CHAPTER 12 - Age of the Earth

We have seen in examining several major types of fossils that the characteristics of the fossil record fit much more easily with the concept of initial complexity (creation) rather than initial disorganization (evolution).

Visual #12-1

From a scientific perspective, it really does not matter how long ago the process of creation was. From a Christian perspective, a much more important question is:

When did death enter the world?

Visual #12-2

The Bible tells us in many places (Romans 5:12-21, I Corinthians 15:21-22, 45-49) that the first Adam brought sin and death into the world and so sin and death spread to all mankind. Before he sinned, animals were to eat only plants, not each other (Gen. 1:29-30). Even the ground was cursed for his sake (Gen. 3:17-19). As a result, all of creation was made subject to vanity (Rom. 8:19 -

Visual #12-3

20). There will one day be a restoration to pre-Adamic conditions in which animals are not killing each other (Isa. 11:6-9).

Because we are all descended from Adam, we are all fallen beings who need a Savior. Jesus, the "last Adam," came to undo what the first Adam did. Adam brought sin and death; Jesus came to bring righteousness and resurrection to all who will receive Him (). If there was no *first* Adam who brought sin and death into the world, what do we need a *last* Adam for? For a Christian, then, the question of when death entered the world – and indirectly, the age of the earth – is crucially important.

Visual #12-4

- Evolution holds that for eons of time our pre-human ancestors were developing into more and more evolved forms as they survived a process of struggle and competition for resources. Those that were not as fit died; those that were more fit evolved. The driving force in the evolution of humans was struggle and death. That is, struggle and death caused man.
- The Bible tells us exactly the opposite: that humans were directly responsible for bringing struggle and death into the world. That is, man caused struggle and death.

You can't have it both ways.

I. HISTORICAL BELIEFS ABOUT THE AGE OF THE EARTH.

Visual #12-5

Many ancient cultures, most notably Greeks such as Aristotle, believed that the earth has existed for an extremely long time, perhaps forever. (Though the Greeks believed Zeus was the chief god at their time, they did not believe that he had created the earth. That happened some time in the unknown past.) Similarly, modern-day evolutionists who are committed to explaining everything by purely natural processes have no choice but to believe that the universe and earth are billions of years old.

Genesis contradicts this belief. Though the Bible does not tell us exactly how old the earth is, it gives us clues that its age should be measured in thousands of years, not billions. For instance:

Visual #12-6

- Depending on the context, the Hebrew word "yom" used for each of the days in the creation week can mean either a 24 hour day, the daylight portion of a day, or an indefinite period of time. Every time throughout the Old Testament that *yom* is used with a number (over 350 times outside Genesis Chapter 1) it always means a 24 hour day. This is the way it appears in the Creation account. The Author who inspired Moses to write Genesis obviously meant to say that these were literal 24 hour days.

Visual #12-7

- The Ten Commandments reiterate that "In six days the LORD made heaven and earth, the sea, and all that in them [is]..." (Exod. 20:11). "All that in them is" includes everything in the physical universe, even the atoms that compose it. The earth could not have begun to exist millions of years before the beginning of Day One of the creation week.

Visual #12-8

- The days themselves could not have been millions of years. Plants were created on Day Three, the sun on Day Four, and insects on Day Five. If the period between Day Three and Day Four was much longer than a few weeks, the plants would have become extinct for lack of sunlight. Likewise, the plants would have had to go for millions of years without insects to pollinate them so that they could reproduce. They would have died out within just a few years.

Visual #12-9

- If we accept that the human race is only six days younger than the earth and simply add up the genealogies in Genesis, we have to conclude that the earth is something less than ten thousand years old.

Visual #12-10

Not all Christians through the ages have accepted the Bible at face value. For example, in the 1200s the influential theologian Thomas Aquinas accepted the Aristotelian idea of an ancient earth. Many in the centuries since have followed his lead, among whom was Georges de Buffon in the 1700s. Buffon was one of the first to propose the idea that each of the days of Genesis was actually a great expanse of time. Georges Cuvier, considered one of the founders of paleontology, built on this idea. He interpreted the rock strata as catastrophic deposits left by a number of successive worldwide floods, including Noah's Flood as the most recent catastrophe.

James Hutton, a contemporary of Cuvier, laid the groundwork for Darwinism when he rejected Cuvier's idea of successive catastrophes. In 1785 Hutton proposed the idea of uniformitarianism, the concept that presently observed processes are sufficient to explain the geologic features from the distant past. In the 1830s Charles Lyell expanded on Hutton's works.

Visual #12-11

Finally, Darwin drew heavily on Lyell's writings to justify the time needed for evolution to occur.

Ever since Darwin, skeptics have tried to place the burden of proof on creationists by asking where the evidence for a young earth is. They try to hide the fact that evidence is not "for" one side or the other, but must be interpreted. Both sides look at exactly the same evidence, whether a fossil or the light from a distant star. The difference is in what we do with that evidence. Each side interprets it according to our presuppositions.

Visual #12-12

Since both sides are looking at the same evidence, there is no "magic bullet" capable of instantly persuading either evolutionists or creationists that they are wrong about how old the earth is. Instead, we can use a principle of logic known as Occam's Razor: the simplest explanation that fits all the facts is probably the best. We can determine which belief fits the facts best by examining as many arguments as possible on each side. The more direct observation and the fewer the assumptions for either side, the stronger its case.

Christians who believe the earth is only a few thousand years old do so primarily for Scriptural reasons and look to science for support.

II. ARGUMENTS FOR AN OLD EARTH.

Visual #12-13

On the other hand, there are three main reasons people believe the earth is billions of years old.

1. Belief that it takes millions of years to form ***fossils***.
2. ***Geologic Features*** such as the Grand Canyon and the Geologic Column are supposed to have taken hundreds of millions or billions of years to form. Other features such as salt domes and coral reefs are supposed to have taken hundreds of thousands of years, far too long to fit into a Biblical time frame.

THE GEOLOGIC COLUMN

ERA	PERIOD	EPOCH	Beginning (Years Ago)
Cenozoic	Quaternary	Holocene (Recent)	10,000
		Pleistocene	1.8 million
		Pliocene	5.3 million
	Neogene	Miocene	23.8 million
		Oligocene	33.7 million
	Paleogene	Eocene	54.8 million
	(Tertiary)	Paleocene	65 million
Mesozoic	Cretaceous		144 million
	Jurassic		206 million
	Triassic		248 million
Paleozoic	Permian		290 million
	Pennsylvanian		323 million } CARBON-
	Mississippian		354 million } IFEROUS
	Devonian		417 million
	Silurian		443 million
	Ordovician		490 million
	Cambrian		543 million
Precambrian	Ediacaran		650 million

(Univ. of Calif. Museum of Paleontology)

Pre-Cambrian rocks include anything said to be older than about 543 million years. Since this division contains few fossils, we will consider it only in the cases where the fossils it does contain are important to the creation/evolution controversy.

Visual #12-14

Though it is not shown on every version of the geologic column, the accepted value for the absolute age of the earth is about 4.55 billion years. The age comes from a study done by geochemist Clair Patterson in 1953. He used the ratio of uranium to lead in the Canyon Diablo meteorite (believed to have blasted out Meteor Crater in Arizona) to calculate its age at 4.55 billion years (Patterson, 1956). He then assumed that all the parts of the solar system formed at the same time so the earth must be the same age. Ever since then, the calculated age of this single meteorite has been accepted as the age of the earth. If is incorrect, then so is every date based on it.

3. Belief that ***radiometric dating*** is a reliable way to determine the dates of prehistoric objects and events. Arguments for great age include the fact that no known radioactive isotopes supposed to have been present since the beginning have half-lives measured in less than millions of years. (More on radioactive dating and half-lives later in this chapter.)

III. RESPONSE TO OLD-EARTH ARGUMENTS.

A. HOW ARE FOSSILS FORMED?

The geologic column is made up of rock composed of water-laid sediment. It is obvious that extinction of various types of creatures has occurred on a massive scale in the past. At least hundreds of billions of plants and animals are preserved as fossils. How did this happen?

1. UNIFORMITARIANISM.

Uniformitarianism (evolution) says that animals or plants became fossils when they died in or near bodies of water, then sank to the bottom and were covered by sediment. Over millions of years, the chemicals in their carcasses dissolved and were replaced by hard minerals. Eventually, they turned into fossils. Finally, geologic events and erosion brought them to the surface again.

Some problems with this scenario:

a. Need for Rapid Burial.

Suppose an animal dies and falls into a lake. We know from observation that the carcass will decay or be eaten unless it is quickly removed from contact with oxygen and hungry scavengers. It must be buried quickly, not slowly.

b. Large-Scale Fossil Formation.

We do not see large-scale fossilization occurring by slow, gradual processes today. We only see things turning into fossils after rapid, catastrophic events such as volcanic eruptions. However, in the fossil record we find a great many enormous mass fossil deposits. Three examples personally visited by the author:

(1) The Lance Creek Formation of Wyoming, in which an estimated 34,000 *Edmontosaurus* skeletons are buried in water-deposited sediment,

(2) The Redwall Limestone at the Grand Canyon, with a fossil deposit estimated at several billion nautiloids (also in water-laid sediment), and

(3) The Karoo Supergroup of South Africa, believed to contain hundreds of billions of vertebrate fossils (also in water-deposited sediment)

as well as hundreds of other mass fossil graveyards around the world.

2. CATASTROPHISM (CREATION).

Visual #12-15

Catastrophism says that most of the fossil record was produced in one or more massive catastrophes, perhaps even on a worldwide scale, when great numbers of animals and plants were buried rapidly. This would imply that they were buried quickly in mineral-rich sediment, which subjected them to a great deal of heat and pressure.

If uniformitarianism is correct, the process would far exceed the lifetime of any human observer. If catastrophism is correct, we have no way to test it on a worldwide scale. However, we can look at present events on a small scale to see which idea fits better with what we can observe. As noted earlier:

- Researchers have been able to turn chicken bones into mineralized fossils in five to ten years under laboratory conditions. In some cases, experiments on bones, beetles, and resin have cut the time needed down to about a single day.
- Lab experiments under high pressure and temperature conditions have converted cow manure to a good grade of crude oil in twenty minutes, not millions of years.
- It does not take a great deal of time for objects to become completely encrusted in minerals. A prime example are spark plugs used as fishing sinkers in the harbor in Durban, South Africa. Sometimes the lines break and the spark plugs are left on the bottom. The water has such a high concentration of minerals that they become coated and look like fossils in just a few years.

It is clear that fossils do not require millions of years to form.

