

This essay covers a number of articles concerning the age of the earth. It provides a different perspective with challenging arguments. There is no claim of authorship here except for compilation of the material from the books mentioned and their respective authors. The challenge put forth in this essay is for the reader to consider the possibility of a different world view.

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The Age of the Earth

Catastrophism vs Uniformitarianism

Age of the Earth: Catastrophism vs Uniformitarianism

Introduction:

It's A Young World After All by Dr. Paul D. Ackerman. This text starts with the theme that's carried on with the other books researched in this essay: Catastrophism verses Uniformitarianism. Dr. Ackerman deals with a number of issues that challenges the stand on uniformitarianism. He first deals with what is called the famous argument associated with Moon Dust. This in turn leads to 'fossil' meteorites and other evidence such as the subject of a solar janitor. The following topics are dealt with also: geology of the earth and other planets and various phenomena, age of the moon, the Sun, beyond the solar system, light, Mt St Helens, and monuments of the past. There is also an article on carbon dating discussed in this essay. This was also covered in another text under creationism. Part 2: Creation's Tiny Mystery is written by Robert V. Gentry, a prominent Christian scientist. However, the main topic of his research concerns itself with the radioactive nature of the Halos and the decay rate of these Halos. Part 3 contains information on the book, Thousands.. not Billions by D. DeYoung which gives us additional support in understanding how evolutionists get it wrong through their dating systems.

Part 1

Evolutionists maintain that the earth and the rest of the cosmos must be 4.5 billion years old, but contra to this, the actual physical evidence indicates that things are quite young. For example, the argument regarding moon dust is important because it opened up the issue of the time of creation for many Bible-believing scientists and scholars. Scientists know that space contains lots of tiny specks of cosmic dust. It is constantly falling and collecting onto earth and other planets. In the beginning, the moon's surface was clean of this dust. But scientists also began to question the lack of cosmic dust on the surface of the moon, and providing various reasons as to why. According to these scientists, it was estimated to be between 50 to 180 feet on the moon. Many precautions were made, including probes and special landing gear so they wouldn't sink into this dust. They found out that there was only a few thousand years worth of dust on the moon. Armstrong tried and tried to push the flag into it but it was only a few inches thick. They have now decided that the reason for the lack of dust is due to its closeness to the earth and scientists have now decided there is a general lack of dust in the area close to the earth and moon. Another such clock that works on the same principle is the amount of measurable space materials and meteors. The evolutionist's model

predicts a high number of meteorites which should eventually turn up on earth. But a survey failed to turn up a single case of a meteorite being found in the geologic column.

There are other clocks that present simple questions like, 'If the universe was created long ago, why does it look so young?' There's also a solar cleanup clock which constantly sweeps and sorts many of the smaller particles that floats around the solar system slowing them down. According to the Poynting-Robertson Clock, there's supposed to be a greater effect on smaller objects initially and larger one later but, in fact, this hasn't proved to be true in respect to meteor streams entering the earth's atmosphere. Photographs of such showers find no dispersion whatsoever which shows that they can't be old. In terms of sweeping as collisions of photons hit space objects, they break off small bits of matter and thus over time break them down into cosmic dust. The problem is, many stars are surrounded by huge clouds of dust and gas and they are radiating energy as much as hundreds of thousands of times more than the sun. How can these stars be so old and still be surrounded by so much material? Of course, they are not old. Again, physical evidence show that we live in a young universe.

Other examples are comets which have basically been classed as 'dirty icebergs.' Every time one of these comets rounds the sun, lots of dust and ice is brunt off them. But again, if the earth is old, there should not be any short-period comets left. One source says that perhaps Jupiter has captured long period comets and turned them into short period comets but it's acknowledged that there isn't enough near passes to Jupiter to do this. Then some say that they come from the asteroid belt, but the physical makeup of those asteroids is completely different. Another idea suggests that they were thrown out of erupting volcanoes on other planets. There supposedly is a belt of dirty icebergs circling the solar system beyond Pluto where they are occasion knocked off course into the solar system. NASA was extremely surprised to find an active volcano on Io which was supposed to be 4.5 million years old. Io in fact is still hot and geologically active in its interior. There are volcanic eruptions going on even now. The moon is more violent than earth itself. The cause was said to be the geological pulling of the planet on it. Our moon contains radioactive materials that shouldn't exist for a moon being so old. The same goes for the instability and turbulence that is happening within the rings of Saturn. Three dust rings have been discovered millions of miles wider circling the asteroid belt between Mars and Jupiter. This not only shouldn't be but should have long diminished.

Hermann von Helmholtz presented a thesis on the gravitational collapse of the sun as the reason for its chemical reaction inside, but Lord Kelvin in a debated against this evolutionary idea. The evolutionists temporarily changed their stand and said that thermonuclear fusion in the sun's core was the source of its energy. This is now widely accepted but difficult to prove. They thought by collecting neutrinos, a by-product of this destruction. These neutrinos are particles emitted during certain nuclear reactions, which are believed to power the sun. They travel near the speed of light and can penetrate miles of dense matter without striking anything. The expense and commitment to this project has been extensive and the results haven't been favourable. In fact, it's quoted that: 'all of us have been surprised by the results: there is a large, unexplained disagreement between observation and the supposedly well established theory. This discrepancy has led to a crisis in the theory of stellar evolution; many authors are openly questioning some of the basic principles and approximations in this supposedly dry (and solved) subject.' There's a host of other problems: the lack of make up of chemical composition of older stars; gravitationally bound star clusters containing stars of different ages of thermonuclear burns and lack of mass to hold them together; Sirius B once being a red star is now a white star as described by the Egyptians: Cicero, Seneca and Ptolemy. Even the theory of gravitational collapse has become vogue again. But if the sun is shrinking at one tenth of a percent per hundred years then the sun can't be that old.

The speed of light is evolutionists' most persuasive argument for an ancient origin of the universe. If these objects are at the distance of millions and millions of light years from earth, how can the universe be only a few thousand years old? The most common answer by creationist is that God created light trails at the same time. Some feel this is somewhat deceptive as it shows that whatever we see didn't happen. However, Barry Setterfield study indicates that the speed of light has not been constant; it was faster in the past. This came about because Setterfield discovered a clear and distinct pattern of decay with the passage of time. He went about drawing up a curve that would ascertain how much light had in fact slowed down over time. His curve put the origin of the earth at about 6,000 years old. This applies directly to the use of carbon 14 testing because a key factor in rates of decay is the speed of light. For example, the faster the speed of light, the more rapid the decay of radioactive elements are, and vice versa. Some say that time actually stops when applied to light as it reaches that speed of light. Dating calculations must be refigured with the corrected and decreasing value for light speed. Another example, a four billion year old rock assumes

that the speed of light was the same in the past as it is now and thus the rate of radioactive decay was the same in the past as it is today. No one has been able to disprove these findings. Another physicist by the name of Russel Humphreys approached the problem in a different direction in 1990. He says that the universe has a boundary with an outer edge where all created material things exist. He applied Einstein's theory of General Relativity to the assumed nature of the universe. His conclusion is that movements of the speed of objects are relativity to the magnitude to the gravitational field in which the particle moves. Thus the passage of time will be faster in locations where the gravity field is weaker. When created the earth, moon and stars the gravitational field was maximal in the vicinity of earth but minimal in the heavens being stretched out. Thus, during a few moments from the vantage point of the Word of God call the heavenly bodies into existence on earth, billions of years of processing would have occurred from the standpoint of created objects. Also the commonly cited uranium-lead decay shown by carbon 14 testing sequences gives off helium as a by-product. Yet there's not nearly "enough" helium is present in the atmosphere, if this radioactive process has been occurring for millions and billions of years, in the manner claimed by evolutionists. This clock also indicates a younger earth.

