cell not treated with telomerase. Interestingly the cells that had the telomerase introduced into them remained healthy, were of normal appearance, had the proper number of chromosomes, and did not develop cancer.

Obviously telomerase activity is only part of the human longevity picture (75). It nevertheless is one of the most important research areas being investigated now. Scientists, with continuing research, may discover that telomeres and the enzymatic processes that control it may or may not be viable way to prolong human lifespan. If telomere and telomerase research do indicate that they are part of the puzzle for human longevity then telomerase activity is one of the several factors that God could have manipulated in the post flood world to reduce longevity.

Genetics

When average life spans are mentioned in contemporary literature or historical accounts what is really being stressed is average age of death. Often confusion arises when a record states that 200 years ago the average life span was only 40 years. This would seem to mean that people living into their fifties and sixties was very rare during the 1700s. Once the factors of infant mortality and childhood diseases are taken into account the lifespan for most people in most time periods has remained stable at about 70 to 80 years.

> Since the mid-19th century the human population has experienced one of the most important and dramatic changes in the history of the species—a near doubling of the expectation of life at birth from 40 to 80 years. Most of the mortality declines and increase in life expectancy that occurred early in this century were a result of rapidly declining neonatal, infant, and maternal mortality. Today, mortality rates in younger and middle age groups are so low in the United States that the complete elimination of mortality before the age of 50 (about 12.4% of all deaths) would increase life expectancy at birth by only 3.5 years. (76)

The above quote is simply restating what the Bible says. That man's average age at death has been around 70 years and if a person had good health and strength then 80 years of life may be achieved. Notice what king David wrote more than 2,000 years ago.

> Psalms 90:4, 9 For a thousand years in Your sight [Are] like yesterday when it is past, And [like] a watch in the night…The days of our lives [are] seventy years; And if by reason of strength [they are] eighty years, Yet their boast [is] only labor and sorrow; For it is soon cut off, and we fly away.

Unlike multicelled organisms many single celled organisms have extended life spans. Most, for all practical purposes, are immortal and simply continue to divide into two separate organisms that then continue to divide. This cycle continues perpetually. Unfortunately cancer cells also seem to have this immortality trait (77). On the other hand as has been mentioned previously in this paper a normal human cell seems programmed for death after 30-50 divisions. Once cell damage is great enough then death results. This indicates that much if not all of longevity is under genetic control. Human genetics controls the enzymes, hormones, and other chemical pathways that control ageing. The human body switches on these chemical signals at the right time, in the right amount, and at the right place, all of these are controlled by the preprogrammed human genome (78). In other words ageing is a preprogrammed result controlled by genetics.

Much scientific research (79) points to 120 years as being the human maximum for age. This agrees nicely with the book of Genesis.

> Genesis 6:3 And the LORD said, "My Spirit shall not strive with man forever, for he [is] indeed flesh; yet his days shall be one hundred and twenty years."

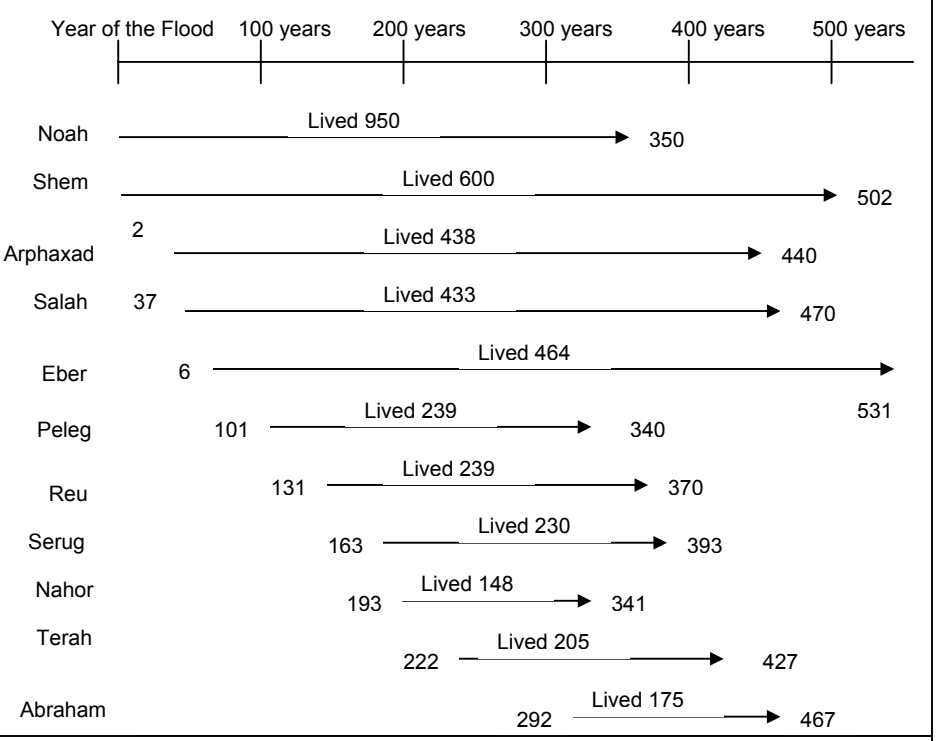

Figure 10. The longevity of the patriarchs after the flood indicating when they were born and died in relation to each other and the flood. Notice that all the patriarchs even those born before the flood (Noah and Shem) died within a 191-year time period. Also Peleg, Reu, Serug, Nahor and Noah all died within a 52-year time period. This indicates that environmental factors and genetic factors both played a part in the declining lifespans.

Many groups seem to have a genetic predisposition to live longer. In a study conducted of fruit flies and mice longevity seemed to be under genetic control (80, 81, 82) and this quality could be isolated in groups of fruit flies. It is also common knowledge that longevity occurs in families. If longevity is under genetic control how does this fit in with the preflood and post flood scenarios? Over viewing the details in the book of Genesis some very interesting facts are noticed. Please refer to figure 10 and consider the following:

- Noah lived 950 years. 600 years before the flood and 350 years after the flood.
- Shem lived 600 years. 100 years before the flood and 500 years after the flood.
- Arphaxad, Salah, and Eber the first three generations after the flood all had the same approximate lifespan, 438, 433, and 464 year respectively.

- 100 years after the flood Joktan the brother of Peleg was born. His name means to *reduce* or to *make small*. After his birth life spans declined almost 50%.
- Peleg, Reu, and Serug the 4th, 5th, and 6th generations born after the flood also all had the same approximate life span of 235 years.
- Nahor, Terah, and Abraham the last three generations had the same approximate life spans of 148, 205, 175 years respectively.
- The most interesting longevity feature is that all of the patriarchs died within a 191 year time period and the individuals in the above mentioned groups (with the exception of Nahor) died clustered around a few decades
- There was a population bottleneck because of the flood.
- The earth was destroyed by the flood which would indicate environmental rearrangements (Genesis 6:13)

When all the factors are considered then a possible model of longevity based on genetics and a few environmental factors can be put forth.