B. GEOLOGIC FEATURES.

The basic premise of this book, that the Bible is the Word of God, takes for granted that the passages that deal with Noah's Flood came from God. One such passage is 2 Peter 3: 3 - 6, which warns us about deception in the last days:

Visual #12-16

"…scoffers will come in the last days with scoffing, following their own passions and saying, "Where is the promise of his coming? For ever since the fathers fell asleep, all things have continued as they were from the beginning of creation. They deliberately ignore this fact, that by the word of God heavens existed long ago, and an earth formed out of water and by means of water, through which the world that then existed was deluged with water and perished." (RSV)

The Holy Spirit warned us almost 2,000 years ago that in the last days people would deny

that there has ever been a worldwide Flood.

1. STRATA IDENTIFIED BY SUITES OF FOSSILS.

Visual #12-17

It cannot be emphasized strongly enough that each geologic stratum is assigned an age determined not by radiometric dating, but by the characteristic suite of fossils it contains. Since the simplest fossils would have had to evolve before the more complex, they are assumed to be the oldest. The geologic column has therefore been arranged with the fossils that seem to be simplest at the bottom and the most complex on top.

Many of the strata in the geologic column were named by young-earth creationists centuries ago. Multimillion year ages were added later, based on the assumption that evolution had occurred.

Derek V. Ager, past President of the British Geological Association, underscores this fact. A highly respected geologist and staunch evolutionist, he tells us that he "can think of no cases of radioactive decay being used to date fossils," and that fossils "have been and still are the best and most accurate method of dating and correlating the rocks in which they occur" (Ager, 1983, 425). He confirms that the age assigned to a rock layer (its *stratigraphic* age) is not determined by any testable radioactive method. Geologists identify each layer (Cambrian, Ordovician, Devonian, etc.) by a clearly defined suite of fossils that is essentially the same no matter where in the world we find it.

The clearly defined suites are difficult to reconcile with evolution. Since different types from amoebas all the way up to humans would have had to evolve at different rates in different places at different times, there should be no worldwide pattern of clearly defined communities of fossils. Yet this is precisely how we identify the "age" to which a rock belongs.

The geologic column is divided into only a few dozen eras, periods, and epochs. Only a few of the names even hint at anything to do with time. Most are derived from the places where the suite of fossils was first identified.

- The first fossils designated Cambrian were found in Wales, which in Latin is "Cambria."
- Ordovician fossils were first identified in the area of England where a tribe known as the Ordovices used to live.
- Silurian fossils were first found in the area once occupied by the ancient Silures on the border of England and Wales.
- Devonian fossils were first found near Devonshire, England.
- Mississippian and Pennsylvanian fossils were first identified in those two states. Outside the United States, the two strata together are often called Carboniferous because of the high carbon content of some of their most common fossils, coal and oil.
- Permian fossils were first found near the Russian city of Perm.
- Triassic strata are so named because geologists divided the rocks in Germany into three distinct strata.
- Jurassic rocks were named for the Jura Mountains of Europe.
- Cretaceous rocks are characterized by a high concentration of calcium carbonate, or chalk. "Creta" is the Latin word for chalk.

The strata whose names end in "-cene" (Greek for "recent") are the only ones whose names are supposed to have anything to do with time. They are identified by the modern type fossils they contain. From lowest to highest on the column, the names mean "old recent," "dawn of recent," "scant recent," "middle recent," "more recent," "most recent," and "complete recent." These names were assigned because of geologists' belief in

evolution. The process of assigning ages was essentially complete by the time radioactivity was discovered in the late 1800s.

2. UNIFORMITARIAN BASIS OF THE GEOLOGIC COLUMN.

The 4.5 billion year geologic time scale is based on denying that there was ever a worldwide Flood. It assumes that the strata were laid down by uniformitarian processes, slowly and gradually at uniform rates in accordance with the "Law of Superposition." This was first proposed by Nicholas Steno in the 1600s and says that in undisturbed rock strata, the lower the rock, the older it is.

The so-called "Law of Superposition" has been falsified. The principle seems to work when the water carrying sediment is not moving. However, if the sediment-laden water is flowing, the results are quite different from what Stenon expected.

- On a large scale: The 1980 eruption of Mt. St. Helens and the subsequent mud flows deposited hundreds of feet of finely laminated strata over the space of just a few days. All the strata were the same age, rather than tens of thousands of years apart. Later mudflows carved out a network of canyons hundreds of feet deep through the sediment in a mater of days rather than hundreds of thousands of years.
- On a much smaller scale: Lab experiments by Guy Berthault and Pierre Julien at the University of Colorado show that flowing sediment forms layers that look just like those formed by quiet sediment, except that the ones on the bottom are NOT necessarily the oldest. The layers form in the direction the current flows. The oldest strata may be at the left or right rather than the bottom.

As noted earlier, the single most complete portion of the column is found at the Grand Canyon, which includes rock strata from the Precambrian, Cambrian, Devonian, Mississippian, Pennsylvanian, and Permian. However, the layers at the Canyon skip past the Ordovician and Silurian, which should be between the Cambrian and the Devonian. This represents a gap of at least 70 million years.

This is an excellent example of an *unconformity*, a place where there is supposed to be a time gap from one layer to another. However, it is not a rare example. Every layer is distinguished from the ones below and above by characteristic suites of fossils. The change from any rock layer to one with a different suite of fossils is itself an unconformity.

Not only are there many places where supposed intermediate strata are missing, but there are also hundreds of well-documented cases around the world where strata occur in the wrong order, that is, those that are supposed to be older are on top of those considered younger.

3. ORIGIN OF LIFE AND THE STRATIGRAPHIC LEVEL OF FOSSILS SUPPOSED TO BE OLDEST.

Visual #12-18

Almost all evolutionists accept some variant of the Oparin-Haldane Hypothesis (see Chapter 7) for the origin of life. They believe that a mixture of gases containing the elements needed for life (Carbon, Hydrogen, Nitrogen, Oxygen, Phosphorus, Sulfur and perhaps others) must have been exposed to some energy source that enabled them to come together into amino acids, proteins, and cells. They also generally believe that this process took place somewhere around sea level – as Darwin put it, in some "warm little pond." If this is the case, the very first life began at sea level billions of years ago.

A glaring difficulty with this scenario is that the "oldest" fossils, those of the Archaeozoic (dated a billion years or older), are bottom-dwelling sea creatures. If evolution is correct, then the first organisms (1) came alive at sea level, (2) swam miles down to the bottom of the ocean, (3) then began to evolve higher and higher in the

geologic column until they got back to sea level and beyond. How did they survive the original dive from sea level to the bottom?

C. BIBLICAL CREATION / FLOOD MODEL.

Though the complete geologic column is not found in nature, the overall sequence in places where multiple strata occur is more or less consistent around the world. If the strata do not show evolution, what is the creationist explanation?

1. MUD FLOWS/MUDSLIDES.

Visual #12-19

The Flood was not some tranquil event with water rising gently due to a steady rain. It was the most violent upheaval in the history of the world. In fact, it is the only event for which the Greek word "cataclysm" and the Hebrew "mabbul" are used.

When the Bible says the "windows of heaven were opened," it probably includes not just intense rain, but also impacts from heavenly bodies such as meteorites. The opening of the "fountains of the great deep" probably indicates both that the sea floor broke apart and that there were countless volcanic eruptions.

The opening of the sea floors would churn up vast amounts of sediment, which would now be free to inundate large undersea areas. At higher elevations, the rising waters would pulverize higher ground and lead to mudslides. In addition, many intense rainfalls and volcanoes have produced mudslides that buried large areas or even entire communities in a matter of hours. For instance:

Visual #12-20

- The 1980 eruption of Mount St. Helens produced mudflows that buried 23 square miles on the North Fork of the Toutle River to a depth of up to 600 ft (180 meters) in a single day (Morris & Austin, 2003, 74);
- A 1985 mudflow at Armero, Colombia buried an entire valley and killed 23,000;
- A 2000 mudslide at Vargas, Venezuela buried most of the city and killed 30,000 (Dillinger, 2019);
- A 2010 landslide in Drugchu County, Tibet deposited over a hundred feet of sediment in a few hours (Intl. Campaign for Tibet, 2013).

Imagine the effects if this sort of process were to continue for weeks, as it would have in the Flood.

2. EFFECTS OF TECTONICS AND TIDES.

For at least the first few weeks, the Flood probably did not rise steadily. There would have been surges during which the waters rose and retreated due to processes such as the breaking apart of the original continent's tectonic plates, which had to move thousands of miles until they were close to the present arrangement of the earth's surface.

Visual #12-21

Along the way, they would have repeatedly become wedged together. Baumgardner (2018) believes the stress from the land masses behind them pushing them together would have caused the boundaries to snap back hundreds or thousands of times, giving rise to a great many underwater tsunamis. Each would have carried enormous masses of sediment far away from its original location. The plants and animals that previously lived where the sediment came from would have been carried along with it in mud flows similar to *turbidites*, large flows of sediment that stay together as they move great distances at relatively high speed. The process would have repeated over and over as the plates continued to interact.

Visual #12-22

> (Note: Baumgardner is the author of the "Terra" program used by geologists around the world to model the motion of the earth's tectonic plates. Few realize that the computer program they use was written by a young-earth creationist.)

Though we cannot perform tests to confirm the idea, it seems likely that tides might

Visual #12-23

also have had some lesser effects on sedimentation. The earth experiences high and low tides about twice a day because the earth rotates under the moon about every 24 hours and 50 minutes. As it does, the moon's gravity pulls the oceans from east to west until the water hits the shore and produces a high tide. The land stops the water from going any farther. After the earth has turned far enough under the moon, the water flows back and produces a low tide.

At the beginning of the flood there were still continental boundaries and thus tides. However, by day 40 of the Flood, the original super continent was completely submerged. Though there might have been underwater mountains and hills, there would have been no more shore to stop the flow of ocean water. Any sediment churned up would have been free to move great distances before being deposited. The large scale movement could have had significant effects on the geologic column we see today.

3. BIOME SUCCESSION.

Visual #12-24

In contrast to uniformitarian geology, young-earth creationists generally believe that the contents of the strata represent ecological communities or *biomes* preserved in the order in which they were buried.

> We cannot be sure that a group of fossilized animals and plants lived together or even died together, only that they were buried together.

In cases where one biome is found on top of another, the burial would usually be in the same relative order above the sea floor in which they previously lived, though there could be many exceptions due to violent water and geologic action during the Flood. As a result, we would expect the fossil record to show an overall pattern of biome succession. At the very lowest level we should find ocean bottom dwelling creatures, with each higher layer containing a biome that normally lived closer to the surface of the sea, then at higher and higher elevations above sea level.

Visual #12-25

A 1988 article in *National Geographic* (Eugenie Clark, "Down the Cayman Wall," November, pp. 712-730) illustrates the existence of ecological communities in the world today. Less than half a mile off the coast of Grand Cayman Island in the Caribbean is a sharp drop-off known as the Cayman Wall. On it are four distinct ecological communities: the reef, 0-200 feet; "the wall," 200-600 feet; "the haystacks," 600-1000 feet, and the deep, 1000 feet and below. Each zone contains a distinct community of interdependent animals and plants. If the region were instantly frozen and then dug up by paleontologists in a thousand years, they might think it represented four time periods. After all, the occupants seem more and more complex and advanced as they near the surface. However, we know better. These are four ecological communities stacked up in much the same type of arrangement we see in the fossil record. Each community is well suited to its particular environment, with little blending between them. The bottom to top sequence of the four biomes is reminiscent of the bottom to top sequence of Cambrian, Ordovician, and Silurian.