The natural experiment of Mount St Helens did away with the evolutionists' idea of a vast pre-historical earth with geological ages founded on the premise of the Law of Superposition. Within a matter of days, Mount St Helens laid down strata which scientists say must take millions of years. Fossilized trees in Yellow Stone are said to have come about fifty million years ago. But the trees look as if they have been ripped up instead of covered by volcanic ash where they've stood. But for any organism to fossilize, it must be buried rapidly so as to seal it off from air, insects and bacteria. The tree roots of the Mt St Helens eruption became saturated with water first and sunk to the bottom of the lake and settlement slowly covered them up while other tree sank later at different levels and settlement continued to cover them also. Additional, George Dodwell studied writings of an ancient astronomer, Eudoxus; the Stonehenge layout and also the layout of the Egyptian solar Temple of Amen-Ra. Basically all three reported sun variations that doesn't seem to match the sun's calendar. The problem comes out of modern measurements of the earth's axis, orbit etc. In a mathematical curve, he saw that it referenced the year 2345 BC. This date said that something had happens then to the earth to cause it to tilt from its axis. This could have been caused by the flood. Dodwell credited a possible meteorite strike as the cause.

So we've talked about the lack of dust on the moon, the destruction of objects in the solar system by solar sun rays hitting them, the question of the presence of comets in the solar system when there should be none, the reason for the chemical reaction within the sun and the lack of neutrinos, the discovery that light speed is slowing down and the gravitation effect on light and finally the results of Mt St Helens revealed eye opening proof of catastrophic results of what happened just over a year instead of millions and millions of years. I believe the author met their objectives in every way by presenting a clear picture of the information.

One of the problems with such information is that it is easily discounted as unproved creationist propaganda. I believe in order to make this information more presentable, the presentation of the materials must be much more publicized with art work and presented to a variety of audiences.

The benefits of having the facts as presented in this fashion can easily be remembered and used to confront any would be evolutionists. Thankyou!

Part II

Additional Support

Introduction: Creation's Tiny Mystery is written by Robert V. Gentry. The main topic of the book concerns itself with the radioactive nature of the Halos and the decay rate of these Halos. Other minor topics include the Impact of Creation on evolution and the Age of the Earth, The Search for Halos in Lunar Rocks, The Spectacle Halo, the Origin of Sedimentary Rocks, Secondary Polonium Halos and the biasness of the scientific community toward Robber Gentry in his discovery. This is an up to date scientific analysis of the radiation given off rocks.

The Big Bang is said to have produced just hydrogen and helium with the other 92 elements originating from thermonuclear fusion reactions that occurred billions of years ago deep in side stars. Another accepted point is the radiometrically determined age of the earth. Accordingly, the oldest rocks on earth formed several billion years ago when a hot, molten proto-earth began to cool. This radioactive dating was due to the decay of a parent element into an end product. For example, uranium decays into radiogenic lead. By determining the decay of the parent element and its rate, most geologists believe they can tell the time since the rock was formed. Scientists assume a uniform decay rate but there is no proof for this. This assumption is a main part of the evolutionary premise and is known as the uniformitarian principle. It's the glue that holds all the pieces in the evolutionary mosaic together.

In studying mineral specimens, the author came across tiny grains embedded in the host mineral which were surrounded by coloured concentric rings and was eventually named pleochroic halos. In 1907 Professor John Joly of Trinity College in Dublin found that these Halos had a radioactive nature. He wondered if there was uranium in the tiny halo centre and if so, could alpha particles from the uranium cause these pleochroic halos? The sunburst pattern of these particles might be enough to produce the colouration. So Joly identified that uranium and a companion element, thorium produced these halos. Each ring was identified by an appropriate isotope according to its alpha energy. Geologists wanted to use radioactivity as a means of determining age so they became interested in this phenomenon. The standard sized rings were thought to prove a constant decay rate whereas a deviation in size was thought to show a change during its history. Further, with rings of various sizes was due to its age so the implication was that the decay rate varied with time but others disagreed with this. While the author was still in college, he felt that this needed more study but his departmental chairman was against it. The chairman was more concerned if something was discovered that would change this stand. Would the end results be an embarrassment to Georgia Tech? The author went on to study halos in Dalhousie University in Halifax, Nova Scotia for the summer where a Dr Henderson had committed many years to the work. Henderson found other types of halos beside the uranium and thorium. The author continued research on these other halos the following years. An enigma rose; the polonium halos in granite was traced to known isotopes with half-lives of just three minutes. Thus the conventional geological theory considers it impossible for polonium to be a primordial constituent of Earth's granite rocks. Henderson thought that these halos had a secondary origin but this wasn't true. The author then began to wonder: perhaps the granites had not crystallized out of cooling magma; perhaps there was no molten sphere nor the chemical elements of the planet were not the result of nucleo-synthesis. Were the three minutes of the half life the measure of time that elapsed from the creation of the chemical elements to the time that God formed the granites? The author then began to understand that the uniformitarian principle was only an assumption that earth and life evolved through unvarying action of known physical laws. Eventually the author published his findings to see what others thought of it. The author reasoned that the halos were primordial. It seemed that a crucial test of this idea hinged on determining whether the polonium halos in the granites were derived secondarily from uranium. Further experiments found a new type of lead and 13 years tenure in Oak Ridge. This new type of lead could not be accounted for by

uranium decay; yet it was exactly that expected on the basis of the decay of polonium in the halo centre. Through publication after publication certain scientists realized that the existence of polonium halos would cause apparently insuperable geological problems since the relevant polonium half-life is of the order of minutes. This brought about suggestions that these halos did not even exist and claims of being uranium halos. He went on to examine this. He thought that if coalified wood specimens contained microscopic sites which had captured uranium, possibly other sites might have captured polonium.

Sedimentary rocks are initially the result of transport of deposition by ice, wind or water. Sedimentary rocks often contain fossil remains of plants and animals from both terrestrial and marine environments. The Precambrian granites, which are one type of crystalline rocks, do not contain fossils. The evolutionary view of sedimentary rocks based on geological uniformitarianism is that they form slowly over hundreds of thousands or millions of years by geological processes. The alternate view is based on a supernaturally event such as a worldwide flood. His studies continued for the search for secondary polonium halos which lead him to the coalified wood specimen from the Colorado Plateau. There were hundreds of them in just one square inch sometimes. These were only the Po type within the samples and none of the types that occurred in granites. This occurrence of an elliptical secondary ^{210}Po halos is evidence that the wood was in the same gel like condition when infiltrated by uranium solution which fit the flood model perfectly. These compared to the wood specimens taken from the Jurassic, Triassic and the Eocene formations with the same gel like condition at the time of infiltration. This is exactly what would be expected on the basis of a near simultaneous deposition of all the wood at the time of the flood. This contradicts the view that these periods were laid down tens of millions of years apart which in turn contradicts the evolutionary view that a hundred million years or more separated certain formations, for example, in the Colorado Plateau.