Noah lived 950 years this was his genetic potential. His son Shem even though he was born before the flood lived less than all the pre flood patriarch with the exception of Enoch who did not live out his expected life span (Genesis 5:23-24). This would indicate that the genes for longevity were still operating in Shem and that his reduced longevity was caused by environmental factors. Shem may also have suffered from some mutational factors that shortened his life span. After the flood all the patriarchs suffered greatly reduced life spans. Since they all were the descendants of Shem this would mean that Shem now had passed on a gene for reduced life span. How did this happen? If the patriarchs before the flood had the longevity gene Shem would have inherited it from his father Noah. If Shem had the gene for longevity this would cause him to live a long time. His death at 600 years indicates that he had the genetic ability to live a long time, which may have been masked and altered by environmental factors. Nevertheless his offspring all born after the flood had reduced life spans. This means that if longevity is under genetic control then this gene for shortened lifespans was passed on through Shem. Undoubtedly Shem and his brothers Ham and Japheth (Genesis 5:32) all had a mutational defect that altered their longevity gene into a gene that conferred a shorter life span.

This mutation in the longevity gene of Shem and his contemporaries may have been the result of several effects (83). A few to consider are reduced or increased levels or ionizing radiation. Radiation hormesis could have played a factor in the mutation of the genes carried by Shem and his generation (84). Recall the radiation hormesis strengthens the body against further radioactive damage. Before the flood there could have been higher levels of background radiation, which would have increased the health of the preflood world. After the flood the hormesis effect was suppressed by a lowering of the background levels of radiation and then a sudden burst of radiation may have mutated this longevity gene in the reproductive cells of the post flood generation. Distinction needs to be made between the kinds of mutations that humans suffer. Some mutations are made to the organism's cells and their genetic material. These types of mutations affect the person but they are not passed on to the children. Other types of mutation are made to the genetic material in the sperm and egg cells of males and females. This second type of mutation is inheritable by the offspring. The post flood population was suffering from

both types of mutations. The second type of mutation to the germ cell of the parents would be passed on to the children.

These reduced life spans were grouped in generations, see figure 10. This generational grouping would indicate that the genetic basis for longevity was being selected out through intermarriages of not to distantly related spouses caused by the population bottleneck after the flood. In other words the gene for longevity has to be in the genetic material of both the father and the mother. If both parents did not have the gene longevity would not be expressed and the offspring would die off at a younger age. As an example of this generational grouping notice that Peleg's brother was Joktan, see figure 3. The word Joktan means to make small, or reduce (85). At the time of Joktan's birth, which occurred about 100 years after the flood the lifespan of human, was once again made "small" or "reduced" significantly. The average lifespan of the three generations before Peleg and Joktan was about 450 years, for the three generations after it was 236 years or almost half of the previous lifespan. Genetics was probably the main reason for this reduction augmented by some environmental factors still extant after the flood.

> Genesis 10:25 And unto Eber were born two sons: the name of one was Peleg; for in his days was the earth divided; and his brother's name was Joktan.

As more time passed the environmental factor that cause the longevity gene to mutate would have spread throughout the population and the effects of the suppress or mutated longevity gene would disappear into history. The environmental factors would then disappear or reached a more normal equilibrium with time. The fact that groups of closely related patriarchs were dying off at the same time indicates that longevity was still being affected by some environmental factors. These environmental factors may have been intensifying or been in harmony with the working of the mutated longevity gene. Metabolic, genetic, hormonal, and enzymatic pathways also would all have contributed to the lowering of human life spans.

Eden to be Restored

The scriptures indicate that the preflood conditions that existed during the time of Eden are going to be recreated after the return of Jesus Christ as Lord of Lords (Revelation 19). Not only is the nature of man going to be changed but the nature of the animal world will also be changed. The biological, geological, ecological world as well as the theological structure of the world will be altered.

> Isaiah 6:5-9 Righteousness shall be the belt of His loins, And faithfulness the belt of His waist. " The wolf also shall dwell with the lamb, The leopard shall lie down with the young goat, The calf and the young lion and the fatling together; And a little child shall lead them. The cow and the bear shall graze; Their young ones shall lie down together; And the lion shall eat straw like the ox. The nursing child shall play by the cobra's hole, And the weaned child shall put his hand in the viper's den. They shall not hurt nor destroy in all My holy mountain, For the earth shall be full of the knowledge of the LORD As the waters cover the sea.
>
> Isaiah 65:17" For behold, I create new heavens and a new earth; And the former shall not be remembered or come to mind.
>
> 2 Peter 3:13 Nevertheless we, according to His promise, look for new heavens and a new earth in which righteousness dwells.

> Isaiah 35:1-10 The wilderness and the wasteland shall be glad for them, And the desert shall rejoice and blossom as the rose; It shall blossom abundantly and rejoice, Even with joy and singing. The glory of Lebanon shall be given to it, The excellence of Carmel and Sharon. They shall see the glory of the LORD, The excellency of our God. Strengthen the weak hands, And make firm the feeble knees. Say to those [who are] fearful-hearted, "Be strong, do not fear! Behold, your God will come [with] vengeance, [With] the recompense of God; He will come and save you." Then the eyes of the blind shall be opened, And the ears of the deaf shall be unstopped. Then the lame shall leap like a deer, And the tongue of the dumb sing. For waters shall burst forth in the wilderness, And streams in the desert. The parched ground shall become a pool, And the thirsty land springs of water; In the habitation of jackals, where each lay, [There shall be] grass with reeds and rushes. A highway shall be there, and a road, And it shall be called the Highway of Holiness. The unclean shall not pass over it, But it [shall be] for others. Whoever walks the road, although a fool, Shall not go astray. No lion shall be there, Nor shall [any] ravenous beast go up on it; It shall not be found there. But the redeemed shall walk [there,] And the ransomed of the LORD shall return, And come to Zion with singing, With everlasting joy on their heads. They shall obtain joy and gladness, And sorrow and sighing shall flee away.

> Ezekiel 36:33-36 …the ruins shall be rebuilt. "The desolate land shall be tilled instead of lying desolate in the sight of all who pass by. "So they will say, 'This land that was desolate has become like the garden of Eden; and the wasted, desolate, and ruined cities [are now] fortified [and] inhabited.' "Then the nations which are left all around you shall know that I, the LORD, have rebuilt the ruined places [and] planted what was desolate. I, the LORD, have spoken [it,] and I will do [it."]