Visual #12-26

The same holds true on land. For instance, in the state of Colorado alone there are at least eight distinct interdependent communities of animals and plants. The type of biome at any location depends on a number of factors such as elevation above sea level, latitude (which affects the amount of sunlight), annual rainfall, average temperature, extremes of temperature, and so on. While the creatures in one ecosystem may be similar to those in another, there are also some differences -- e.g., same genus but different species. There is little mixing, except perhaps at the elevation where one biome ends and another begins. If we didn't know better, we might say that they are evolving. They

are not, though; they live at the same time but in different environments.

Many other instances show that animals and plants around the world live in interdependent communities that are rather clearly defined. If we were to instantly preserve all the biomes and then arrange them from simple to complex, what we would find would match very well with the suites of fossils we find in the fossil record.

4. BIBLICAL TIMELINE OF THE FLOOD.

The Bible does not give details of what was happening underwater, but it tells us about some major events that occurred during the year of the Flood.

Visual #12-27

- Day 1: On the seventeenth day of the second month, all the windows of heaven were opened and all the fountains of the great deep burst forth.

  Besides rain, the "windows of heaven" may also have included such things as meteor impacts. The "fountains of the great deep" probably included a great deal of volcanic activity as well as enormous geysers spewing up through the crust.
- Day 40: After forty days, the intense rain diminished, though it did not completely stop until at least day 150 (Gen. 8:2). The water now covered even the highest pre-Flood mountains "under the whole heaven" (Gen. 7:19-20).

  Some time between day 40 and day 150, God caused a wind to pass over the earth. The fact that it was significant enough to be mentioned in the Flood account indicates that it was more than just a gentle breeze, and probably lasted for many days. Some believe this indicates one or more "hypercanes."

  One of the primary causes of wind is a temperature difference between large masses of air. If there were large scale volcanic activity as implied by the "fountains of the great deep," it would have heated up the water above the volcanoes. This activity may have continued until day 150 when the fountains were stopped. The heat would then have gradually radiated to the air above. Since water has such a high specific heat, it would have taken years for all the heat to flow from the ocean into the atmosphere.
- Day 150: The waters continued to cover the mountains until at least Day 150 (Gen. 7:24). The bottom of the Ark ran aground on that day (Gen. 8:4), but the mountains remained underwater for many more months. As the water receded, it was probably flowing down from the rising land masses into the sinking ocean bottoms. This would have carried away tremendous quantities of sediment.
- Day 224: About 74 days later, the tops of the mountains first became visible on the first day of the tenth month (Gen. 8:5). During these two and a half months water and large quantities of sediment continued to flow downward to lower elevations.
- Day 264: After 40 more days, Noah sent out a raven and a dove, which returned (Gen. 8:6-8).
- Day 271: After another seven days, he sent the dove back out (Gen. 8:10). It returned with an empty beak.
- Day 278: He sent the dove out yet again after seven more days (Gen. 8:12). This time it returned with an olive leaf in its beak.
- Day 285: He sent the dove out again. This time it did not return.
- Day 314: 29 days later, on the first day of the first month, he removed the covering of the Ark because the ground visible to him was dry.
- Day 370: After 56 more days, Noah and the animals came out of the Ark.

D. POSSIBLE CORRELATION OF THE FLOOD WITH SEDIMENTARY LAYERS.

There is a sharp contrast between evolutionary models of fossil formation and the young-earth creation model of flood geology.

- According to evolution, fossils accumulated within each stratum as it was deposited over millions of years. After a long while, the deposition stopped and erosion began. Eventually, the process repeated and the next stratum was deposited on top of the last one. Thus, while there could be gaps due to erosion, there should be many examples where the fossils in one stratum gradually evolve into those in the next higher layer.
- On the other hand, a flood model would lead us to believe that large-scale fossilization occurred as a result of massive sediment dumps and mud flows. The biomes nearest the bottom of the sea would have been buried first as the fountains of the great deep churned up enormous quantities of sediment from below. Meanwhile, sediment also began to pour into the oceans from the land above.

Visual #12-28

The water eventually rose over the tops of the highest mountains, which were probably not nearly as high as they are at present. Nevertheless, climbers who have been to the top of the Himalayas and Andes, the highest mountain ranges in the world, confirm that there are sea shells even at the very top.

As the water continued to rise to its highest level, the biomes at sea level and above would have been violently ripped from their normal locations and buried by the sediment being churned up from the ocean and from land at higher elevations. Some of the biomes would have been buried while the water was still rising, others during the time it was receding.

Though it is not clear how this scenario relates to the geologic column of Precambrian, Cretaceous, Eocene, and so forth, many creationist geologists (e.g., Baumgardner, 2018; Clarey & Werner, 2018; Snelling, 2014) follow a chronology similar to the following.

1. ARCHAEOZOIC ERA. (From the Greek for "Beginning life.")

Baumgardner and many others believe that the Precambrian (Archaeozoic) sediments were deposited around the onset of the Flood. There is not always a clear erosional boundary between them and the Cambrian, but there is a clear difference in the type of fossils. There are supposed to have been millions of years of evolution during the Precambrian, but the fossils of that layer are not considered to be the ancestors of those in the Cambrian. This is so obvious that the boundary between Precambrian and Cambrian is known as the "Great Unconformity."

2. PALEOZOIC ERA. (From the Greek for "Ancient life.").

The Paleozoic Era contains the Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, and Devonian Periods.

As the original super continent of Gen. 1:9 broke apart, each region would have been experiencing vastly different processes and forces. The breaking and colliding plates would have produced many underwater tsunamis, pushing large masses of sediment back and forth. These would have buried entire ecological communities.

Each stratum of the Paleozoic is identified by the suite of fossils it contains rather than by a clearly defined erosional boundary separating it from the one below it. Very seldom are two or more strata found one on top of the other in the "correct" order. In no case do the fossils show evolution from one layer to the one above.

a. Cambrian, Ordovician, Silurian.

We would expect the biomes living progressively higher above the ocean bottom (Cambrian, Ordovician, Silurian, Devonian, Carboniferous) to be buried at higher and higher levels as underwater tsunamis churned up enormous amounts of sediment. However, because of the violent circumstances, it would be unlikely for us to find more than a few biomes buried at the same location.

As we move up the column to the Pennsylvanian (upper Carboniferous), about 99% of the animal fossils known are marine (Clarey & Werner, 2018). This is consistent with the idea that fossils of the lower Paleozoic strata were ocean-dwellers. As Clarey and Werner (2018) put it, "The fossil pattern observed across three continents is best explained by the systematic flooding of progressively higher and higher elevations of the pre-Flood continents as described in Genesis 7."

b. Devonian.

Many call the Devonian the "Age of Fishes" because it contains so many types of fish not found at lower levels. An alternate interpretation is that the Devonian contains fish that simply did not live at lower levels. They are also not found in higher strata, making the Devonian a record of extinction rather than sudden appearance.

c. Carboniferous (Pennsylvanian and Mississippian)

Visual #12-29

The next layer up, the Carboniferous, is known for a large amount of vegetation, much of which turned into coal and crude oil.

There is no hint of evolution among the plants. They are mostly the kinds we would expect to find close to sea level. Many still occur in the world today.

Very few animal fossils are found in the Carboniferous. The animals in the Devonian are supposed to have skipped this layer and evolved into those above in the Permian and Triassic strata.

d. Permian.

The next higher stratum, the Permian, contains relatively few fish. This layer mostly contains a record of creatures such as vast numbers of amphibians and "mammal-like reptiles" that seem to have been suited for a marsh type environment roughly at sea level.

Since the forms found in lower layers generally do not appear in the Permian and since most of the Permian creatures do not appear any higher in the fossil record, many evolutionists say that between 90% and 96% of animals became extinct in the Permian. This would be the greatest extinction of all time. This is destruction, not gradual evolution.

To recap: there is no evolution apparent between the Paleozoic suites. Each seems to have been particularly suited for a specific environment.

3. MESOZOIC ERA. (From the Greek for "Middle life.")

The Mesozoic contains the Triassic, Jurassic, and Cretaceous Periods. They are collectively known as the "Age of Reptiles," though a few types of mammals have also been found in the Mesozoic rocks. Some sea creatures have also been found jumbled together with them. Evolution is nowhere to be seen between these layers.

Young-earth creationists generally believe that the subdivisions of the Mesozoic represent different biomes that were affected by geographic factors such as elevation above sea level, climate, so on. These biomes are generally believed to have been buried while the waters were still rising.

The lowest known appearance of dinosaur fossils is in the Upper Triassic. They are also found in five other biomes: Lower, Middle, and Upper Jurassic and Lower and Upper Cretaceous. There are no transitional fossils showing that they evolved from lower to upper layers. Instead, these six specific environments seem to have been particularly well suited to their needs. Each dinosaur type is usually found in only one of the suites and appears suddenly and fully formed with all its ordinal characters intact. Biblical creationists generally believe the dinosaurs died in the Flood except for a few

juveniles that survived on the Ark. These survivors are probably the basis of dragon legends around the world.

4. CENOZOIC ERA. (From the Greek for "Recent life.")

Most young-earth creationists believe that the Archaeozoic, Paleozoic, and Mesozoic biomes (pre-Cambrian through Cretaceous) were buried during the rising stage of the Flood. However, there is a bit of disagreement about the circumstance under which the lower Cenozoic (Tertiary) strata were deposited. Some believe that these strata, the Paleocene through Pliocene, were laid down as the Flood waters continued to rise. Others believe they were deposited during the receding stage of the Flood.

Almost all young-earth creationists believe that the upper Cenozoic (Quaternary) sediments were deposited in local catastrophes after the Flood. These two strata, the Pleistocene and Holocene, are the only ones that contain undisputed human fossils.

a. The K-T (K-Pg) boundary.

Visual #12-30

The boundary between Cretaceous and Cenozoic (Tertiary) used to be called the K-T boundary. (The K is because the German word for Cretaceous begins with the letter K.) However, the terminology has been changed so that the lowest level of the Tertiary is now called the Paleogene. Thus, the term "K-Pg boundary" is often used instead of "K-T boundary."

In a number of locations around the world, the K-Pg boundary between the Mesozoic and the Cenozoic Eras is more clearly marked than boundaries within the Mesozoic. There is often a thin layer of clay, "shocked" quartz (deformed quartz crystals), an elevated level of the element iridium, and/or a layer of soot. Though it is not clear why this layer exists, is hints that something drastic happened at the top of the Cretaceous deposits.