As the author's work became more and more known, especially, in that it pointed toward creationism, his work became less and less recognized. It was in 1981 that more anti-creationist propaganda was issued from various conferences and institutions. They said that the standards of creationism are not science nor do creationists participate in scientific enterprise. Anti Christian feelings in the classrooms are increasing with Christians being shouted down at every point. This repressive treatment of religious students would not be surprising under a totalitarian, atheistic regime but this also exists in America. There have even been court trials heavily biased toward evolution. In one such trial in Arkansas

promoted by the ACLU who thought it imperative to find a witness who would strongly promote an ancient age of the earth. This trail followed the legacy of the famous Scopes trial in Tennessee. One such question was posed, 'where is the science in creation science?' This was one of the important arguments as presented by evolutionists. The Arkansas trial continued with the ACLU trying to establish the plausibility of an ancient age of the earth. At one stage there were challenges to radiometric dating techniques. One testified that radioactive decay rates had been constant without any time qualification. This rested on the belief that this rate had been tested which was impossible to test. At one stage the granite synthesis experiment was explained and Robert Gentry's name was provided as a person who did scientific work and was a creationist. Robert's explained his work and presented his research and arguments as earlier shown above. As a scientist he said, I have worked to uncover the truth about the origin and history of the earth. At the trial my conclusions unequivocally supported creation, but those conclusions were based on scientific evidence. The author acknowledged that the accounts of the trial had a negative impact on his position as a guest scientist at ORNL. Attitudes of colleagues changed toward him after the trial. Also, the American association for the Advancement of Science to preserve the integrity of science condemned creation science. They said that Creationists were imposing beliefs disguised as science upon teachers and students to the detriment and distortion of public education in the United States.

However, at the same time of the trial, the author found out that somehow his ideas could be used in the approach to the disposal of nuclear waste. The doctor went to help in obtaining pieces of each granite core to determine how well radioactive zircons had resisted leakage under increasing temperature of radioactive waster. If the earth was only several thousand years' old, only negligible lead loss was expected. The radioactive zircon crystals extracted lost none of their radiogenic lead which presented strong evidence that the presumed 1.5 billion year age of the granites was in error. But the author emphasized in the writing that the synthetic zircons would constitute a very safe mode of containment. This report came out at the same time as the trial. The laboratory discontinued the author's contract even with the new findings. Further experiments with this by others provided stronger evidence for a younger earth. The author's twenty year question to prove a young earth was being fulfilled. The cost was high in loss of friends and financial support. In a reference presented by the same institute that condemned anything that was of creationism, the author has a chance to defend his position. Later evolutionists damned the author for

whatever reason. Neither would these same evolutionists perform the tests which the author performed showing positive and unambiguous evidence for a primordial origin of polonium halos in granites as well as decisive, independent evidence against their secondary origin. Since the Arkansas trial a battle against creation science has been waged by the National academy of Sciences.

Part III

DeYoung, D, (2005). *Thousands...Not Billions: Challenging an Icon of Evolution – Questioning the Age of the Earth*. Master Books, Green Forest, AR, USA.

This volume contains a brief history of radiation studies which includes an overview of radioisotope dating, Carbon-14 Dating, Helium Retention, radiohalos, fission tracks in Zircons, discordant radioisotope dates, theories of accelerated nuclear decay and a proper reading of Genesis 1:12:3

1. Carbon-14 atoms are found where they are not expected. With a half-life of 5,730 years, C-14 should no longer exist within 'ancient' fossils, carbonate rocks, or coal. Ye small quantities are indeed found on a worldwide scale. This evidence supports a limited age for the earth.
2. The New Mexico zircons studied by the RATE team have a radioisotope age of 1.5 billion years. If this were true, then the internal helium atoms should long ago have escaped from the zircons. Instead, however, the RATE scientists and other find high concentrations of helium still present inside the zircon crystals.
3. Radiohalos are tiny spherical defects in rocks. They result from the decay of clusters of radioactive atoms, mainly uranium and polonium. The frequent occurrence of thes halos in rocks is evidence for widespread nuclear decay. These are present in abundance in granites whose formation accompanied the Genesis flood. This indicates that a large-scale acceleration of nuclear decay occurred during the year-long Flood event.
4. Many rock units worldwide were analysed by radioisotope dating techniques. These experiments include the parent-daughter isotopes potassium-argon, rubidium-strontium, samarium-neodymium, and also the lead-lead method. The efforts gave fresh data on apparent ages and their consistency. Some examples of concordance, or agreement in age were found, while many other examples showed discordance, or disagreement. In fact, both extremes often occurred for the same rock unit.

5. There are three important assumptions made in radioisotope dating. Each of them has been addressed and found to be subject to failure. The first is that the initial conditions of rock sample can be determined accurately. This is challenged by the many discordant isochron dates. Ancient dates are often obtained for volcanic rocks known to be very recent in origin. The second assumption is that the open or closed nature of rock sample can be determined and quantified. There are frequent indications of the mixing of mantle and crustal isotopes with rock samples. Also polonium radiohalos show the movement of isotopes through rocks and minerals by hydrothermal transport. The third assumption is that nuclear half-lives have remained constant throughout history. This assumption is countered by the unexpected helium found in 'ancient' zircons. Also there are abundant radiohalos and fission tracks in rocks which were rapidly deposited during the Flood.
6. The concept of accelerated decay arises many times in the RATE work. It is the logical inference of placing millions or billions of years' worth of nuclear decay, at present rates, into a short time frame. The episodes of increased nuclear activity appear to have occurred during the creation week and also during the flood of Noah's day. The evidences for vast amounts of decay include the abundance of nuclear decay products, high concentrations of helium atoms residing in zircon crystals, radiohalos, and fission tracks.
7. The RATE radioisotope dating measurements also contribute information regarding accelerated nuclear decay. These measurements reveal two distinct trends. First, the isotope which decay by alpha particle emission tend to give older dates than the isotopes which undergo beta decay. Second, heavier isotopes tend to give older dates than lighter isotopes. Neither of these trends should exist if the radioisotopes have had constant half-lives and accurately measure the ages of rocks. This decay information may provide useful clues to understanding the mechanisms responsible for accelerated nuclear decay.
8. The linguistic studies of Genesis 1:12:3 likewise support a recent creation. This research shows that biblical texts may be identified as either narrative or poetry with a high degree of confidence, based on the Hebrew verb forms used by the authors. The distribution of finite verbs in numerous Old Testament narrative and poetic passages were analysed. The Genesis creation story is found to be a narrative account describing literal historical events. This conclusion challenges all efforts to explain away the early chapters of Genesis as non-literal poetry, metaphor, or allegory. The research also contradicts the currently popular idea that the Genesis account describes the big-bang theory in pre-scientific terms.

The methods employed by these studies help determine the age of rock and organic materials. Plus, the earth's age is based on the radioisotope dating of rocks and meteorites. Age estimates for the rest of the universe follow largely from the big-bang theory. These multi-billion year time spans are sometimes called deep time, corresponding to deep space. Deep time refers to time scales which are much larger than those by which we define our lives. It should be remembered, however, that the existence of billions of years of history is not a certainty. Deep time is a major "icon" or symbol of evolution, a presumption which is challenged in the subtitle of this book.