The Edenic conditions are to be restored. As the Bible shows the nature of animals will be restored to the conditions at Eden. They will be peaceful and their carnivorous nature will be replaced with the original nature they were created with, the prey and predator cycle will cease. The earth will also be transformed. Vast areas of desert will blossom and produce fruit—"blossom as a rose." Other scriptures indicate that there will be vast geologic changes that take place at the return of Christ. Many biblical passages scattered throughout the word of God indicate that the islands in the sea will be removed (Revelation 6:12-17), mountains will be shaken (Isaiah 24:1, 4-6, 18-21) and great astral signs will occur (Luke 21:25-27). These catastrophic events will reshape and prepare the earth for its renewal.

> Revelation 6:12-17 I looked when He opened the sixth seal, and behold, there was a great earthquake; and the sun became black as sackcloth of hair, and the moon became like blood. And the stars of heaven fell to the earth, as a fig tree drops it late figs when it is shaken by a mighty wind. Then the sky receded (margin: split apart) as a scroll when it is rolled up, and every mountain and island was moved out of it place. And the king of the earth, great men, the rich men, the commanders, the mighty men, every slave and every free man, hid themselves in the cave and in the rocks of the mountains, and said to the mountains and rocks, "Fall on us and hide us from the face of Him who sits on the throne and from the wrath of the Lamb! For the great day of his wrath has come, and who is able to stand?

After these globe-shattering events Jesus Christ is to return and he will rule during the millennial period for one thousand years (Revelation 20:5). God's original intent was for humanity to live in a millennial setting as a prelude to being born as Sons and Daughters in His family. This was interrupted by the deceit of Satan and our first parents. God's will is eventually accomplished and He is going to return to reestablish what was interrupted by sin.

Human Longevity to be Restored

God is going to reestablish his kingdom on the earth and this coming kingdom is modeled on the original Edenic state. If this is correct and the scripture indicate it is, then an obvious question

is—will God reestablish human longevity (2)? The answer is Yes! Once it is understood that God is coming back to reestablish Edenic like conditions then many ambiguous and unclear scriptures become very clear. Many of these scriptures are often read in a spiritual context when they are referring to basically physical event having to do with extended life spans.

> Psalm 92:12-15 The righteous shall flourish like a palm tree, He shall grow like a cedar in Lebanon. Those who are planted in the house of the LORD Shall flourish in the courts of our God. They shall still bear fruit in old age; They shall be fresh and flourishing, To declare that the LORD is upright; [He is] my rock, and [there is] no unrighteousness in Him.
>
> Zechariah 8:3-5 "Thus says the LORD: 'I will return to Zion, And dwell in the midst of Jerusalem. Jerusalem shall be called the City of Truth, The Mountain of the LORD of hosts, The Holy Mountain.' "Thus says the LORD of hosts: 'Old men and old women shall again sit in the streets of Jerusalem, Each one with his staff in his hand Because of great age. The streets of the city Shall be full of boys and girls Playing in its streets.'

Notice the next scripture in the 65th chapter of Isaiah. The time setting is after the return of Christ. Christ is ruling from Jerusalem and there is no more crying or weeping in this war torn city. The Edenic conditions have been reestablished and humans are living for hundreds of years. This scripture only makes sense if the people living during the millennium are living long life spans like the antediluvians. Life spans will exceed 100 years during this time period. The word for child (verse 20) is actually better translated *young man* or *youth*. Therefore infants and old men will live out their long lives. On the other hand a young man (child) that dies at the premature age of 100 years will actually be accursed since his life was cut short. This seems to indicate that people who are living less than 100 years are dying a premature or accursed death (86).

> Isaiah 65:17-22 For behold, I create new heavens and a new earth; And the former shall not be remembered or come to mind. But be glad and rejoice forever in what I create; For behold, I create Jerusalem [as] a rejoicing, And her people a joy. I will rejoice in Jerusalem, And joy in My people; The voice of weeping shall no longer be heard in her, Nor the voice of crying. " No more shall an infant from there [live but a few] days, Nor an old man who has not fulfilled his days; For the child shall die one hundred years old, But the sinner [being] one hundred years old shall be accursed. They shall build houses and inhabit [them;] They shall plant vineyards and eat their fruit. They shall not build and another inhabit; They shall not plant and another eat; For as the days of a tree, [so shall be] the days of My people, And My elect shall long enjoy the work of their hands.

Conclusion

God's original purpose was for humanity to live a long life in an Edenic condition—a life span of hundreds of years in length. This would give humanity time to live and develop godly character, which can only be developed over time and through experience. After a time period of physical life God was then going to give man to eat of the Tree of Life. Man's sin and the adversarial plan of Satan delayed this.

God's will is always accomplished; therefore Jesus Christ is going to return as Lord of Lords. He triumphed over Satan—the Adversary—and is coming back to the earth to reestablish God's plan. Long life spans will be reintroduced because the factors that caused them will be extant once again. The genetic, environmental, enzymatic, and all other factors that worked in harmony to produce life span in the hundreds of years will once again exist. After this is done man will

have the opportunity to live a long and productive life—this time in obedience to God.

> Revelation 22:1-2 And he showed me a pure river of water of life, clear as crystal, proceeding from the throne of God and of the Lamb. In the middle of its street, and on either side of the river, [was] the tree of life, which bore twelve fruits, each [tree] yielding its fruit every month. The leaves of the tree [were] for the healing of the nations.

God's kingdom will return and with its return humans will once again live out long lifespans. Then after a long life man will have access to the tree of life and man will be given the opportunity to partake of immortality. Humans will then finally become the Sons and Daughters of God.

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Works Cited and Research Notes

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1. Unless otherwise noted all scriptural notations are from: The Bible. The New King James Version. Thomas Nelson Publishers. Nashville, TN. 1994.

2. The word translated day in Genesis 2:17 is from the Hebrew word *yowm* (#3117) יוֹם it has several meanings including: day, time, year, a division of time, lifetime or temporal references. Obviously Adam and Eve did not die the day they ate of the fruit therefore this verse is speaking about another time period.

> Genesis 2:17 "but of the tree of the knowledge of good and evil you shall not eat, for in the day that you eat of it you shall surely die."

The word for die is better translated as "dying you shall die," see the marginal reference in the NKJV. What this scripture means is that if they ate of the fruit in a certain time period "dying you shall die." What is this time period? Notice that all the patriarchs lived slightly less than 1,000 years.