Visual #12-31

- *Asteroid Hypothesis:* The presence of both iridium and shocked quartz is used in support of the idea (the Alvarez Hypothesis) that an asteroid hit the Yucatan Peninsula and kicked up a layer of debris that blanketed the world at the end of the Cretaceous. Iridium has been detected on extraterrestrial objects, and an impact such as an asteroid could produce shocked quartz. This might also ignite large scale fires, producing the layer of soot.

  However, it is doubtful that a single impact could produce more than one crater. Since there are a number of impact craters around the world, there may have been multiple impacts.
- *Volcanic Hypothesis:* Cretaceous rocks received their name because of their high concentration of calcium carbonate (*creta* in Latin). This is often a major product of volcanic eruptions. Volcanoes have also been known to produce shocked quartz, especially when the volcanic eruption results in lightning strikes. The soot would be a natural product of the volcanic eruptions.
- *Combination hypothesis:* Flood geology leads us to expect that both asteroid impacts and volcanoes were occurring worldwide.

b. Where did the water go? Vertical Plate Tectonics.

Visual #12-32

The highest mountains in the world today are in the Himalayas (over 5 miles above sea level) and the Andes (over 4 miles). How could the Flood have covered the highest mountains? Simply because they were not as high as they are at present. Some of the worlds's great mountain ranges such as the Alps, Carpathians, Rockies, and Himalayas are placed in the Cenozoic (Berggren, 2020). This would lead us to conclude that they must have risen after the K-Pg boundary was laid down.

When we think of plate tectonics, we usually think of the continents moving

sideways. However, plate tectonics also includes the idea of vertical motion. As the Bible says in Ps. 104:6-9,

> "The waters stood above the mountains. At Your rebuke they fled; At the voice of Your thunder they hastened away. They went up over the mountains; They went down into the valleys, To the place which You founded for them. You have set a boundary that they may not pass over, That they may not return to cover the earth." (NKJV)

Young's Literal Translation renders the same passage as,

> "The abyss! as with clothing Thou hast covered it, Above hills do waters stand. From Thy rebuke they flee, From the voice of Thy thunder haste away. They go up hills--they go down valleys, Unto a place Thou hast founded for them. A border Thou hast set, they pass not over, They turn not back to cover the earth."

This passage seems to indicate that the mountains were covered with water, then moved upward while the valleys – which would include the sea floors – went down. If so, even though the water level was no longer rising, there would have been large scale runoffs of water and sediment. The resulting mud flows and mudslides would explain how the Tertiary (Lower Cenozoic) biomes were buried.

c. Tertiary and Quaternary Periods.

Visual #12-33

Though the terms "primary" and "Secondary" are no longer used, these were once the names given to the eras now called the Paleozoic and Mesozoic Eras. At that time, the Cenozoic Era was divided into the Tertiary and Quaternary Periods. However, the Tertiary Period itself is now divided into two sub periods, the Paleogene and Neogene. Though the word "quaternary" implies that it is the fourth major fossil bearing division, it is actually the fifth. Nevertheless, it is still called the Quaternary.

Visual #12-34

As compared to the animals of the Mesozoic, Cenozoic animals generally seem to be the kinds that would do better inland, either farther from the ocean or at higher elevations. Likewise, Cenozoic fish tend to be the kind found farther from the ocean in fresh water lakes.

i. Lower Tertiary (Paleogene).

The lower part of the Cenozoic, the Paleogene Period, includes the Eocene and Paleocene Epochs.

aa. Paleocene Epoch: Modern plants, rodent-like mammals, hoofed animals, large birds. Many fossils concentrated around Wyoming.

bb. Eocene Epoch: "Oldest" known fossils of almost all the modern orders of mammals, other types of hoofed animals, fresh water fish, "earliest" primates, proboscideans (elephant-like animals), rodents, bats. Many fossils concentrated in upper central North America, e.g., Nebraska, Wyoming, S. Dakota.

Most creationists believe the reason no undisputed primates are found in any layer lower than Eocene is because they are among the most mobile and intelligent animals, so they would have been able to avoid burial in the rising waters longer than most other creatures. This would also help explain why there are so few primate fossils. If they were able to move to higher elevations as the waters rose, they would have been less likely to be buried. Their carcasses would probably have decomposed rather than become fossils.

ii. Upper Tertiary (Neogene).

The next higher division, the Neogene Period, includes the Oligocene, Miocene, and Pliocene Epochs.

aa. Oligocene Epoch: Mammals similar to horses, rhinos, predatory cats, tapirs, camels, deer, cattle, Old World and New World monkeys. Many fossils concentrated around Nebraska, Wyoming, S. Dakota.

bb. Miocene Epoch: Animals similar to rhinos, horses, camels, elephants, dogs, apes. Miocene rocks found in many more geographic locations (e.g., Florida, California, Nebraska, Texas) than the three Cenozoic biomes found at lower levels. Many more fossils than the three lower layers.

cc. Pliocene Epoch: Modern type animals including some of the "highest" of the primates, are found at multiple locations around the world.

iii. Quaternary Period.

Visual #12-35

The Quaternary Period includes the Pleistocene and Holocene Epochs. The Quaternary is considered to have begun at the time of the "Ice Age(s)," marked by widespread glaciation.

Note that undisputed primates are not found in any strata lower than Eocene. Most creationists believe this is because they are among the most mobile and intelligent animals, so it makes sense that they would have been able to avoid burial longer than most other creatures. Very few would have been fossilized.

There are no undisputed human fossils below the Pleistocene. If any are ever found, they may have been formed during the Flood in massive sediment dumps in local areas separated by the undersea mountains. They would have been dead so they would not have gradually climbed to higher elevations under the rising waters, nor would they have floated freely through the Flood waters (they would have decomposed), but would have been buried in sediment like everything else. They would simply have been able to get to higher elevations before they were buried.

Visual #12-36

aa. Pleistocene Epoch: Besides modern type animals, human fossils are found at multiple locations around the world. Since the Bible says that the Flood drowned all humans except those on the Ark, most creationists believe the Pleistocene deposits (which are much smaller in scale than lower layers) were deposited in local catastrophes after the end of the Flood. However, the Bible does not explicitly say that all traces of them (such as their corpses) were erased. If we ever do find any humans in layers lower that the Pleistocene, we could assume they were buried like everything else but probably were able to get to higher elevations before burial.

bb. Holocene (Recent) Epoch: Fossils are the types found in the world today.

5. PROPOSED OVERALL FLOOD MODEL.

Since the details cannot be tested, it is not possible to formulate a scientific theory about what happened during the Flood. However, the following model is at least consistent with about how our observations might fit into the Biblical account.

Visual #12-37

Many young earth creationists believe the Flood waters rose in multiple surges. First, the ocean dwelling Paleozoic fossil suites (Cambrian through Devonian), were buried in the early stages as the sea floors split apart and churned out a great deal of sediment. Then, the biomes that lived around sea level (Carboniferous through Permian) were buried. As the surges continued during the rising stage, the Mesozoic strata were deposited. (The Mesozoic is noted for reptiles, which usually do better in warmer climates. They were usually not buried one on top of the other, though textbooks make it appear as though they were.)

Something dramatic must have happened as the water reached its highest level at

or near the top of the Cretaceous. Multiple catastrophes such as volcanoes and extraterrestrial impacts laid down the shocked quartz, clay, calcium carbonate, and iridium characteristic of the K-Pg boundary. The mountains pushed up and the water began to recede, burying the Lower Cenozoic (Tertiary) fauna in vast mud flows. (The Cenozoic is noted for containing many mammals, which usually thrive in a different environment than reptiles.) The Cenozoic biomes would not have come along millions of years later, but instead would have been buried in runoffs as the mountains pushed upward.

Though Tertiary deposits are smaller in scale than those of the Paleozoic and Mesozoic, they are still significantly larger than present sedimentary processes would be expected to produce. (Oard, Aug. 2010) Thus, many creationists believe that the Tertiary was the product of the Flood. The Quaternary sediments, which are smaller in scale than the Tertiary, were probably deposited in post-Flood local catastrophes (see below).

6. POST-FLOOD SEPARATION OF HUMANS - THE TOWER OF BABEL AND THE ICE AGE.

Visual #12-38

After the Flood, the animals Noah released from the Ark began to spread out. However, the humans did not. We do not know if every one of them migrated from the Ark's resting place in the mountains of Ararat to a land identified as Shinar, but at least most of them did. They stayed there until the tower of Babel, about a hundred years after the Flood. Meanwhile, their life spans had begun to shorten and the age at which they had their first children had dropped to the thirties (Gen. 11). Peleg, who received his name because "in his days was the earth divided" (Gen. 10:25) was in the fourth generation of Shem's family only a century after the Flood. Most commentators interpret this passage to mean that he was born close to the time of Babel.

How could there have been enough people after only a century for scattering to make any sense? Genesis 10 says that Japheth had seven sons, Shem five, and Ham four. Since on average there are an equal number of boys and girls born in the world, this would mean:

Visual #12-39

- *First generation:* approximately 32 children, 16 boys and 16 girls, in the generation of Arphaxad and his cousins. If these sixteen couples each had about five boys and five girls, this would have produced
- *Second generation:* 160 children or 80 couples in the generation of Salah and his second cousins. If each of them had on average five boys and five girls, there would have been about
- *Third generation:* 800 children or 400 couples in the generation of Eber and his third cousins. If each of these couples had about five sons and daughters, there would have been about
- *Fourth generation:* 4000 children or 2000 couples in the generation of Peleg and his fourth cousins.

Immediately after the Flood, people were still living hundreds of years. Most or all of them would still have been alive at the time of Babel. Adding up the members of all the generations, there could have been thousands of people in the world.

God forced the humans who were clustering around Babel to scatter over the Northern Hemisphere into the areas now known as Asia, Europe, and Africa. As they spread out, the Ice Age was beginning to set in as the earth began its recovery from the Flood. The conditions in Asia, Europe, and later, North America were much different that they were accustomed to.

There is geologic evidence that much of the Northern Hemisphere was covered with ice and glaciers at some time in the past. (The Ice Age is not believed to have affected the Southern Hemisphere.) Because of their assumptions of uniformitarianism and great ages, many evolutionists believe there were multiple ices, each lasting for millions of years. However, a single Ice Age with the same results fits easily into a young-earth framework.

Most young-earth creationists believe the Ice Age began shortly after the dispersion from Babel and ended decades before Abraham. (See answersingenesis.org, icr.org, creation.com, and the like.) The widely scattered human fossils such as Neanderthals and Cro-Magnons found in the Pleistocene are believed to be artifacts of this dispersion, as opposed to human fossils in Africa, which would likely have been produced by local catastrophes.

Visual #12-40

An ice age beginning a little more than a hundred years after the Flood and lasting perhaps several hundred years would help explain several mysteries.