To grasp these contrasting views of age, consider one human generation as a basic unit of time, about 25 years. If the world is 6,000 years old then it spans just 240 generations. However, 4.6 billion years of time would encompass 184 million generations. The young and old views of earth history indeed stand in stark contrast to one another. The young-earth view is confidently promoted in this book because the Bible clearly points in this direction. Along with this, all scientific data, as well, can be interpreted to support a recent creation.

In 1997 a group of scientists met in San Diego to discuss the age of the earth. Their goal was clarify the chronology of earth history. However, this team sought a fundamental correction to the usual assumptions of deep time. They were sceptical of the evolutionary time scale which dominates modern geology. These scientists reviewed the assumptions and procedures used in estimating the ages of rock strata and recognized multiple weaknesses inherent in those procedures. This group identifies itself with the acronym RATE which stands for Radioisotopes and the Age of the Earth. The information contained in the resume is a summary of their findings. A comprehensive treatment of the RATE research is available in two publications. The first is titled *Radioisotopes and the Age of the Earth: A Young-Earth Creationist Research Initiative* (Vardiman et al., 2000). This volume fully explains the initial RATE research plans and also includes a comprehensive 90-page glossary of terms.

First, to help our understanding of the radiation particles, a brief review of chemistry is helpful. There are currently about 115 known elements in the periodic table. Each atom of carbon has six protons in its nucleus. The number of protons in an element is known as its atomic number. This is also the number of electrons which orbit the carbon nucleus, although electrons are often shared with other atoms by chemical bonding. For example, carbon-13 is slightly heavier than carbon-12 because the C-13 variety has one additional neutron in its nucleus, seven instead of the usual six neutrons of carbon-12. Isotopes which possess extra neutrons, such as carbon-14, often are unstable and eventually experience radioactive decay.

There are more than 2,000 known isotopes among all the elements. Uranium alone has at least 28 distinct isotope varieties. The majority of all isotopes are radioactive, with a great range of lifetimes from microseconds to billions of years. However, the most common isotopes in nature are stable. There are three major types of radiation and they have been identified in nature. The alpha rays or particles (α) are equivalent to the nuclei (the plural of nucleus) of helium atoms. An alpha particle is a tiny bound packet containing two neutrons and two protons. It carries a double plus electrical charge because of the two positively charged protons. The beta particles (β) are single electrons which carry a negative charge. Electrons are normally bound in orbits around an atomic nucleus and thus are an integral part of every atom. There are multiplied trillions of electrons in our bodies and also in every visible object. Electrons are only called beta particles when they are free from atoms and moving at high speed. Gamma (γ) rays, the third type of radiation, are a form of high-energy electromagnetic radiation. Interestingly, light in general, displays the dual behaviour of both waves and particles. When characterized as particles, the "wave packets" of light, including gamma rays, are called photons. Beyond the α , β , and γ forms of radiation there are several others that can be produced in the laboratory. These include beams of positrons, neutrons, protons, and antiprotons. Each of these has important applications in physics research, technology, and medicine. Alpha particles are often released during the decay of the heavier radioactive isotopes such as samarium, thorium, and uranium. Beta emission occurs when a neutron within a nucleus spontaneously converts to a proton and an electron. The proton stays behind and the electron is emitted from the nucleus. Gamma rays often accompany both alpha and beta radiation. The gamma radiation provides a way for atoms to release excess energy when nuclear decay occurs. Now, early studies revealed a basic property of radioactive decay called nuclear half-life. This is the length of time required for 50 percent of a quantity of radioactive material to disintegrate or decay away. An alternate way to describe nuclear half-life is that the number of atoms decaying during any given moment is proportional to the total number of atoms available. As a result, the greater the number of radioactive atoms present, the more decay will be occurring. The half-life law eventually breaks down as the number of remaining radioactive atoms approaches zero. This half-life law is "Nature's clock" which begins ticking when radioactive isotopes are sealed within newly crystallized igneous rocks. As the word ignite implies, igneous rocks form when hot, molten material cools. Melted rock is called magma while underground and it becomes lava if it reaches the earth's surface. The other two basic types of rocks, sedimentary

and metamorphic, are less useful for dating since their origin is pre-existing, reworked rocks. Radioisotope dating requires a measurement of the quantity of daughter atoms that result from the decay of radioactive parent atoms within the igneous rock sample. For example, the radioactive parent isotope potassium-40, K-40, decays to the daughter argon-40, Ar-40, with a half-life of 1.25 billion years.

Radioisotope dating is performed by many commercial and university laboratories. The experiments are highly specialized and technical in nature. One key instrument used is called a mass spectrometer. It is designed to separate charged molecules, atoms, and isotopes on the basis of their weight or mass. A small amount of sample is vaporized to a gas. Individual atoms are then counted as they travel through strong electric and magnetic fields. Potassium-argon dating is the most commonly used procedure today. One reason is that potassium is abundant in many rocks and minerals.

There is an additional concept which is vitally important to radioisotope dating called an isochron, which means "equal time." An isochron is a graph of data which attempts to address three dating issues. The first issue concerns whether any daughter atoms were present in the rock when it first crystallized from magma, before any parent atoms had as yet decayed. The second issue concerns whether or not the sample has remained a closed system during its history. If not closed, various atoms can migrate into or out of the sample over time and invalidate the age calculation. The third issue addressed by isochrons concerns the most likely computed age for a rock body, based on the statistical averaging of several radioisotope measurements. Isochrons are utilized today in almost every radioisotope dating experiment. All rocks are made of one or more minerals such as biotite, feldspar, olivine, and quartz. In actual isotope dating procedures it is only the data points along the upper tilted line that are measured. This line, which itself is called the isochron, shows the measured isotope content for several minerals. Isochrons are assumed to be a powerful technique for assuring the accuracy of radioisotope dates..

In the argon-argon dating system, rock samples are exposed to neutrons inside a nuclear reactor to bring about this conversion. The number of new Ar-39 atoms formed is assumed to be proportional to the potassium-39 content of the sample. Since the ratio of potassium-40 to potassium-39 appears to be constant, the number of Ar-39 atoms formed is also proportional to the number of K-40 atoms in the sample. The result of the neutron bombardment procedure is that the rock sample now includes both Ar-40 and Ar-39 isotopes. A laboratory procedure is then applied to measure the ratio or fraction Ar-40/Ar-39 in the

sample. The resulting number is taken as a direct measure of the sample's age since it is proportional to the daughter/parent radioisotope ratio, $\text{Ar-40}/\text{Ar-39} = \text{Ar-40}/\text{K-40}$. One major advantage of this technique is that ratios of isotopes such as argon can be very precisely measured.

Another much-used isochron method is based solely on two stable isotopes of lead, lead-206 and lead 207. They result from the decay of the most abundant radioactive isotopes of uranium: $\text{U-238} \rightarrow \text{Pb-206} + 8\alpha + 6\beta$ $\text{U-235} \rightarrow \text{Pb-207} + 7\alpha + 4\beta$. This decay actually goes through a number of intermediate steps.