> 2 Peter 3:8 But, beloved, do not forget this one thing, that with the Lord one day [is] as a thousand years, and a thousand years as one day.

This indicates that by analogy that one day is the same as a thousand years to God. The millennium lasts 1,000 years. What God was revealing is that men had the potential to live past the 1,000-year mark but because they ate of the fruit of the tree of the knowledge of good and evil they died before this "day" was over—before they lived longer than 1,000 years. Indications are that man will live out the millennium since this was God's original intent at the beginning. Therefore when the millennium is established man will once again have extended life spans.

3. *Echoes*. Artwork by Joe Tucciarone. Used with permission. 2403 West Friday Circle Cocoa, Florida 32926. http://members.aol.com/INTERSTELL/joe.html.

4. Photo of DNA helix courtesy of National Human Genome Research Institute.

5. There are many other Biblical examples of this principle. Many previous Biblical statements now make perfects sense as scientific advances have been made. Consider a few other examples.

> Revelation 8:7-12 The first angel sounded: And hail and fire followed, mingled with blood, and they were thrown to the earth. And a third of the trees were burned up, and all green grass was burned up. The second angel sounded And something like a great mountain burning with fire was thrown into the sea, and a third of the sea became blood. And a third of the living creatures in the sea died, and a third of the ships were destroyed. Then the third angel sounded; And a great star fell from heaven, burning like a torch, and it fell on a third of the rivers and on the springs of water. The name of the star is Wormwood. A third of the waters became wormwood, and many men died from the water, because it was made bitter. The fourth angel sounded; And a third of the sun was struck, a third of the moon, and a third of the stars, so that a third of them were darkened. A third of the day did not shine, and likewise the night.

This example of catastrophic destruction coming from the sky was shrouded in mystery until very recently. What could cause this type of devastation? Science now reveals that the description of the events in Revelation 8:7-12 could very easily be explained as the destruction

caused by the earth being struck by a small comet or asteroid. The description here matches the description given in many scientific articles that deal with cosmic catastrophes. See:

Hsu KJ. Terrestrial catastrophe caused by cometary impact at the end of the Cretaceous. Nature. 285:210-13. 1980.

Many scoffers have now come to understand that the prophecies in many of the scriptures have indeed been fulfilled or are in the process of being fulfilled. Consider the words in the book of Daniel as a general overview of this topic:

> Daniel 12:4 But you, Daniel, shut up the words, and seal the book until the time of the end; many shall run to and fro, and knowledge shall increase.

This is an uncanny glimpse of the future with the increase of knowledge through computers and the Internet and the globe trotting movements of large masses of humanity. In the very recent past these scripture would have been looked at in a symbolic way when in reality they are describing in simple language the activities of this modern end-time age.

6. Various methods have been used to try to make the long Biblical lifespans agree with the modern day lifespans. This includes the month for a year scenario. In other words each year is actually one month long. According to this view some cultures used the moon or the month as a measure of age an example of this would be the Native Americans. Using this method Methuselah would be about 80 years old. Actually such methods often create more problems than they solve. For example using the year—month/moon principle many of the patriarchs would have had children at a very young age. Enoch would have had his son Methuselah when he was only 5 years old ($65 \div 12 = 5.4$ years). Other methods include counting the age of the individual as the age of his dynasty or counting the age from the birth of his children, all of these methods are based on the assumption that it was impossible for men to live hundreds of years.

7. Josephus, Flavius. *Complete Works of Flavius Josephus*. Ant. III. 9. Translated by William Whiston. Kregel Publications Grand Rapids MI. 1981.

8. Hoeijmakers JHJ. Genome maintenance mechanisms for preventing cancer. Nature. 411:366-374. 2001.

9. A second source of radiation is termed background radiation. The source of this radiation comes from the radioactive decay of the minerals in the earth's crust. This type of radiation and its effects on longevity, good and bad will be discussed later in this paper.

10. The Cosmos: cosmic rays and magnetic fields. Britannica CD 98 Multimedia Edition 1998.

11. Photo courtesy of NASA. The edge of a supernova remnant shell as captured by the NASA Space Telescope in this image of the Pencil Nebula. Officially know as NGC 2736 the pencil nebula is part of the Vela Supernova remnant. Sir John Herschel discovered it in the 1840s. The long thin appearance gave it its name. This picture shows the shock wave encountering interstellar gas. This superheats the gases and causes them to glow giving it a rippled-like look.

12. Aharonian FA. *et al*. High-energy particle acceleration in the shell of a supernova remnant. Nature. 432:75-77. 2004.

This paper shows that the supernova RX J1713.7—3946 and its associated supernova remnant shell (SNR) can be directly tied to various cosmic ray showers that occur in the Earth's atmosphere. This supernova has particles accelerated to energies of more than 100TeV. This is the first direct evidence that SNR accelerate atomic particles causing cosmic rays, which then strike the earth. This SNR is an ever-expanding shell of super fast and highly charged particles. The earth's bombardment by these particles would affect the earth, man, biological life, and the various chemical processes that take place on it.

13. Brakenridge GR. Terrestrial Paleoenvironmental effects of a late Quaternary-age supernova. Icarus. 46:81-93. 1981.

The fluctuation of the amount of cosmic rays striking the earth's upper atmosphere due to a SNR would also affect the atmospheric production of carbon-14 (^{14}C).

14. Cosmic ray energy is usually measured in units of MeV, for mega-electron volts (million), or GeV, for giga-electron volts (billion). 1eV = energy an electron gains when it accelerates through a potential difference of 1 volt. Most primary galactic cosmic rays have energies between 100 MeV and 10 GeV. A proton with 100 MeV is equivalent to a proton with a velocity of about 40% the speed of light, 10 GeV equivalent to more than 99% the speed of light. Large energy cosmic rays are very rare. Recently the supernova RXJ1713.7-3946 was determined to accelerate particles to speeds of more than 100 TeV (tera = 3 fold or 1,000×billion or 10^{12}eV see reference 12 above) Large energy cosmic rays in the GeV range are high-speed protons with the equivalent energy of a baseball traveling almost 100 mph, TeV cosmic rays would be proportionally faster, theoretically they would be traveling faster than the "local" speed of light. This can be confirmed by the emission of Cherenkov light from the cosmic ray showers. This Cherenkov light is analogous to the sonic wave created by high velocity objects. The faster than light particles ionize the air and create measurable light.

15. *Betelgeuse Supernova*. Artwork by Joe Tucciarone. Used with permission. 2403 West Friday Circle Cocoa, Florida 32926. http://members.aol.com/INTERSTELL/joe.html.