- The fauna of Australia are somewhat different than those of the rest of the world. The ice sheets in the Northern Hemisphere would have stored a great deal of water that later flowed back into the oceans. Meanwhile, the water levels in the oceans would have been significantly lower. Marsupials, which carry their babies in pouches, could have moved faster than placental mammals and arrived at the land bridge to Australia before the rest of the mammals, which were then cut off from that continent as the ice sheets melted.
- The monkeys of the New World (Central and South America) are a bit different than those of the Old World.

  One possible explanation for the differences: Perhaps New World monkeys spread throughout Asia before the Ice Age became severe, then crossed the Bering Strait when the ocean levels dropped, continuing southward toward the warmer climates of Central and South America. Those in North America died or left because it was too cold.

  An alternative explanation: New World monkeys may have floated across the oceans to South America on huge rafts of vegetation capable of sustaining them for at least a few weeks (Oard, 2014). While this sounds bizarre, even today floating islands capable of supporting cattle are known (Van Duzer, 2004). They can persist for weeks and are easily capable of transporting animals long distances.

The point of this section is that a Biblical/Flood model is not some silly little bit of folklore. Though many details remain to be worked out, it is scientifically plausible.

E. ARGUMENTS AGAINST UNIFORMITARIANISM.

Recommended resources: R.L. Wysong, *The Creation-Evolution Controversy*; Whitcomb & Morris, *The Genesis Flood*. Much of the following information is from these books. The former takes a non-religious approach while the latter also deals with Biblical aspects of the controversy.

The evolutionary belief in uniformitarianism allows only steady and gradual processes and denies that there has ever been a worldwide flood. Creation, on the other hand, would have been an exceptional event not explainable by uniform processes. Since a creator would not be limited to using uniform processes, we must allow for the possibility of major and minor catastrophes throughout the earth's history. Biblical creation specifically says that there was a worldwide flood. It certainly would have left evidence of its occurrence.

Visual #12-41

Suppose there really was a worldwide flood. What would we expect to find? Billions and billions of dead things buried in rock layers laid down by water all over the earth, even

on top of the highest mountains. What do we actually find? Billions and billions of dead things buried in rock layers laid down by water all over the earth, even on top of the highest mountains.

We already saw that it does not take millions of years to form a fossil and that radiometric dating cannot tell us anything with certainty. As we look at the third reason people believe the earth is old, geologic features such as the geologic column, we will see that the evidence does not indicate that these features were formed by gradual processes. Instead, the evidence points to violent, rapid events.

1. ORIGIN OF THE UNIVERSE AND EARTH.

Visual #12-42

- Whatever process might have produced the singularity that is supposed to have exploded in the Big Bang, it is surely not going on today!
- There is no known present process that can produce about 90 of the elements that exist in nature.
- There is no known present process whereby a collapsing disk of gas and dust (a "planetary nebula") could produce a solar system such as ours in which each planet has a composition distinct from all the others and from its host star.
- Despite attempts to work out the math, there is no known process -- past or present -- in which the planets in such a system could acquire about 98% of the angular momentum, while 98% of the mass remained in the host star (Brun et al*,* 1998).
- There is no known present process which could cause the planets and moons to begin to rotate in so many different directions.
- The earth's magnetic field is believed to have reversed its direction several times. Though there are proposed explanations. there is actually no presently known mechanism capable of causing such an event.

2. SEPARATION OF THE INITIAL SUPERCONTINENT.

Evolutionists and creationists agree that at some point in the past, the present continents were part of a much larger land mass, commonly known by names such as "Pangaea." The question is, *what caused it to break apart?* Creationists would say that the separation was a catastrophic event associated with Noah's Flood. Evolu- tionists, on the other hand, cannot point to any known present day process to explain what happened. Once again, the present is certainly not the key to the past.

Once the initial supercontinent broke apart, evolutionists believe that the earth's tectonic plates moved slowly back and forth until they finally settled into their present arrangement. However, there is no known natural process that would have caused them to change direction a single time, let alone repeatedly.

3. MOUNTAIN-BUILDING.

Visual #12-43

No presently observed gradual processes are capable of large scale *orogenesis*, or mountain-building. Proponents of plate tectonics say that North and South America are moving away from Europe and Africa and that the movement of the continents would have pushed up the mountains. However, present estimates of the speed at which the continents are separating are on the order of only a few centimeters a year.

It would take an enormous amount of momentum to buckle the earth's crust enough to push up mountains. Any modern day motion of the continents is much too slow. They would have had to move much faster at some time in the past to push up the great mountain ranges found around the world.

Many geologists who work with plate tectonics use a computer program known as "Terra," written by geophysicist John Baumgardner. The program divides the earth's surface into about 64,000 geologic zones and requires the processing power of a

supercomputer. The program works so well to model continental motion that it is used worldwide. However, few uniformitarian geologists who use Terra seem to realize that the author, Dr. Baumgardner, is a young-earth creationist. His program works much better for rapid motion over a short time (up to 45 miles per hour for less than two weeks) than for a few centimeters a year over millions of years.

Such rapid motion fits very well with the geological implications of the Genesis Flood. The Bible tells us that God called the dry land together (Gen. 1:9-10) during the creation week, and we can conclude that the initial supercontinent stayed together until the Flood. There must have been vast reservoirs of water trapped beneath the land mass, because the "fountains of the great deep" burst forth at the beginning of the Flood (Gen. 6:11) and kept flowing for a hundred fifty days (Gen. 8:2). Thus, the land mass was at least partially supported by the water until something happened to produce an initial crack, possibly where the mid-Atlantic ridge is now. The water waiting to escape from below would have served as a lubricant as the water in the process of escaping forced the plates apart at a much faster rate than presently possible. As the plates crunched to a halt, the crust buckled and formed mountain ranges. The process could have occurred in a short time rather than millions of years.

4. ***COMPLETE GEOLOGIC COLUMN NOT FOUND IN NATURE.***

Besides the fact that the geologic divisions are identified by suites of fossils, the complete column exists only in textbooks and in the imagination of evolutionists. In most places, just a few of the strata occur. Even in those locations where several strata can be identified together, some are always missing. Every stratum, not just the Cambrian, can be found directly overlying basement rocks someplace in the world (Spielker, 1956, 1805).

5. ***CLEARLY DEFINED STRATA.***

The geologic column itself testifies to the failure of uniformitarianism. There are a number of *unconformities* in the world such as the continent-wide "Great Unconformity" plainly visible at the Grand Canyon, where hundreds of millions of years of sediment are missing. If slow, gradual processes were responsible for the deposition of sediment at the Canyon, the strata should blur together . They do not. They are clearly separated.

Besides unconformities, each period, epoch, or era is identified by a well-defined suite of fossils. They do not blend smoothly together as they should if each type of creature were evolving at different rates at different places around the world. In at least one case, the "K-Pg" boundary between Cretaceous and Paleogene, a clearly defined boundary is found across continent-size areas.

6. ***OUT-OF-ORDER STRATA.***

In addition to the problem of missing strata, layers of the geologic column are found in the wrong order in hundreds of places throughout the world. Just two examples:

- The Matterhorn in Switzerland consists of rocks dated older than the strata beneath it. It would have had to move at least 60 miles to its present location on top of "younger" rocks.
- The Lewis Overthrust in Montana is a 10,000 square mile mass of rock in which Pre-Cambrian sediments lie on top of Cretaceous.

Interested students can easily find hundreds of other examples. The point is that evolutionary assumptions do not lead us to predict a great many of the observations of geology; instead, we have to *explain them away*.

In general, the strata do contain fossils which seem to increase in complexity from

bottom to top. However, there are hundreds of exceptions to this pattern. How do creationists and evolutionists explain these exceptions?

a. Creation: Flood Action.

The creationist explanation for most misplaced strata is that they occurred as a result of flood action. In general, suites of fossils represent ecological communities. Almost all the lowest fossils are (or were) bottom-dwelling sea creatures which are fairly round and dense and not very mobile. Those farther up the column are less and less dense, of more and more complex shapes, more and more mobile, and tend to dwell at higher and higher elevations. It is logical to expect catastrophic sedimentation conditions such as those that occur during widespread flooding to sort and preserve the fossils in roughly the order in which they occur in the geologic column. The many exceptions would probably be the result of violent water currents that transported individual fossils and even entire communities away from their normal habitat and rapidly buried them.

This model is based on direct observation of floods as well as on observed characteristics of fossils. Many reject it not because of scientific evidence but because they refuse to accept anything that fits with the Genesis Flood account. Their rejection is motivated by religion, not science.

b. Evolution: Overthrusting.

Evolutionists usually explain misplaced strata by saying that they formed over millions of years by slow processes of erosion and sedimentation. Then, as a result of geologic upheavals, the older rocks slid into place on top of the younger in a process called overthrusting.

The problem with this belief is that in most cases there is little or no indication of the enormous amount of *brecciation* (rock fragmentation due to friction) that would occur at the boundary as the two "ages" of rock slid past each other. Creationists believe that the layers were able to do this because they were still soft when they moved. Evolutionists, on the other hand, believe that the rocks were fully hardened for millions of years before they slid around. Those who believe that overthrusting is a more plausible explanation of the misplaced strata might want to consider how the eight-hundred-trillion ton Lewis Overthrust (for one example) was able to move forty miles without leaving any evidence of its journey (Whitcomb & Morris, 1982, 189-192). The present is certainly not the key to its past.

7. MISPLACED FOSSILS.

Besides entire strata out of sequence, there are numerous cases of misplaced fossils. One interesting example is the "Nampa Image," a baked clay figurine (perhaps a religious artifact or a toy) discovered in 1889 during the drilling of a well in Nampa, Idaho. The shaft went through a Tertiary lava sheet, dated at least 12 million years old. In the drilling debris extracted from beneath the sheet workers found the figurine. Since the lava was previously undisturbed, anything below it would have to be dated at least 12 million years old (Wysong, 1976, 370). Humans are the only creatures known to make dolls, but we are not supposed to have evolved until within the last million years. Something is wrong with the dating system.

8. MASS EXTINCTIONS.

According to evolutionary geology, the fossil record shows at least six mass extinctions, during which well over 90% of all living things became extinct. Some non-uniformitarian process or event must have happened at least these six times.

One of these extinctions, known as the K-T Boundary, marked what evolutionists

believe was the end of the dinosaurs. (Young-earth creationists believe they died off after humans came on the scene.) There are many hypotheses as to why they became extinct, but all of them acknowledge that the environment must have changed drastically to cause such large-scale extermination.