There are three basic assumptions in the radioisotope dating method. The first assumption is that the initial conditions of the sample are accurately known. This includes any daughter isotope atoms existing in rocks at their time of formation. Isochron plots may help to indicate the presence of such daughter isotopes. The second assumption is that we can tell whether or not the rock has exchanged atoms with the surrounding material during its history. Isochron plots may help in determining the closed or open nature of rocks. The third assumption is that the nuclear decay rate or half-life of the parent isotope has remained constant since the rock was formed. However, if the rate of decay has changed during the rock sample's history, similar to a clock that runs either fast or slow, the calculated radioisotope age would obviously be incorrect. Isochron methods are not sensitive to testing the correctness of this third assumption.

The Carbon-14 method is by far the most familiar radioisotope dating method. It also is distinguished from the other dating techniques because of its especially short time scale. The half-life of carbon-14 is 5,730 years, compared with millions or billions of years for the radioisotopes used in the other common methods. Also, instead of rock samples, carbon-14 dating usually is applied to the remains of once-living plants and animals — materials such as wood, charcoal, bone, shell, and fossils. Carbon-14 has found many applications which are of interest to biblical studies. A well-known example concerns the Dead Sea Scrolls, one of the most famous archaeological discoveries of all time. However, carbon-14 dating of the linen wrappings, a plant material, showed that the scrolls were between 150 b.c. and a.d. 70. This is more than 1,000 years older than other known Hebrew biblical texts. The ancient Dead Sea Scrolls demonstrate God's providence in preserving the accuracy of His Word throughout human history. Carbon -14 is found to be a friend of biblical creation rather than a foe. Any carbon-containing materials that are truly older than 100,000 years should be "carbon-14 dead" with C-14 levels below detection limits. This fact gives rise to a major challenge to the

long age assumption for rocks and fossils. A RATE review of the radiocarbon literature found many additional examples. These include carbon-14 in fossils, petrified wood, shells, whale bone, coal, oil, and natural gas. The resident carbon-14 content is also found in inorganic rocks and minerals including marble, graphite, and calcite. These samples are from all around the world and from all depths. The detected carbon-14 atoms simply should not exist in these "ancient" materials. Coal, for example, is an abundant fossil fuel consisting of buried vegetation, almost entirely composed of carbon. This Carbon 14 has been found in items that evolutionists have dating as being millions of years old. Is there any way that new carbon-14 atoms could possibly enter and contaminate materials which are truly ancient? Three suggestions to that question will be evaluated here. The first idea is that either the earth's atmosphere or moving groundwater somehow supplies old samples with new C-14 atoms. The second suggestion involves nuclear reactions in which outside neutrons enter samples and convert either nitrogen-14 or carbon-13 atoms directly to carbon-14. The third suggestion concerns heavy radioactive isotopes which exist in trace amounts in some samples. These include radium, thorium, and uranium atoms which can decay in several possible ways. A very small fraction of these decays produces carbon-14 atoms.

So how the carbon-14 findings might fit the young-earth view? One intriguing possibility involves the rock strata laid down by the global flood of Noah's day. During the pre-Flood centuries, the C-14 component of carbon was distributed uniformly throughout the earth's vegetation. This biomass then was rapidly buried and fossilized during the Flood which occurred about 4,500 years ago. The RATE team concludes that a key assumption used in obtaining these carbon-14 ages is not correct because the ratio of carbon-14 to total carbon was almost certainly less during pre-Flood times than it is today. Another factor is that a stronger geomagnetic field existed during pre-Flood history than exists at present. This early earth magnetism would deflect cosmic rays away from the earth more efficiently than today and would diminish the historical production of carbon-14. Together, these factors can easily decrease the calculated carbon-14 dates of coal and diamond samples tenfold, from 50,000 to just 5,000 years, a value consistent with Flood history. An alternative interpretation of the carbon-14 data is that the earth experienced a global flood catastrophe which laid down most of the rock strata and fossils. Also, many rates of change were accelerated in the recent past including sedimentary rock formation, erosion rates, and radioactive decay. Whatever the source of the carbon-14, its presence in nearly every sample tested worldwide is a strong

challenge to an ancient age. Carbon-14 data is now firmly on the side of the young-earth view of history.

In another similar situation of helium atoms residing where they should no longer exist, the helium was found deep underground within granite. One would expect the helium gas to eventually diffuse upward out of the ground and then disappear into the atmosphere. To everyone's surprise, however, large amounts of helium have been found trapped inside the zircons. Much of it appears to have gone nowhere. An initial suggestion was that the biotite mineral surrounding the zircon crystals might act as a barrier to keep the helium atoms trapped inside the embedded crystals indefinitely. Knowing the amount of helium present in the zircons, and assuming a given time scale, the expected value of diffusivity can be calculated for different temperatures. This requires detailed theoretical calculations which also were part of the RATE research. Mathematica software was utilized for the solution of the equations. In essence, the software divides the amount of helium lost at each temperature by the time during which it was lost. This time was either 6,000 years or 1.5 billion years depending on the model used. The lower level squares represent the predicted diffusion for the conventional long-age model. A very small helium diffusion value is required because the zircons are assumed to be 1.5 billion years old, yet they still possess considerable helium. In contrast, the young-earth model assumes a much shorter history for the zircons. One of the RATE's experiments calculated helium diffusion based on a time scale of just 6,000 years. Based on the measured helium retention, statistical analysis gives an estimated age for the zircons of $6,000 \pm 2,000$ years. This age agrees with literal biblical history and is about 250,000 times shorter than the conventional age of 1.5 billion years for the zircons. The conclusion is that helium diffusion data strongly supports the young-earth view of history. But some sceptics of the helium diffusion results have brought up the concept of closure temperature. The argument is that below a certain temperature, called closure, helium atoms do not have sufficient energy to escape the zircons. The bottom line is that closure temperature does not seal zircon crystals to helium loss and does not explain the measured helium retention in these crystals. But RATE also found that in the zircons a large fraction of the helium is generated by this same uranium decay. The RATE helium diffusion measurements show that such high concentrations of helium simply cannot be sustained for more than a few thousand years. The only way we can reconcile the observed amount of uranium decay with the observed levels of helium retention is with one or more periods of accelerated nuclear decay in the earth's recent past. We conclude that the RATE helium

diffusion experiments give strong evidence for accelerated decay of the uranium atoms inside zircon crystals, and a young age for the earth.

Radiohalos in Granite – Fingerprints from Radiation. The atoms within most solids, including rocks and minerals, are lined up in orderly arrays of rows, columns, and layers. When the decay of a radioactive atom such as uranium takes place inside a solid crystalline material, a permanent record may be left behind in the form of microscopic tracks of damage. Examples of radiation damage in crystals include radioactive halos, or radiohalos. The formation of a radiohalo requires a concentration of radioactivity called a radiocenter. This often occurs within igneous rocks as they solidify from molten magma. The radiohalo spheres are typically 10-40 microns in diameter. The halos typically occur in biotite, a mineral that easily breaks apart into thin sheets called cleavage planes. Radiohalos can form only within a solid crystalline structure since they are a record of defects or damage to the alignment of atoms. If radiohalos are observed in an igneous rock formation, they must have formed after the rock cooled and solidified. In addition, if the rock is reheated at a later time, the radiohalos will fade and disappear as the crystal atoms realign themselves and repair the crystal defects. There is an intriguing mystery involving radiohalos. It concerns those halos which result from the decay of three particular isotopes of the element polonium: The mystery is how the short-lived polonium atoms come to be embedded in crystalline rock without uranium atoms existing at the same location. How do these "parentless" or "orphan" halos originate? Radiohalos are important for RATE investigation since these crystal features provide visible information on the history of nuclear decay.