Many scientists believe that the star Betelgeuse a red giant a 1000 times larger than our sun in the constellation of Orion may become a supernova in our lifetime—or at least in the next 10 million years. This picture is a rendering of what the cataclysmic 600 light years away may look like from the vantage point of our solar system.

16. Erlykin AD. Wolfendale AW. Spectral features and masses in the PeV region. XII International Symposium on Very High Energy Cosmic Ray Interactions, CERN, Geneva, 15-19 July 2002.

17. Erlykin AD. Wolfendale AW. High-energy cosmic gamma rays from a 'single source.' Journal of Physics G: Nuclear and Particle Physics. 29:4:718-28. 2003.

18. Another exploding supernova may have lead to the demise of the pre-Adamic world. The Vela Supernova (PSR-0833-45) exploded several tens of thousands of years ago. This could have been one of the factors that lead to the destruction during the war in heaven mentioned in Revelation 12:7. If the earth's atmosphere was nonexistent a SNR shell striking the earth could have affected the decay rates of many of the radioactive minerals that are found in the surface of the earth.

Aschenbach B. Egger R. Trumper J. Discovery of explosion fragments outside the Vela supernova remnant shock-wave boundary. Nature. 373:587-90. 1995.

> Furthermore, the angular offset of the objects' origin divided by the proper motion velocity of 0.049 arcsec yr $^{-1}$ gives an independently determined age of the Vela SNR of t =18,000 ± 9,000 years.

Lyne AG. *et al*. Very low braking index for the Vela pulsar. Nature. 381:497-98. 1996.

> …the age derived for the Vela is 22-29 kyr…

19. Photo courtesy of NASA. This image of 1,500,000°C gas in the Sun's thin, outer atmosphere (corona) was taken March 13, 1996 by the Extreme Ultraviolet Imaging Telescope onboard the Solar and Heliospheric Observatory (SOHO) spacecraft. Every feature in the image traces magnetic field structures. This telescope is of such high quality that more of the subtle details are visible.

20. Burchuladze AA. Pagava AV. *et al*. Short-term variations of cosmogenic radiocarbon with solar activity. Proceeding of the 16th International Cosmic Ray Conference. University of Tokyo. Japan. MG3-1:200-5. 1979.

> It now seems established that there exist an anticorrelation between sunspot numbers and production of radiocarbon, at least for the solar cycle with the period of 80-90 years. It is believed that this effect is due to the modulation of galactic cosmic rays by solar wind…This would indicate about 25% variations of the radiocarbon production rate during the solar cycle 19.

21. The sun's sunspot activity is an indicator of solar output and magnetic strength. Depending on the magnetic strength of the sun more or less cosmic rays would reach the earth. The cosmic rays show an inverse relationship to the sunspot cycle. The sun's magnetic field is stronger during times when sunspots are at a maximum and this shields the Earth from cosmic rays

For information on sunspot and their relation to amount of cosmic ray striking the earth see:

Eddy JA. The Maunder Minimum. Science. 192:1189-1203. 1976.

For information on the effect the sunspot minimum had on the climate and historical records relating to it see:

Beckman JE. Mahoney TJ. The Maunder minimum and climate change: have historical records aided current research? *Library and Information Services in Astronomy III*. (ed) U. Grothkopf. Astronomical Society of the Pacific. ASP Conference Series. 153:212-217. 1998.

22. Reiter P. From Shakespeare to Defoe: malaria in England in the Little Ice Age. Emerging Infectious Diseases-Perspectives. 6:1:1-11. 2000.

23. This is one of the reasons that ^{14}C dates that cannot be historically verified are dubious. For more information on the fluctuations inherent in carbon dating see:

Mendez AC. Factors affecting ^{14}C dating. Noah's Ark–Early Man Seminars and website. www.amendez.com. 2005.

24. Cosmic rays not only shorten life spans but they also produce ^{14}C. For more on how the magnetic field of the earth protects us from galactic cosmic rays see:

Lingenfelter RE. Ramaty R. Astrophysical and geophysical variations in C14 production. Nobel Symposium 12th: 1969:Uppsala Universitet. Wiley Interscience Division. New York. p. 513-537. 1970.

Abstract—"In the present paper we study time-dependent variations in the production rate of C14, resulting from changes in various astrophysical and geophysical factors. The general success of the C14 dating method implies that to a first approximation the production rate of C14 has been essentially constant for the last several millennia. However, a variety of phenomena cause change in the production rate, which in turn may produce measurable perturbations in the biospheric C14 activity. In particular, we shall consider changes in C14 production caused by variations in the terrestrial and interplanetary magnetic fields, leading to changes in the flux of galactic cosmic rays at the earth, and by enhanced fluxes of particles produced by solar flares and by variations in the local interstellar cosmic-ray flux produced by nearby supernova explosions. We calculate the yields of C14 from the interaction of proton, alpha particles and high-energy gamma rays as functions of the incident energy. Using models of the modulation of the cosmic-ray spectrum by terrestrial and interplanetary magnetic fields and of the possible time variations of these fields, we then compute the resultant changes in C14 production. Similarly, from estimates of the rates of occurrences of the solar flares and supernovae and their particle and radiation-flux densities at the earth, we calculate the possible C14-production variations."

For more on the interaction of the magnetic field of the earth and cosmic rays see the following:

Barton CE. Merill RT. Barbetti M. Intensity of the Earth's magnetic field over the last 10 000 years. Physics of the Earth and Planetary Interiors. 20:96-110. 1979.

Bucha V. Influence of the Earth's magnetic field on radiocarbon dating. Nobel Symposium 12th:1969:Uppsala Universitet. Wiley Interscience Division. New York. p. 501-511. 1970.

Labeyrie J. Delibrias G. Duplessy JC. The possible origin of natural carbon radioactivity fluctuations in the past. Nobel Symposium 12th:1969:Uppsala Universitet. Wiley Interscience Division. New York. p. 513-537. 1970.

Merril RT. *The Earth's Magnetic Field: Its History, Origin, and Planetary Perspective*. Academic Press Inc. London. pp. 100-109. 1983.

Suess H. The three causes of the secular C14 fluctuations, their amplitudes and time constants. Nobel Symposium 12th:1969:Uppsala Universitet. Wiley Interscience Division. New York. p. 595-605. 1970.

25. Photo courtesy of NASA.

26. Illustration courtesy of the United States Geological Survey (USGS). ^{222}Rn comes from the decay cycle of ^{238}U, which occurs in many types of granites and other igneous rocks (^{220}Rn is in the decay cycle of ^{232}Th). As radium decays it is converted into different atoms some being more stable than others. The final end product is lead, which is not radioactive. Radon is a gas and it can mix with atmospheric air and enter closed confined areas such as homes, mines, and caves. ^{222}Rn has a half-life of about 3.8 days.