9. FOSSIL GRAVEYARDS.

The earth's sedimentary layers contain a great deal of evidence that fossils were formed in rapid, catastrophic events. Those which the author has personally visited include the Karoo Supergroup of South Africa, estimated to contain billions of fossils; Dinosaur National Monument, containing thousands of dinosaur skeletons; the Lance Creek Formation of Wyoming, containing a herd of *Edmontosaurus* specimens estimated at about 34,000 individuals; the Redwall Limestone of the Grand Canyon, estimated to contain billions of nautiloids, and many mountains composed of sedimentary rock. Other large scale fossil deposits include the Cumberland Bone Cave, the Baltic amber deposits, the Geiseltal lignite beds, the Sicilian hippopotamus beds, the Rocky Mountain mammal beds, the California Miocene shales in which more than a billion fish are fossilized in a four-square-mile area, and many others (Whitcomb & Morris, 1982, 154-161). Many of the fossils are preserved in positions indicating that they died and were jumbled together as a result of some violent process involving water-deposited sediment. A number of these graveyards also show evidence of being *allochthonous* deposits, that is, they were transported to their final location from somewhere else. This is just what we would expect if they were killed and buried under flood conditions.

10. POLYSTRATE FOSSILS.

If a dead tree is left in contact with the air for more than a few months or years, it decays into powder. Yet polystrate (extending through multiple strata) fossil trees dozens of feet high have been unearthed in several places around the world (Wysong, 1976, 366-368; Taylor, 1987, 114). Even animals such as whales are sometimes found fossilized in two adjacent strata (Russell, 1976).

Since the geologic time scale is based on the assumption that only a fraction of an inch of sediment accumulated each year, evolutionists have to believe that the dead trees (or animal carcasses) stood in place for millions of years until they were finally covered and the fossilization process began. Maybe they've never thought about the fact that dead trees and animals rot. The presence of polystrate trees is yet more evidence that the sediment accumulated rapidly, not gradually.

11. DEFORMATION OF SEDIMENTARY LAYERS.

Visual #12-44

There are many places around the world (the Grand Canyon, Meteor Crater, and the Swartberg Mountains of South Africa, to name a few) where thick sections of rock were obviously bent some time in the prehistoric past. How do you bend a rock without shattering it? Evolutionists say that this must have happened deep underground so that there was enough pressure to smoothly bend fully hardened rocks. Creationists, on the other hand, believe that the strata were deposited rapidly and thus just hadn't had enough time to fully harden. They were bent while still soft.

We have no scientific record of what happened, but which makes more sense?

12. RAPID FORMATION OF GEOLOGIC FEATURES.

Visual #12-45

One of the most common arguments for a great age of the earth is that geologic processes would have required millions of years of erosion to produce features like the Grand Canyon in Arizona. A recent event, the eruption of Mount St. Helens, may shed some light on how the Canyon might have formed. We will then consider the Canyon itself.

a. Mount St. Helens.

Visual #12-46

Mount St. Helens is a medium size volcano in southwest Washington State. For over a century before 1980, it had lain dormant and was known for its beautiful snow-capped peak. Then, in late March of 1980, a series of earthquakes began to shake the area. For the next two months the mountain became more and more active, releasing a great deal of steam and ash. The north side bulged about five feet more each day. Finally, at 8:32 A.M. on May 18, 1980, Mt. St. Helens erupted. (Corcoran, 1986, 4-19)

Visual #12-47

Most volcanoes blow their top when they erupt. Mt. St. Helens was different. The side of the mountain blew off instead, directing most of the force of the initial explosion sideways. The blast threw an eighth of a cubic mile of rock into Spirit Lake, sending a wave hundreds of feet up the surrounding hills. Millions of trees were uprooted, with about a million settling into the lake. The explosion also released a blast of superheated steam (about 680 degrees) that traveled faster than the speed of sound and leveled about 50,000 acres of forest in six minutes.

Visual #12-48

The total amount of energy released in the eruption is estimated as the equivalent of one Hiroshima size atomic bomb per second for nine hours. The ejected ash made it all the way around the world. And remember, this is only a medium size volcano!

Visual #12-49

Yet despite the destructive power, from a geological perspective the aftermath of the eruption is more interesting than the eruption itself.

i. Pyroclastic Mud Flows.

Visual #12-50

Very little lava came out of Mt. St. Helens. Instead, massive flows of superheated mud buried the surrounding countryside, in some cases as much as six hundred feet deep (Morris & Austin, 2003, 74). The 80 mile per hour mud flow laid down thin laminated layers one on top of the other. They look very much like the layers found at such places as the Green River in Wyoming. These are supposed to have been deposited one at a time over millions of years, yet Mt. St. Helens laid down thousands in two days.

Someone who was unaware of what happened could look at the layers in the Mt. St. Helens mud flows and think they formed over hundreds of thousands of years. They didn't. They formed in a matter of days.

ii. Soft Rock Erosion: The "Little Grand Canyon" of the Toutle River.

Visual #12-51

A great deal of the mud flowed into the North Fork of the Toutle River, burying it to a depth of about a hundred and forty feet. The superheated mud produced steam explosions as it contacted the water, forming weak spots in the hardening mud. Meanwhile, snow began to accumulate in the volcanic cone. It mixed with the tremendous amount of volcanic ash left behind. 20 months later, March 19, 1982, a second mudflow broke through the weak spots in the first flow. In one day the mudflow carved out a network of canyons including one the hundred forty feet deep "Engineer's Canyon" (Austin et al., 1994, 94). This is roughly one thirty-fifth the depth of the Grand Canyon. It didn't take millions of years. It took one day.

Visual #12-52

iii. Hard Rock Erosion: "Step Canyon."

A skeptic might point out the fact that the sedimentary rock was not fully consolidated and thus was relatively easy to erode. This is exactly the point creationists make about the Grand Canyon. Even more amazing than the rapid erosion through soft sedimentary rock, though, is the rapid erosion through ***hard***

Visual #12-53

rock, that is, granite. During the initial eruption, the volcano carved a seven hundred foot deep canyon (now known as Step Canyon) through the solid granite of the "Goat Rocks." According to the assumption of uniformitarianism this much erosion through granite would take at least hundreds of millions of years -- yet it actually took **one day.**

iv. Trees at the Bottom of Spirit Lake: a Possible Clue to "Multiple Forests."

Several years after the eruption Dr. Steve Austin of ICR went scuba diving in Spirit Lake. His photographs of the bottom of the lake may reveal the answer to an argument for a great age at Yellowstone National Park.

Two notable features of the park are Specimen Ridge, in which 18 successive layers of trees are buried, and nearby Amethyst Mountain with 15 (Whitcomb & Morris, 1982, 418-421). For years, visitors were told that the multiple layers were the result of multiple forests growing over tens of thousands of years. One forest would grow, be buried, be covered by a new forest, and so on many times. This would take far too long to fit into a young-earth framework. However, the "forests" do not indicate growth but instead burial. Each layer of trees is anchored in different layers of sediment, but the trees do not have roots. Most now believe that the layers of trees actually sank to the bottom of a lake that was in the area in groups over just a few years, rather than thousands. (To the credit of the Park Service at Yellowstone, references to the supposed multiple forests have been removed.)

Mount St. Helens may give us a clue to what happened at Yellowstone. The blast left a million or so trees floating in Spirit Lake. Ever since, the root ends of the trees have been getting waterlogged before the trunks, making one end heavier. This gradually turns the trees upright until they float vertically and finally sink that way. Different trees sink at different rates, while more sediment washes into the lake every time it rains. Austin's underwater photography shows that the bottom of Spirit Lake is beginning to look very much like the "multiple forests" of Yellowstone. It's not a case of thousands of years of growth; it's a case of rapid deposition after a catastrophic event.

The eruption of Mount St. Helens demonstrates that it doesn't have to take millions or even thousands of years to form large scale geologic features.

With this in mind, let's consider how the Grand Canyon might have come to be.

b. The Grand Canyon.

Most people think the Colorado River must have taken millions of years to carve the Grand Canyon, because that's what they have been told. A study of Canyon geology shows otherwise.

Visual #12-54

The Grand Canyon is 277 miles long, a mile deep, and between 4 and 18 miles wide. It cuts east to west through the Colorado Plateau, which covers much of Colorado, Utah, Arizona, and New Mexico. The Colorado River runs more or less north to south through Arizona until a point just east of the Grand Canyon, where it makes a sharp westward turn. From there it runs straight through an upwarped area known as the Kaibab Plateau. The north rim of the Canyon is about 8,500 feet above sea level; the south rim is about 1,200 feet lower.

The Canyon is not an eroded area in a flat desert, but a gash through the uplifted Kaibab Plateau. Since water does not flow uphill, the river could not have carved the Canyon through a pre-existing plateau thousands of feet higher than the surrounding area. Also, since the south rim of the Canyon is so much lower than

the north, the river would have had no reason to run across the slope for 277 miles. It would have run downhill. There would have been no Grand Canyon.

How, then, was the Canyon formed? There is no universally accepted theory among geologists. However, the Havasupai Indians who live there believe that it was scoured out by the receding waters of a great flood. There are good reasons to believe this explanation.

i. Missing Sediment.

Visual #12-55

At least a thousand cubic miles of sediment are missing from the Canyon itself (Austin, 1994, 88) plus tens of thousands of cubic miles eroded from the Colorado River's drainage area, enough to make a large mountain range. This much sediment flowing down the Colorado over millions of years would produce an enormous delta. However, the delta is not particularly large. If the sediment washed down the Colorado, it did so rapidly enough to be carried out into the ocean. This would have required a flow many times greater than the present rate.

ii. Topography of the Canyon.

Visual #12-56

The Canyon is not just a big hole in the ground. The Colorado River runs through the thousand foot deep inner gorge, but the main canyon is miles wider and thousands of feet higher. Throughout its length are elevated mesas, buttes, and plateaus. Most of them have no rivers or creeks running past. Presently observed processes of erosion could not have carved them. There had to be a vastly greater flow of water though the Canyon some time in the past.

iii. Indication of Rapid Deposition - the Redwall Limestone.

Though most sources say it took millions of years to erode the Canyon sediments, few deal with the question of how long it took to lay them down.

The Canyon contains fossils from bottom to top. Since dead animals and plants only turn into fossils when buried rapidly, the layers of sediment must have been laid down quickly.

Visual #12-57

Uniformitarians, on the other hand, believe the sedimentary layers were deposited slowly over millions of years. One particular segment of the Canyon, the Redwall Limestone, has long been considered to be devoid of fossils. No one ever bothered to check if this was correct until Dr. Steve Austin (a creationist) began to carefully inspect the limestone during his rafting trips down the Colorado River. In 1999 he issued his report to the Geological Society of America showing that the limestone actually contains billions of nautiloid fossils, spread out over about 15,000 square kilometers. The shells average about 0.8 meters, or about 31 inches. Many of the shells are smashed in, indicating that the animals were still alive at the time of burial but died and decayed while the sediment was still soft enough to collapse and crush them. The shells tilt toward the southwest at an angle indicating a sediment flow rate of about 5 meters/sec, or about 11 miles per hour (Austin et al., 1999). This indicates rapid burial on a large scale, not gradual deposition over millions of years.

iv. Petrified Forest.