For several years there has been discussion and debate about the possible rapid movement of polonium atoms away from their uranium source within crystals. The presence of the short-lived polonium halos indicates that the magma cooled to solid rock very rapidly rather than over long ages as often assumed. The parentless polonium halos point to a young age for these rocks and for the earth exactly as Robert Gentry predicted years ago. Metamorphic rocks form underground when existing rocks are altered by high temperature, pressure, hydrothermal fluids, or chemical changes. Melting also occurs in extreme metamorphism. These factors change the rock's appearance and crystal structure.

Similar to radiohalos, fission tracks represent another permanent record of nuclear decay within crystalline solids. Dating of minerals by fission track counting is a widely used clock or geochronometer. To determine a sample's history, one first counts the number of tracks over a known surface area. This number is related to the length of time during which

the tracks have accumulated. Next, the number of remaining, un-decayed uranium-238 atoms within the sample is measured by one of several techniques. The counting of these induced tracks gives a measure of the concentration of U-238 atoms in the sample prior to irradiation. Knowing this total and the number of original fission tracks is somewhat equivalent to knowing the numbers of daughter atoms and remaining parent atoms. From this data an age can be determined for the sample. Induced fission tracks can be very numerous, often measuring in the tens of millions per square centimetre. The actual counting is done with a microscope over a much smaller area. The fission track data tells us several things. First, there is a wide spread fission track data in the RATE age results for the Middle Cambrian samples. The RATE ages actually fails to agree with previously published results, showing major disagreement or discordance. On the other hand, the Middle Cambrian results confirm that substantial spontaneous decay of uranium-238 that has occurred in these rocks. In fact, the previously published values indicate as much as 500 million years of decay. In the young-earth view, the Middle Cambrian rocks were deposited during the early stages of the Flood. This implies that greatly accelerated nuclear decay occurred at this time, including the spontaneous fission of uranium-238 to form the observed tracks. During the Flood there was also global tectonic activity occurring with associated heating effects which may have erased many fission tracks as well as radiohalos.

Fission tracks and radiohalos provide a visible microscopic record of nuclear decay in crystalline solids. In the young-earth view, these fingerprints give evidence for accelerated decay, especially during the Genesis flood event. In addition, the abundance of fission tracks and radiohalos provide evidence for a recent creation. This follows because the host rocks have not experienced serious heating since the track and halo formation. Just hundreds of degrees are sufficient to erase the crystal defects, yet they remain. It is difficult to imagine the rock formations remaining cool over vast ages of time with accompanying episodes of volcanic and tectonic activity. In the young-earth view, the radiohalos and tracks remain relatively recent and freshly made.

Discordant Radioisotopes Dates – Selectivity of Radioisotope Data: questions naturally arise for which answers are not readily available. For example, how and why were particular rock samples chosen for analysis and reporting? we all filter data through a grid of prior assumptions. This unavoidable bias in the selection and interpretation of data has been called the file drawer problem. That is, data which give unexpected or inconsistent results may be stored away in a file drawer for later investigation rather than being published. This

can occur in all disciplines, including geology, where the approximate age of a rock formation is assumed to correspond to its location in the geologic record. The results show clearly that discordance exists among the various radioisotope dating methods. This discordance is systematic and repeatable for rock samples from different geologic locations and settings.

Interestingly, once such rock unit, the Beartooth Mountains were dated previously at $2,790 \pm 35$ million years using rubidium-strontium isotopes (Wooden et al., 1982). Yet, there were several possible types of discordance in regards to this. Radioisotope dating results for mineral and whole rock samples from the Beartooth Mountains of Wyoming listed ages were based on isochron plots and were given in millions of years, ie, $2,011 = 2,011,000,000$ years. The ages are based on the uniformitarian assumption of unchanging nuclear decay rates in the past. The last column shows the type of data used for each isochron. Four categories of discordance were found, each based on the ages derived from isochron graphs: The age of the whole rock should be the average of that found for its component minerals. The second category of discordance occurs when the whole rock age is greater than that of its constituent minerals. Two or more discordant dates may result for minerals which have been separated from the same rock. In contrast to category two, a whole rock age may be less than that determined for the minerals taken from the same rock. There are several possible explanations for the discordant isotope dating results. Three major possibilities are given: first, there may be a mixing of isotopes between the magma and the rock body into which the magma intrudes. Second, it has been suggested that the separate minerals in a sill may solidify at significantly different times. Thus, one mineral may form and start to age, while other minerals remain molten with zero age until millions of years later. Such a process would indeed lead to discordance between mineral samples from the sill. However, there is no evidence that magma cooling and solidifying takes place at such an incredibly slow pace. The third possible reason for discordant dates is that the decay rates of the radioisotopes have been different in the past than they are today.

The Geological Record and Biblical History: As we have seen, there are multiple problems and uncertainties with the radioisotope ages of rocks. Nevertheless, there is a clear trend of relatively older rocks existing at deeper levels of strata. How does the young-earth view of history explain this upward trend of conventional ages in the earth's rock layers? The concept of accelerated nuclear decay provides a compelling answer. Consider a burst of nuclear decay, corresponding to several billions of years' worth of decay at present rates. This

occurs during the early part of the week of creation as the earth's original rocks are being formed. This affects the radioisotopes within the entire earth, including lower rocks which today are called basement rock. As a result, the original surface layer of the earth contains a large quantity of radioisotope daughter products. To a person with conventional assumptions of deep time, these decay products appear to imply an ancient age. RATE research further indicates that an additional accelerated decay episode then took place during the Genesis flood event which occurred about 1,500 years after the creation.

The Flood involved a period of intense geologic change on a global scale. Flood sediments, in some cases several miles in total thickness, were deposited during the year-long Flood. These sedimentary deposits generally cannot be directly dated by radioisotope methods. Instead, the ages are determined by magma which intrudes these sedimentary strata. It appears that volcanic rocks which intruded the lower layers contain more decay products than the volcanic rocks that intruded the upper layers. Thus, radioisotope dating methods generally give Paleozoic rocks older dates than rocks from the Mesozoic part of the record. The shallower strata represent sediments deposited later in the Flood. Their associated igneous intrusions have smaller amounts of decay products and hence yield younger ages. It appears that the radioisotopes in these rocks experienced a shorter period of accelerated nuclear decay. These results imply that accelerated decay likely persisted throughout the year of the Flood. The RATE research concludes that the primary explanation for the large amount of daughter products now present in the earth's rocks are two periods of highly accelerated nuclear decay, with about 90 percent of the total occurring during the early part of creation week and the remainder during the year of the Genesis flood.

Radioisotope dating of many rocks therefore includes some contribution of nuclear decay from the rocks themselves, and also from their near neighbours. This means that rocks are open systems to some degree and that they are not accurate clocks. Third, consistent trends in the dating results for alpha and beta decays indicate that nuclear half-lives have not always remained constant.

Theories of Accelerate Nuclear Decay: Over an eight-year period, the RATE team explored many aspects of radioisotope dating and the age of the earth. One fundamental conclusion is that radioactive half-lives have not remained constant throughout the earth's history. In particular, RATE research indicates nuclear decay was temporarily accelerated or speeded up on more than one occasion in the past. These suggested occasions are early during

the creation week and also during the year of the Genesis flood. The evidence for accelerated decay comes from several directions as described in previous chapters.