27. Hoeijmakers JHJ. Genome maintenance mechanisms for preventing cancer. Nature. 411:366-374. 2001.

> The physicochemical constitution of our genes does not guarantee life-long stability or proper function. A perplexing diversity of lesions arises in DNA from…environmental agents such as the ultraviolet (UV) component of sunlight, ionizing radiation and numerous genotoxic chemicals (can) cause alterations in DNA structure, which, if left unrepaired, may lead to mutations that enhance cancer risk.

28. Nero AV. *et al*. Distribution of Airborne Radon-222 concentrations in U.S. homes. Science. 234:992-997. 1986.

29. Many studies have been done where mice have been kept in radiation proof containers at the bottom of abandoned mines and no observable difference in life span was noted. Does this go contrary to the conclusions of this paper? The answer is no! When the earth was destroyed (Genesis 6:13) many factors changed. Human longevity is a complex mechanism that probably will not ever be able to be completely reestablished. What this paper is trying to do is to show a few of the factors that govern longevity have been changed and how they have been changed. Showing that something was once possible in the past does not mean it can be duplicated today. The past is more complex than is realized. For example there is strong scientific evidence that the ancient atmosphere held more atmospheric oxygen than it now has. Simply because scientists know this and can prove it by commenting on present day processes does not mean that they will be able to reproduce the ancient atmosphere. It would be ludicrous to expect them to be able to do that—the same can be said for studies dealing with patriarchal longevity.

For experiments with mice, caves, and longevity see:

Dillow, Joseph C. *The Waters Above*. Moody Press. Chicago. p. 170. 1981.
For information on the past atmosphere see:

Berner RA. Atmospheric oxygen over Phanerozoic time. Proceedings of the National Academy of Science. 96:10955-57. 1999.

30. Sievert is Sv; one sievert is equal to100 rem. An mSv is a thousandth (milli) of a Sievert. Sievert is the International Standard common unit and rem is the United States common unit. They both are a measure of an absorbed dose of radiation called the equivalent dose. The sievert is slowly replacing the rem as the unit of measure in radiology.

31. Luckey TD. Radiation Hormesis. CRC Press. Boca Raton Fl. 1991. Adapted from figure 6.1 p. 98.

32. Radiation hormesis was commonly used when radiation was first discovered but because of policies by the various governmental nuclear agencies it has received much bad "press." Most governmental agencies hold the LNT (Linear No Threshold) concept toward radiation. In other words radiation if it is bad at high doses is also bad at low doses. The effects of radiation and dosage is no longer consider linear by many scientist. Consider the following analogy. Water is toxic at high levels. If too much water is ingested it leads to biological complications and death. If this is true according the LNT model then a little water is bad—obviously this is not true. Many substances that are essential and stimulate the body at low levels can be deadly at higher levels. See the following:

Calabrese EJ. Baldwin LA. Radiation hormesis: the demise of a legitimate hypothesis. Human and Experimental Toxicology. 19:76-84. 2000.

> This paper examines the underlying factors that contribute to the marginalization of radiation hormesis in the early and middle decades of the 20th century. The most critical factor affecting the demise of radiation hormesis was a lack of agreement over how to define the concept of hormesis and quantitatively describe its dose-response features.

Luckey TD. Radiobiology deception reject health. Paper 8788. Proceedings of ICONE 8. 8th Annual Conference on Nuclear Engineering. Baltimore MD. April 2-6, 2000.

> Abstract—Radiobiology data shows that biological functions are stimulated at low doses of ionizing radiation, while high doses result in detrimental effects. This results in improved health, and successful treatment of medical conditions, by low to moderate radiation doses, as shown in numerous studies, in both animal experiments and human epidemiological studies

Mortazavi SMJ. An introduction to radiation hormesis. Self Published. Biology Division, Kyoto University of Educating, Kyoto 612-8522, Japan. 2004.

> Our radiation protection policy is based on linear extrapolation from the dose-response at a of high doses of ionizing radiation. According to the results of many worldwide studies, this assumption is not compatible with observed health effects of low levels of radiation. Obviously LNT and current radiation protection regulations exaggerate the risk of low-level ionizing radiation (in the range of 1-50 cGy) and cause radiophobia (Yalow RS 1990). It is concluded that according to new findings, the existence of radiation hormesis and adaptive response are not deniable and abandoning the LNT theory in low dose risk estimations will be a real necessity in the near future.

Muckerheide J. There has never been a time that the beneficial effects of low-dose ionizing radiation were not known. Self Published. Center for Nuclear Technology and Society at WPI Radiation, Science, and Health, Inc. 2004.

> Health and medical benefits of radon and radium health spas were known for centuries. After radioactivity was discovered, this link was documented. In 1896, a few months after Roentgen published his x-ray paper, health benefits of low-dose x-rays were demonstrated; along with many reports of high-dose harm. We know now that the response described was primarily immune system stimulation. It cured and prevented diseases, especially infections and inflammations.

33. Muckerheide J. Apply radiation health effects data to contradict and overturn radiation protection policies and rules. Paper 8792. Proceedings of ICONE 8. 8th International Conference on Nuclear Engineering. Baltimore MD. April 2-6, 2000.

34. Pollycove M. Feinendegen LE. Biologic responses to low doses of ionizing radiation: detriment versus hormesis-part 2 dose responses of organisms. Journal of Nuclear Medicine. Newsline. 42:9:26N-37N. 2001.

35. Feinendegen LE. Pollycove M. Biologic responses to low doses of ionizing radiation: detriment versus hormesis-part 1 dose responses of cells and tissue. Journal of Nuclear Medicine. Newsline. 42:7:17N-27N. 2001.

36. Miller RA. *et al*. Longer life spans and delayed maturation in wild-derived mice. Experimental Biology and medicine. 227:7:500-508. 2002.

> Wild mice were selected for longevity over domesticated stock. Not only could longevity be genetically selected but the longer-lived mice matured slower and had their first litter later. This is similar to the patriarchal record in Genesis. Men were living longer and the longer-lived men matured later.

37. Morton GR. Can the Canopy Hold Water? Creation Research Society Quarterly. 16:3:164-169. 1979.

38. Vardiman L. Bousselot K. Sensitivity studies on vapor canopy temperature profiles. Proceedings of the Fourth International Conference on Creationism. Pittsburgh: Creation Science Fellowship. 1998.