Visual #12-58

About a hundred and fifty miles southeast of the Canyon lies the Petrified Forest, clear evidence of a great flood. This is not a forest at all – the trees lie on their sides, with no roots or limbs – but a collection of tens of thousands of huge trees that floated into place. Since they are all found in a fairly small area, the water that carried them must have drained off quickly. How? If we look on a map we see that the Little Colorado River, which flows past the Petrified Forest, lies

between two elevated areas running southeast to northwest as far as the Grand Canyon. A plausible explanation is the concept of a "breached dam:" the water covering the Colorado Plateau -- thousands of square miles -- backed up until it suddenly broke through this relatively low area and merged with the Colorado at the Canyon, leaving the logs behind.

Visual #12-59

v. Meteor Crater.

Midway between the Petrified Forest and the Grand Canyon lies Meteor Crater. This 570 foot deep crater resulted when the prehistoric Canyon Diablo meteorite, estimated at 60,000 tons, hit the earth at a speed of possibly 40,000 miles per hour. Most of the meteorite turned to vapor, but even so, the impact would have released an amount of energy equivalent to 1.7 million tons of TNT.

Visual #12-60

Austin tells us that "ballistic experiments liken Meteor Crater to the pockmark left by a rifle fired into soft mud" (Austin et al., 1993, 205). A bullet fired at a rock either shatters it or breaks off a piece, but a bullet fired into soft mud forms a small crater. Likewise, the way the sediments are pushed up at Meteor Crater shows that they were all still soft when the meteor hit. This and the smooth curvature of Canyon sediments show that something drastic happened within a short time after the layers were deposited. The meteor impact less than a hundred miles from the Canyon may have sent out a shock wave that helped release the catastrophic flow of water that scoured out the Canyon. At any rate, the layers of sediment could not have been laid down over millions of years. Nor, it seems, were they eroded over millions of years.

If we lay aside the evolutionary presupposition that the Grand Canyon is millions of years old we can envision what might have happened. A mile or more of sediment was deposited quickly under flood conditions. While this sediment was still fairly soft something drastic happened to uplift the Kaibab Plateau. This produced a bulge that finally cracked. The waters from the east and southeast flowed through the crack, scouring out most of the Canyon in a very short time.

It looks like the Havasupai Indians are right. It is eminently reasonable to believe that the Grand Canyon was carved by the receding waters of a great flood. Recent Creation has no problem explaining its presence. In fact, uniformitarianism is so full of flaws that the late Stephen Jay Gould, an ardent anti-creationist, admitted that strict uniformitarianism "was useful only when science was debating the status of the supernatural in its realm" (Gould, 1965).

To summarize: the evolutionary time scale is based on the assumption that slow, steady, gradual processes operated at the same rates in the past as they do in the present in order to produce the earth's entire geologic record. It would falsify the whole time scale if even a single phenomenon could be identified that could not be explained by present processes. (It takes only one non-barking dog to falsify the assumption that all dogs bark.) We've seen that not just one but a great many geologic phenomena are not explainable by known natural processes. We can either believe in unknown natural processes, or in unknown non-natural processes. Either way, it's a step of faith.

c. Salt Domes.

Visual #12-61

Around the world there are enormous salt deposits hundreds or thousands of feet thick. In many cases salt domes protrude upward thousands of feet from these deposits. Crude oil is often found trapped around these domes.

Evolutionists usually call these deposits *evaporites* because they claim that the salt was left by many miles of sea water evaporating over millions of years. This would be far too long a period to fit into a Biblical time frame. However, one of the most obvious problems with this scenario is that the deposits are extremely pure. If it took millions of years for them to form by evaporation, there would surely be a great deal of sediment or other debris that is present in sea water. There is not.

How else might these thick salt deposits have been laid down? Heerema (2009) has proposed that a better explanation is deposition by rapid flows of salt-containing magma (http://creation.com/magmatic-origin-salt-deposits) at over 800 degrees Celsius. Though there are no eyewitnesses to tell us whether evaporation or magmatic deposition (or something else) is correct, the extremely pure deposits fit much better with the concept of rapid deposition rather than slow, undisturbed evaporation over millions of years.

d. Coral Reefs.

Visual #12-62

A common argument for an old earth is that coral reefs form much too slowly to have accumulated in just a few thousand years. For instance, the Eniwetok Atoll in the Marshall Islands, the thickest known coral formation in the world, is estimated to be almost 4,600 feet thick.

This not a problem for young-earth advocates. The maximum known growth rate for coral is about 14 inches per year. At this rate, the reef could be built up in a little over 4,000 years. This would mean that the largest reef in the world could have been built since Noah's Flood. In addition, drilling samples have shown that much of the structure on which the reef has grown is calcium carbonate, not coral. Calcium carbonate can precipitate out of the ocean in volcanic regions fairly. Thus, the reef – the thickest in the world – could easily have accumulated since Noah's flood (Whitmore, 2010).

We cannot scientifically prove whether the earth is old or young, but we can analyze the arguments for either side. There are reasonable answers for every old-earth claim, but as we will see, there are several young-earth claims that have yet to be answered.

F. POSITIVE ARGUMENTS FOR A YOUNG EARTH.

Visual #12-63

All the evolutionary models, Progressive Creation, and the Gap Theory depend upon a great age of the earth. We have seen that (1) fossils do not take millions of years to form and (2) geologic features can form in a short time, sometimes a matter of days. (We will deal with radiometric dating shortly.) There is no compelling evidence to make us believe that the earth is millions or billions of years old. Christians need not feel it necessary to compromise and accept either Progressive Creation or the Gap Theory.

Visual #12-64

There's more. Not only are there no irrefutable arguments that the universe and earth are old, there are strong positive arguments that they are young – perhaps only a few thousand years old.

Visual #12-65

1. TEMPERATURE AND THICKNESS OF THE EARTH'S CRUST. (See Taylor, *In the Minds of Men*, pp. 292-294)

Evolutionists believe that the earth began about 4.6 billion years ago as a ball of molten rock, then gradually cooled from the outside in, forming a crust at the outer edge. As it continued to lose heat into space, its crust became thicker and thicker. Given enough time, even the center of the earth will harden into solid rock.

Visual #12-66

In order to calculate the earth's maximum possible age, let's assume that the earth did start as a molten blob. By measuring how fast it radiates heat into space, how thick the crust is, and how the temperature rises toward the center of the earth, we can get an

idea of the longest possible amount of time it could have been cooling. Since it could have been created with a solid crust in order to sustain life, the actual age could be anything less.

The great scientist William Thompson, better known as Lord Kelvin, dealt with this question in 1865. He showed that even if the earth had begun as white-hot molten rock, it could be no more than 400 million years old - less than a tenth the age evolutionists believe.

We now have much more accurate data about the crust's temperature than were available in Kelvin's day. In 1954 Ingersoll redid Kelvin's calculations using up-to-date values. He did two computations, one ignoring radioactivity as a possible heat source inside the earth and the other including it. He determined that if radioactivity was not a factor the earth could not be over 22 million years old; even taking it into account, the maximum possible age is 45 million years (Taylor, 1987, 292-294). This is only one percent of the amount of time evolution requires. And it could be any age less.

2. HELIUM IN THE ATMOSPHERE.

Visual #12-67

A number of radioactive decay series such as uranium and thorium involve alpha decay, in which a radioactive atom emits two protons and two neutrons in the form of an alpha particle. The alpha particle forms the nucleus of a helium-4 atom. Two electrons complete the atom, which then mixes into the gases in the atmosphere.

In order for any object to totally escape the earth's gravitational pull (e.g., a probe sent to the moon or beyond), it must achieve a velocity of about 25,000 miles per hour, or about 11.2 km/sec. For the molecules of a gas, we can calculate the average velocity by measuring the temperature in Kelvins. At the 300K temperatures found in the earth's upper atmosphere, an average Hydrogen molecule with its molecular mass of 2 grams per mole would travel at about 16 km/sec, fast enough for even the molecules with below-average velocity to break free. However, Helium-4 has twice the mass of H_2 and thus would have an average velocity of about 11.3 km/s, barely above escape velocity. The individual molecules with above-average velocity could escape, but many of the cooler ones would be left behind. Thus, as time passed more and more of the helium-4 produced by alpha decay would accumulate in the atmosphere. The problem is that even if the earth started with zero helium, there is only enough in the atmosphere to account for a maximum of about 11,000 years of radioactive decay (Ackerman, 1986, 80-81; White, 1985, 86-87). The atmosphere, it seems, must not be more than a few thousand years old. Evolution requires billions of years.

3. HELIUM DIFFUSION IN ROCKS.

Visual #12-67

Many radioactive decay series produce alpha particles, which quickly capture two electrons and turn into helium. Even though the helium starts out inside a rock, its molecules are so small that they can gradually work their way through the molecules of the rock until they escape into the atmosphere. At helium's measured rate of diffusion through granite and similar rocks, the escape time has been calculated to be a few tens of thousands of years. There should be no measurable helium inside rocks more than a few tens of thousands of years old, yet many rocks supposed to be hundreds of millions of years old have been split open and found to contain significant amounts of helium. Since the diffusion rate is known to a fair degree of accuracy, it seems likely that the rocks are just not that old.

4. RATE OF CARBON-14 PRODUCTION. (From Slusher, *Critique of Radiometric Dating*)

As we saw earlier, Carbon-14 is produced when cosmic radiation strikes nitrogen atoms in the upper atmosphere. The C-14 decays back to N-14 with a half-life of about 5760

years. Since the decay is relatively rapid, it is logical to assume that all the C-14 present in the atmosphere has been produced since the earth began.

Visual #12-69

Imagine you have a bucket with a small hole in it. You begin to add water at a rate faster than it can leak out through the hole. The bucket eventually becomes full. From then on, water pours over the edge as fast as you put it in. Likewise, cosmic radiation striking an atmosphere devoid of C-14 would produce C-14 (putting the water in) somewhat faster than the C-14 could decay back to N-14 (leaking out). Eventually, the atmosphere would reach a saturation point (the bucket begins to overflow), after which the rate of C-14 production and decay would be equal. It has been calculated that it would take no more than 30,000 years to reach this stage of equilibrium.

The problem is that the rate of C-14 formation has been measured at about 2.5 atoms/cm^2/sec, but the rate of decay is 1.9 atoms/cm^2/sec. This means that C-14 is being produced about 24% faster than it is decaying. The atmosphere has not yet reached equilibrium. Dr. Melvin Cook calculates that at the observed rates of C-14 production and decay it would take no more than 10,000 years for the atmosphere to reach its present concentration of C-14. Since the atmosphere and the earth came into existence about the same time, this implies that the earth is no more than about 10,000 years old.

5. THE MISSING METEORITES.

Visual #12-70

The earth's atmosphere is constantly bombarded with meteors. The great majority burn up because of friction with the air, but a few survive and reach the ground as meteorites. Several thousand have been found, many of which are in museums.