Some critics have argued that the young-earth viewpoint is a hindrance to scientific progress. They claim that belief in biblical creation returns us to the dark ages of naïve, pre-scientific, and false views of natural history. However, such claims are mistaken. The questioning of radioisotope dating and the geologic time scale neither stifles inquiry nor hinders scientific progress. Instead, it serves the healthy purpose of uncovering assumptions and bias. It is known that the alpha decay process is very sensitive to the depth and radius of the nuclear potential well. For this reason, nuclei which decay by alpha emission have a vast range of half-lives, extending from microseconds to trillions of years. The range is more than 23 orders of magnitude, or one followed by 23 zeros. This is an example of an unusually large range for a measured physical quantity, similar to the atomic diffusion values discussed.

String Theory: Other current fields of scientific research include even more abstract concepts than nuclear potential wells and quantum theory. One such field is string theory and its newer variations called superstring and m-theories. These are mathematical attempts to describe the building blocks of matter on the smallest possible scale. String theory suggests that all matter consists of vibrating loops of energy which are trillions of times smaller than atoms, electrons, and other elementary particles. String theory is of special interest because its accompanying mathematics is both elegant and consistent. This is always found to be the case when mathematics correctly describes parts of the physical universe. The mathematics of string theory also has the potential to unify the distinct forces in nature, including a quantum theory of gravity. This long-sought unification would bring together several concepts of physics into one explanation, theory, or equation. String theory may or may not be the key to this deeper understanding of creation. So far, there is no direct experimental evidence to validate string theory. One might say that mathematics is the very language of creation. While this precise language is elegant and insightful, it also can be exceedingly complex. The extra space dimensions, if they indeed exist, are not accessible to our everyday world. They are said to be confined to an incredibly small size. That is, they are tightly curled up into "manifolds" and they remain entirely invisible to our everyday world. String theory shows a direct connection between the size or radius of these hidden dimensions and a particular constant of nature called the fermi constant. If string theory turns out to be a correct description of nature, then we may have a mathematical model that could account for an acceleration of the beta form of nuclear decay. For example, such a model could explore small, temporary adjustments of

unseen dimensions, perhaps by the direct hand of the Creator. This might alter the fermi constant and in turn, adjust nuclear decay rates significantly. There are several "ifs" in this exploration of accelerated decay and it is presented here only as an example of ongoing research. String theory is highly abstract to be sure, but it has opened up many new avenues of research.

The Precambrian rocks of the earth are largely without fossils. This suggests that much Precambrian rock represents the original created crust of the earth. The Precambrian record encompasses some 88 percent of the conventional time-line of earth history, or about 4 billion years. Some might object the idea that nuclear decay should logically be the result of the Curse, or the Fall of mankind, as described in Genesis 3. If so, then nuclear decay could exist only after this point in history. However, nuclear activity cannot automatically be ruled out during the time prior to the Curse. Indeed, there is no obvious connection between the Curse and nuclear processes. On the other hand, there is abundant evidence for a significant episode of accelerated decay during the Genesis flood event. The Flood included an unprecedented period of global tectonics, erosion, and rapid rock-forming processes. The rocks resulting from this catastrophic event give clear evidence of nuclear decay with resulting daughter products, radiohalos, and fission tracks. The vast majority of the rock strata above the Precambrian level are considered by many creationists to represent Flood deposits. In the conventional time scale, the Paleozoic and Mesozoic eras alone span more than four hundred million years. Radiation that accompanies rapid nuclear decay is of immediate concern to creatures living on the earth at the time of its occurrence. This includes Noah and his family during the Flood event. The barrier of flood waters may have provided a measure of protection from underground radiation.

The Genesis Account of Creation: The original Hebrew, Aramaic, and Greek text of Scripture includes a rich variety of literature. These forms include historical narrative, poetry, law, apocalyptic writings, and letters. Of special interest to the study of earth history is the proper interpretation of the Genesis creation account. The details of creation are recorded in the 34 verses of Genesis 1:1-2:3. Over the years there has been much discussion and debate over the meaning of this passage, and three distinct views have surfaced. First, some readers of Genesis assume that the book is an outdated, pre-scientific document which is riddled with errors and is simply wrong. Genesis is said to be just one of many mythical stories from the distant past. Clearly, this view does not recognize Scripture as uniquely inspired by the Creator. In the second approach to Genesis, the creation passage is seen as a form of poetry

which should not be read as literal history. It is said to convey a sense of truth about origins, but it is not a literal description of actual events. The days of creation may represent long geologic periods in deep time. That is, the biblical creation week is a figurative expression for gradual changes which occurred on the earth, perhaps millions or billions of years ago. The third view takes the creation account as literal narrative history. The Book of Genesis describes the supernatural, literal creation week with 24-hour days. Certainly God could have created the physical universe in just six microseconds, or in contrast, over a span of trillions of years. It is clear, however, that the six-day period is a pattern established for the benefit of humanity. In fact, these six days, plus the day of rest, give rise to our calendar system with its seven-day week. Narratives are defined as telling a factual story, with three general elements. The first element is the setting which gives the time, place, and circumstances of the unfolding story. The second element includes the set of characters that are part of the story. The third element is the sequence of events that comprise the story plot. Biblical Hebrew poetry also has several defining features which help identify it. First, some of the oldest available manuscripts have passages which are organized and labelled as verse. Examples include the Balaam Oracles (Num. 23), the Song of Deborah and Barak (Judg. 5), the Song of David (2 Sam. 22), Psalm 119, and Psalm 136. A second trait of poetry is its distinct style. Hebrew poetry does not necessarily possess meter or rhyme. It often includes similar sounds and arrangements of words, parallelism of thoughts (Prov. 30:18-19), symmetry, balance, and brevity. Poems are highly structured literature which offers profound ideas. A third distinction of poetry is its goal to engage the reader's five senses and emotions. The poet wants the reader to hear, see, smell, taste, and also to feel the experience. As helpful as these descriptions are, the nature of poetry and narrative is still debated.

By application of the preceding criteria for narratives and poetry, it is possible to categorize biblical texts. The particular language feature chosen for this study was the relative distribution of finite verbs. The finite verbs are those defined as having different forms or inflections for person (I, you, he, they), gender (masculine, feminine), and number (singular, plural). There are four finite verb forms in biblical Hebrew. These are given the names preterite, imperfect, perfect, and waw-perfect. Each describes a particular type of action. The finite verbs in Scripture are well suited for technical analysis. Because they are a countable feature, statistical methods can be applied. Also, finite verbs are at the heart of any text because they reflect the main action of the character(s) or their movement through time. Biblical authors wrote texts under the inspiration of the Holy Spirit according to 2 Timothy