39. The word canopy is actually a word that has been substituted for the Biblical word firmament. The word firmament could better be translated *expanse*. Our modern rendering of this word is *heavens*, or an area of space. The word firmament could refer to the expanse above in which birds fly (Genesis 1:20), which is the atmosphere, or the expanse above which is outer space in which the moon and sun reside (Genesis 1:15-17). Although the heavens or firmament cannot contain massive amounts of water as required by some creationists, it is possible that a small amount of water was placed in the atmosphere, which did condense down during the flood. This occurs today it is called rain.

40. DeConto RM. Pollard D. Rapid Cenozoic glaciation of Antarctica induced by declining atmospheric CO_2. Nature. 421:245-248. 2003.

> The sudden, widespread glaciation of Antarctica and the associated shift towards colder temperatures at the Eocene/Oligocene boundary (34 million years ago) is one of the most fundamental reorganizations of global climate known in the geologic record…In our model, declining Cenozoic CO_2 first leads to the formation of small, highly dynamic ice caps on high Antarctic plateaux. At a later time, a CO_2 threshold is crossed, initiating ice-sheet height/mass-balance feedbacks that cause the ice caps to expand rapidly with large orbital variations, eventually coalescing into a continental-scale East Antarctic Ice Sheet.

41. Global warming is a result of an increased greenhouse effect. Does this mean that the supposed present manmade increase in temperature is similar to what has occurred in the past? Are we headed back to an Edenic climate? The answer is no because even though carbon dioxide levels were higher in the past this is only part of the equation. The atmosphere is delicately balanced and when God created the earth the ecosystems including the atmosphere were all perfectly aligned and fine-tuned. Even if all the components of the Edenic state were know the sum of the parts do not make a whole. They have to be integrated into a system that is perfectly matched and balanced. This is stating in another way what the scriptures reveal. Humanity must wait for the return of Christ in order for thing to be revitalized and corrected.

42. The scriptures indicate that the Garden of Eden was watered by a dew regime and that no rain fell during the time that humans were in the garden and possibly up until the time of the flood. This would be consistent with a very efficient carbon dioxide-water vapor atmosphere, which would create an excellent greenhouse effect and hence dew. The scripture indicate that the Garden of Eden had four rivers. In order for these rivers to exist the dew regime would have to be very efficient, thus testifying to the efficiency of the greenhouse effect.

43. Manahan SE. Environmental Chemistry 7th ed. CRC press. Boca Raton, FL. pp. 294-6, 723. 2000.

44. Fetner RH. Ozone-induced chromosome breakage in human cell cultures. Nature. 793:4830:793-4. 1962.

45. The atmospheric level of ozone in the past would have implication for the large amounts and sizes of the pre-Noachian vegetation. In the preflood world ozone was less common at lower atmospheric levels but more concentrated at higher atmospheric levels. As numerous studies have shown this would increase the biomass of vegetation. See the next citation.

46. Gregg JW. Jones CG. Dawson TE. Urbanization effects on tree growth in the vicinity of New York City. Nature. 424:183-87. 2003.

> Multiple regression analysis showed that final season biomass was significantly inversely related to ambient O_3 exposures across all field sites and years of experiments, accounting for 93% of variation…Ozone was the single overriding factor accounting for observed growth differences…

47. Brakenridge GR. Terrestrial Paleoenvironmental effects of a late Quaternary-age supernova. Icarus. 46:81-93. 1981.

48. Clark DH. McCrea WH. Stephenson FR. Frequency of nearby supernovae and climatic and biological catastrophes. Nature. 265:318-19. 1977.

49. Napier WM. Clube SVM. A theory of terrestrial catastrophism. Nature. 282:455-59. 1979.

50. Reid, GC. McAfee JR. Crutzen PJ. Effects of intense stratospheric ionization events. Nature. 275:489-92. 1978.

51. Byrd RE. Exploring the Ice Age in Antarctica. National Geographic. p. 456-7. October 1935.

52. Many scriptures indicate that much of the mountain building was a product of the flood. In the following quotation notice the marginal rendering indicates that the mountains rose up after the flood and the valleys became the ocean basins, which filled with the floodwaters.

> Psalms 104:8 They went up over the mountains; They went down into the valleys (margin: The mountains rose up: the valley sank down).

In the following quote from Isaiah the topic is the restoration of the new Edenic world that has been prophesized. The mountains refer to false kingdom, which will be leveled just as the mountains will be physically leveled at the Return of Christ. This is another indication that the globe will be restored to preflood conditions.

> Isaiah 41: 14-16 Fear not, you worm Jacob, You men of Israel! I will help you," says the LORD And your Redeemer, the Holy One of Israel. Behold, I will make you into a new threshing sledge with sharp teeth; You shall thresh the mountains and beat [them] small, And make the hills like chaff. You shall winnow them, the wind shall carry them away, And the whirlwind shall scatter them; You shall rejoice in the LORD, [And] glory in the Holy One of Israel.

53. Sereno PC. *et al*. The Giant Crocodyliform *Sarcosuchus* from the Cretaceous of Africa. Science. 294: 1516-1519. 2001.

54. Chapelle G. Peck LS. Polar gigantism dictated by oxygen availability. Nature. 399:114-115. 1999.

55. Dudley R. Atmospheric Oxygen, giant Paleozoic insects and the evolution of aerial locomotor performance. Journal of Experimental Biology. 201:1043-1050. 1998.

56. Harrison JF. Lighton RB. Oxygen-sensitive flight metabolism in the dragon fly *Erythemis simplicicollis*. The Journal of Experimental Biology. 201:1739-44. 1998.

57. Ishii Y. *et al*. Efficacy of topical hyperbaric oxygen for refractory foot ulcer. Material Science and Engineering. C 24:329-32. 2004.

58. Kalani M. *et al*. Hyperbaric (HBO) therapy in treatment of diabetic foot ulcers Long-term follow-up. Journal of Diabetes and Its complications. 16:153-58. 2002.

59. Von Heimburg D. *et al*. Hyperbaric oxygen treatment in deep frostbite of both hands in a boy. Burns. 27:404-408. 2001.

60. Plet J. Pedersen K. Jensen FB. Increased working capacity with hyperoxia in humans. European Journal of Applied Physiology. 65:171-77. 1992.

61. Knight DR. Schaffartzik W. *et al*. Effects of hyperoxia on maximal leg O_2 supply and utilization in men. Journal of Applied Physiology. 75: 2586-2594. 1993.

62 . There is much evidence that hyperbaric therapy if overdone can lead to numerous problems including cataracts and various other physical aliments. These problems usually occur when the atmospheric pressure is doubled and pure oxygen is breathed over extended periods of time. For the benefits of hyperbaric therapy to exist the atmospheric pressure needs only to be elevated a few pounds per inch and the oxygen level raised only a few percent. This was undoubtedly what occurred in the construction of the preflood atmosphere.

63. Kappelman J. They might be giants. Nature. 387:126-127. 1997.

64. Day, M. H. Guide *to Fossil Man.* Univ. Chicago Press. p.137. 1993.

65. Campisi J. Aging, chromatin, and food restriction—connecting the dots. Science. 289:2062-63. 2000.

66. Guarente L. Kenyon C. Genetic pathways that regulate ageing in model organisms. Nature. 408:255-262. 2000.

67. Imai S. *et al*. Transcriptional silencing and longevity protein Sir2 is an NAD-dependent histone deacetylase. Nature. 403. 795-800. 2000.

68. Genesis 4:2-5 indicates that Abel raised sheep and that these sheep were offered as sacrifices. The worshipper ate many of the sacrifices. Undoubtedly the preflood inhabitants of the earth ate sacrificial animal flesh although not the same quantity that was eaten post flood when God commanded man to eat animals (Genesis 9:3)

69. Finkel T. Holbrook NJ. Oxidants, oxidative stress and the biology of ageing. Nature. 408:239-47. 2000.

70. There are many foods especially vegetables and fruits that are antioxidants and serve as scavenger of these ROS. Before the flood no doubt the effect of these antioxidants was more effective and food played a part on human longevity. The impact of ROS on ageing could have been suppressed by the types and quality of food that was eaten by the long-lived patriarchs. Human longevity is probably multi faceted. Humans since they cannot recreate these post flood conditions will probably never be able to duplicate long life spans. Interestingly Revelation 22:2-3 speaks of the fruit of the Tree of Life used for the healing of the nations—this may indicate that in the future food may have more life sustaining qualities than it does now.

71. Xu J. Yang X. Will cloned animals suffer premature aging-the story at the end of the clones' chromosomes. Reproductive Biology and Endocrinology. 1:105-110. 2003.

72. Hanahan D. Benefits of bad telomeres. Nature. 406:573-574. 2000.

73. Artandi SE. *et al*. Telomere dysfunction promotes non-reciprocal translocation and epithelial cancers in mice. Nature. 406:641-645. 2000.

74. Baur J. *et al*. Telomere position effects in human cells. Science. 292:2075-2077. 2001.

75. Blackburn EH. Telomere states and cell fates. Nature. 408:53-56. 2000.

76. Olshansky SJ. Carnes BA. Cassel C. In search of Methuselah: estimating the upper limits to human longevity. Science. 50:634-50. 1990.

77. Although cancer cells are immortal, normal cells are not and they eventually will die. It would seem that one reason God shortened human life span was to keep cancer afflicted people from needlessly suffering due to an increase in post flood cancers and mutations.

78. Monaghan P. Metcalfe NB. Genome size and longevity. Trends in Genetics. 16:331-32. 2000.

Other research indicates that long-lived animals have a large genome. So longevity seems to be correlated to the size of the organism's genome. Studies indicate that a large genome is duplicated less often and therefore it cycles slower which means the organism's cells have more time between reproductive cycles and this increases longevity. Humans have a very large genome. Almost 98% seems to serve no function since most is non-coding DNA. In other words only a small part of the human DNA serves genetic purposes. Many scientists have used the size of the human genome as evidence of evolution. According to their logic since most of the genome is not used it means that there is a lot of junk DNA left over from evolution—this is incorrect. Actually the large size of the human genomes indicates that humans have the potential to live longer life spans. If all the junk DNA were made functional then the genome size would affect longevity. This also indicates that the potential for human longevity is still genetically possible. At the flood God through environmental and genetic factor could have manipulated the genome size leading to reduced lifespans. In the coming kingdom when longevity is restored the manipulation or tweaking of the size of the coding DNA may be one of the methods long life spans are restored.

79. Remote S. Finkel T. Ageing and the mystery at Arles. Nature. 429:149-152. 2004.

80. Lin YJ. *et al*. Extended life-span and stress resistance in the Drosophila mutant methuselah. Science. 282:943-946. 1998.

81. Service PM. *et al*. Resistance to environmental stress in *Drosophila melanogaster* selected for postponed senescence. Physiological Zoology. 58:4:380-9. 1985.

82. Miller RA. *et al*. Longer life span and delayed maturation in Wild-derived mice. Experimental Biology and Medicine. 227:7:500-508. 2002.

83. Another factor that could affect mutation and genetics is ozone. After the flood ozone in the lower atmosphere would have caused chromosomal damage. The effects would have been the same as high doses of radiation.

84. Luckey TD. Radiation Hormesis. CRC Press. Boca Raton Fl. 1991.

85. Joktan (#03355) יקתן comes from a root word meaning to make small, insignificant, or reduce. The number in parenthesis refers to: Strong J. *Strong's Exhaustive Concordance*. Crusade Bible Pub., Inc. Nashville TN. 2002 ed.

Brown F. Driver S. Briggs C. *Hebrew and English Lexicon*. Reprint edition. Hendrickson Publishers, Inc. Peabody, MA. 1996.

86. The Resurrections-Doctrinal Paper. United Church of God aia. Cincinnati OH. p. 23. 2005. available on line: http://www.ucgia.org/papers/resurrections.pdf. The following quotes are taken from page 13 of this paper. The United Church of God puts forth three possible explanation of Isaiah 65:20, all three of them imply long pre-flood life spans for people living during the millennium:

> (1) The Great White Throne Judgment will last for 100 years. The Church has taught that this will be a testing period of one hundred years, during which billions of children and adult would have an opportunity to become converted and inherit eternal life. Therefore the death of the "sinner being one hundred years old has been considered to be the second death. God certainly could do things this way if He so chooses.
>
> (2) Life spans will exceed 100 years during the Great White Throne Judgment. This verse certainly conveys a time of longevity, though not necessarily an exact "one hundred years" Isaiah 65:20 says " No more shall an infant from there live but a few days…for the child (*naar*, 'young, youth, young man') shall die one hundred years old" (*Enhanced Strong's Lexicon*, Logos Research System, Inc., 1995). This would describe pre-Flood-type conditions where 100 years are a small portion of one's life. If so, then those who are *only* 100 years old would be considered a "child, youth" or "young man" at 100 years old. And to die at this age would be analogous to a premature death.
>
> (3) Isaiah 65:20 describe a time during the Millennium. If so, then this would provide plenty of time for the pre-Flood-type extended life spans. Under this scenario, one might expect the same type of life spans during the Great White Throne Judgment time period.