3:16 and 2 Peter 1:19-21. The language they chose, including the verbs, shaped the intended meaning. Whether an author wanted the text to be treated as poetry or narrative was evident to the original readers. Today, it is possible to determine this intended meaning by a careful study of its linguistic features. Several historical events in the Old Testament are written in both the narrative and poetic styles of literature. These are called paired texts and they provide an excellent opportunity for the comparison of verb use. Genesis 1:1-5 closely fits the pattern of narrative structure. In contrast, Psalm 104 is a poetic account of creation with a majority of imperfect finite verbs. The Flood account, covering Genesis 6-9, adheres to the historical narrative pattern. One final passage, Psalm 105, gives a narrative history of Israel. In each of these cases there is a consistent pattern of preterite and imperfect verb usage. A survey of the entire Old Testament identified 295 narrative and 227 poetic texts for a total of 522 distinct texts. Hebrew verbs have several parts, including root, stem, person, gender, and number. Altogether, a total of some 9,903 verbs were counted and categorized in the 522 texts. Of these total verbs, 2,099 were identified as the finite variety. The first five Old Testament books are called the Pentateuch, the Law, or Torah. The second division includes the Prophets with 21 books, further subdivided into the Former Prophets and Latter Prophets. The third major division includes the Writings with 13 books. Consider the narrative passage Genesis 31, the story of Laban. This text has 70 preterite verbs out of a total of 153 finite verbs. Verb usage places the non-poetic passage Exodus 33 in the poetry category. Ezekiel 19 is neither narrative nor poetry, but instead is in a specialized category called apocalyptic. This shows the preterite verb ratio for the passage in question, Genesis 1:1-5. Clearly, the creation account falls in the narrative category. A statistical technique called logistic regression was next applied to the 97 selected texts. Logistic regression is useful in making predictions when there are just two choices involved. In our case, the technique predicts the probability that an unknown text is a narrative, given its distribution of preterites. The result is that Genesis 1:1-5 is statistically classified as narrative with a probability of 0.9999. This value, virtually one, shows an extraordinary level of confidence. The biblical creation account clearly is not poetry but instead is a literal description in real time of supernatural events. The RATE research shows that the Genesis creation account is clearly written as narrative literature. However, critics may still claim that Genesis and the rest of the Old Testament contain non-literal stories of history. To counter this challenge, consider three distinct features of Old Testament narratives in general. They verify that the biblical authors of narrative portrayed real historical events. The features are adapted from the book by Meir

Sternberg (1985). Detailed genealogies are given. Adam's genealogy up through Noah is listed in Genesis 5. Genesis 11 then continues this genealogy from Noah to Abraham. God's people are defined in terms of their past history. For example, Abraham is commanded to leave his home country and to launch a new nation (Gen. 12). The past is often reviewed and summarized. Job 38:41 describes many details of the original and the present-day creation. Also, Jeremiah 2:113 examines God's dealings with Israel over time.

The Meaning of Genesis 1:12:3: The distribution of finite verbs in Hebrew narrative writing differs distinctly from that used in poetry. Moreover, statistical analysis categorizes biblical texts as narrative or poetry to a high level of accuracy. Genesis 1:12:3 is determined to be narrative with a probability of virtually one. There follows several major implications from this. First, it is not statistically defensible to interpret this passage as poetry or metaphor. Second, since it is clearly narrative, it should be read as other Hebrew narratives are intended to be read. That is, the creation account describes actually events which carry an unmistakable theological message. Third, when it is read as narrative, there is only one tenable view: God created everything during six literal days. This is surely the plain, direct intention of the text. Furthermore, the unchanging Scripture message has priority over all transient models of earth history.

So, one principle agreed on by all the RATE members is that the earth is young, on the order of 6,000 years old. This is not simply a working hypothesis to be tested as to whether it is true or false. Instead, it is a basic conclusion drawn from the biblical record of creation as written by the only One who was present, God himself. A second guiding principle the RATE team realized from the start is that a large amount of nuclear decay has taken place in the past. This history of radioactive decay is amply demonstrated by accumulated daughter decay products in close association with their parent isotopes in many earth materials. There are also vast numbers of defects caused by nuclear decay in crystalline rocks, including radiohalos and fission tracks. We assume that the earth was not created with an appearance of age at this microscopic level of detail.

The following conclusions are made regarding the above information:

1. Carbon-14 atoms are found where they are not expected. With a half-life of 5,730 years, C-14 should no longer exist within 'ancient' fossils, carbonate rocks, or coal. Yet small quantities are indeed found on a worldwide scale. This evidence supports a limited age for the earth.

2. The New Mexico zircons studied by the RATE team have a radioisotope age of 1.5 billion years. If this were true, then the internal helium atoms should long ago have escaped from the zircons. Instead, however, the RATE scientists and other find high concentrations of helium still present inside the zircon crystals.
3. Radiohalos are tiny spherical defects in rocks. They result from the decay of clusters of radioactive atoms, mainly uranium and polonium. The frequent occurrence of these halos in rocks is evidence for widespread nuclear decay. These are present in abundance in granites whose formation accompanied the Genesis flood. This indicates that a large-scale acceleration of nuclear decay occurred during the year-long Flood event.
4. Many rock units worldwide were analysed by radioisotope dating techniques. These experiments include the parent-daughter isotopes potassium-argon, rubidium-strontium, samarium-neodymium, and also the lead-lead method. The efforts gave fresh data on apparent ages and their consistency. Some examples of concordance, or agreement in age were found, while many other examples showed discordance, or disagreement. In fact, both extremes often occurred for the same rock unit.
5. There are three important assumptions made in radioisotope dating. Each of them has been addressed and found to be subject to failure. The first is that the initial conditions of rock sample can be determined accurately. This is challenged by the many discordant isochron dates. Ancient dates are often obtained for volcanic rocks known to be very recent in origin. The second assumption is that the open or closed nature of rock sample can be determined and quantified. There are frequent indications of the mixing of mantle and crustal isotopes with rock samples. Also polonium radiohalos show the movement of isotopes through rocks and minerals by hydrothermal transport. The third assumption is that nuclear half-lives have remained constant throughout history. This assumption is countered by the unexpected helium found in 'ancient' zircons. Also there are abundant radiohalos and fission tracks in rocks which were rapidly deposited during the Flood.
6. The concept of accelerated decay arises many times in the RATE work. It is the logical inference of placing millions or billions of years' worth of nuclear decay, at present rates, into a short time frame. The episodes of increased nuclear activity appear to have occurred during the creation week and also during the flood of Noah's day. The evidences for vast amounts of decay include the abundance of nuclear decay products, high concentrations of helium atoms residing in zircon crystals, radiohalos, and fission tracks.

7. The RATE radioisotope dating measurements also contribute information regarding accelerated nuclear decay. These measurements reveal two distinct trends. First, the isotope which decay by alpha particle emission tend to give older dates than the isotopes which undergo beta decay. Second, heavier isotopes tend to give older dates than lighter isotopes. Neither of these trends should exist if the radioisotopes have had constant half-lives and accurately measure the ages of rocks. This decay information may provide useful clues to understanding the mechanisms responsible for accelerated nuclear decay.

8. The linguistic studies of Genesis 1:12:3 likewise support a recent creation. This research shows that biblical texts may be identified as either narrative or poetry with a high degree of confidence, based on the Hebrew verb forms used by the authors. The distribution of finite verbs in numerous Old Testament narrative and poetic passages were analysed. The Genesis creation story is found to be a narrative account describing literal historical events. This conclusion challenges all efforts to explain away the early chapters of Genesis as non-literal poetry, metaphor, or allegory. The research also contradicts the currently popular idea that the Genesis account describes the big-bang theory in pre-scientific terms.

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