Suppose only one meteorite a year makes it to the earth's surface. If the sedimentary layers accumulated over billions of years, they should contain billions of meteorites. At least a few thousand of these should be exposed because of erosion or geologic activity, or should come up as part of the drilling debris from wells. Yet geologists have never discovered a single meteorite deposited in sedimentary layers lower than Recent (Ackerman, 1986, 26-28). This should lead us to question whether the geologic column took billions of years to accumulate. If it did, where are the meteorites?

Earlier in this chapter we mentioned Meteor Crater in Arizona. One might argue that the remnants of the Canyon Diablo meteorite there lie below ancient sedimentary layers. They do, but they embedded themselves after the strata were laid down. Remember that "ballistic experiments liken Meteor Crater to the pockmark left by a rifle fired into soft mud" (Austin et al., 1993, 205). The meteorite went through several layers that evolutionists thought had hardened millions of years before, yet they were all still soft. The strata must have accumulated rapidly, not slowly. This is what we would expect if they were produced by flood conditions, not billions of years of slow deposition and hardening.

6. OIL PRESSURE.

You may have seen movies where someone struck oil, releasing a gusher of crude oil hundreds of feet into the air. Such events are not just Hollywood fantasy. Oil spurts this high because it is under extremely high pressure underground.

Oil deposits are usually enclosed in sedimentary rock. Though the rock is hard, it has tiny pores through which pressure gradually dissipates. (The same thing happens to a balloon. It slowly gets smaller and smaller because the air leaks out through microscopic pores in the surface.) Dr. Melvin Cook has calculated that within about 10,000 years all the pressure in an oil deposit should have bled off into the surrounding rocks (Cook, 1960, 341). The fact that new high-pressure deposits are found all the time points toward an age of less than 10,000 years for both the rock formations and the oil within them.

Though oil is supposed to be tens or hundreds of millions of years old, the Carbon-14 method has showed much younger ages for many samples (Wysong, 1976, 159; Taylor, 1987, 337). Since carbon dating only works for ages up to a few tens of thousands of years, the tests should have shown infinite ages. The relatively young ages obtained show that the deposits must be many millions of years younger than evolution requires.

7. PLEOCHROIC HALOES. (From Chapters 1-6 in Robert Gentry, *Creation's Tiny Mystery*, Earth Science Associates, Box 12067, Knoxville,TN 37912-0067.)

Imagine you set off a firecracker in a bucket of water. Five minutes later what traces of the explosion are left? None. But imagine you set off the same firecracker inside a block of ice. As long as the ice stays frozen you can tell that an explosion took place because of the shattered area inside.

Visual #12-71

Much like the firecracker explosion, alpha radiation can produce visible results inside a rock, providing that the rock was fully hardened and not still molten when the radiation occurred. This is because each alpha particle comes shooting out of its parent nucleus as a single unit containing two protons and two neutrons, the equivalent of a helium nucleus. All the particle lacks in order to become a complete helium atom is two electrons.

- An alpha particle is thousands of times smaller than the smallest complete atom because it has no electrons. It is a mere nucleus.
- The force of attraction between charged particles depends upon both charge and distance. An alpha particle bumping into an atom of another element is thousands of times closer to that atom's outer electrons than their own nucleus is. It easily pulls away two of that atom's electrons.
- The alpha particle is small enough to slip between the atoms in the surrounding rock for a measurable distance, perhaps a few millimeters, before contacting one of them. The atom it contacts is damaged as it loses two electrons.
- While a single damaged atom would be too small to show any visible effects, a piece of uranium of only a few micrograms contains trillions of atoms and can damage its surroundings enough to produce a cumulative effect in the form of concentric spheres known as pleochroic haloes.

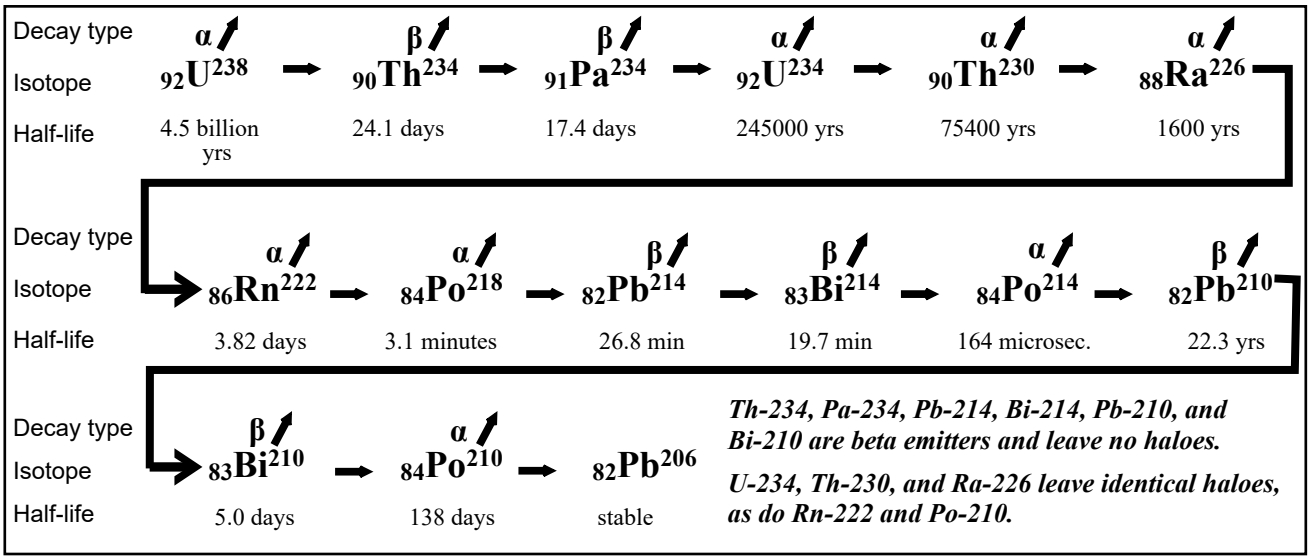
> Beta decay does not leave traces because a beta particle is simply an electron and does not damage the rock. Likewise, gamma is pure energy and also produces no visible damage.

Uranium-238, the source of many of these haloes, is one of the most abundant radioactive isotopes in the earth's crust. Our present understanding is that it and its daughters go through fourteen steps while decaying into Lead-206, producing eight alpha and six beta particles. The half-lives of each of the steps are as shown.

U-238 atoms go through alpha decay and turn into Thorium-234.
Th-234 emits a beta particle and turns into Protactinium-234.
Pa-234 emits a beta and turns into U-234.
U-234 emits an alpha and turns into Th-230.
Th-230 emits alpha and turns into Ra-226.
Ra-226 emits alpha and turns into Rn-222.
Rn-222 emits alpha and turns into Polonium-218.
Po-218 emits alpha and turns into Lead-214.
Pb-214 emits beta and turns into Bismuth-214.
Bi-214 emits beta and turns into Po-214.

Po-214 emits alpha and turns into Lead-210.
Pb-210 emits beta and turns into Bismuth-210.
Bi-210 emits beta and turns into Po-210.
Po-214 emits alpha and turns into Pb-206,
Pb-206 is not radioactive and decays no further.

Visual #12-72



Decay chain from U-235 to Pb-206 *(multiple sources)*

Visual #12-73

Remember that each alpha particle has a specific amount of energy that depends on the element and isotope that produced it, but beta does not leave traces. Thus, the above series could produce up to eight rings. However, U-234, Th-230, and Ra-226 are so close in energy that their rings are indistinguishable from each other. Likewise, Rn-222 and Po-210 produce indistinguishable rings, for a total of five possible rings from the whole U-235 decay chain (Pal, 2004). We can analyze the pattern of rings to determine which isotopes were present when the decay started.

Think about how the whole set of five haloes could have formed inside a rock. Igneous rocks are supposed to have formed billions or millions of years ago as the earth cooled from a swirling cloud of gas and dust. Eventually, this turned into liquid magma, which in turn would have taken hundreds or thousands of years to cool into solid rock.

Short-lived isotopes should not have left any traces inside the still-fluid magma, but once a rock containing U-238 solidified enough, it should have preserved haloes of the longest-lived isotopes including U-238, U-234, Th-30, and possibly Ra-226. Only when it was fully hardened would it be expected to preserve haloes of the short-lived isotopes Rn-222, Po-218, Po-214, and Po-210.

Visual #12-74

The problem is that many rocks contain haloes of the short-lived isotopes without any trace of the long-lived ones that are supposed to have produced them. Dr. Robert Gentry, widely recognized as the world's foremost authority on pleochroic haloes, personally studied well over a hundred thousand of them. He made the startling discovery that many "parentless" haloes were produced by Po-210 (half-life 138.4 days), Po-218 (3 minutes), and Po-214 (164 microseconds). Within about ten half-lives after Polonium appears, virtually all of it decays. In the case of Po-214, the decay is essentially complete within one second.

Even in the present day, a sample of U-238 could be expected to produce a series of halos as described above. At the center we would expect to find remnants of the

longer-lived "parents." However, it would be a shock to find haloes only of the shorter-lived isotopes without any of the long-lived parents present. Yet this is precisely what Dr. Gentry discovered. Many of the blocks of granite he studied contained parentless Po-210, Po-218, and Po-214 haloes. Since the Po isotopes are supposed to be a product of the decay chain of U-238, their parent isotopes (U-238, U-234, Th-230, and Ra-226) element should be present. However, in many cases they are not.

Dr. Gentry had been publishing his study of radiohaloes for many years without negative consequences. However, in one of his articles he finally challenged the scientific community to come up with another explanation besides the one that seemed most reasonable to him: Instantaneous creation of the granite with polonium inside. No one has yet been able to show any errors in his work. Instead, the National Science Foundation, while continuing to acknowledge him as the world's foremost authority, cut off his research funding because of "budget cutbacks." They were paying him a dollar a year.

Though evolutionists reject Gentry's conclusion, they cannot fault his methodology. No one has been able to prove him wrong. The arguments raised against his work are based on speculation rather than observation. (See *Creation's Tiny Mystery*, Chap. 2.)

- Some say that since Polonium is part of the decay sequence from Uranium to Lead, it could have been produced by the decay of Uranium isotopes and their daughters. The missing U-238 and U-234 haloes show us that this is not the case. As we saw above, several of the stages from Uranium to Polonium emit alpha particles. If any of these had been present they would have left haloes of their own. Since there are no such haloes, we can conclude that none of the intermediates were present.
- Others argue that Pb-210 and Bi-210 could have turned into Po-210 without leaving haloes because they do not undergo alpha decay. However, the half-lives of these isotopes are 22 years and 5 days respectively. These are both many times longer than the Po-214 just before them in the decay series. They would have decayed millions of years before the rocks cooled enough to preserve Po-210 haloes. And where are *their* parents?
- Similarly, Po-214 could have come from Pb-214 or Bi-214, but these have half-lives of 27 minutes and 20 minutes. They could not have lasted more than a few hours in molten rock.
- There is no known beta decay parent for Po-218. In the cases where its alpha tracks are the only ones found in a rock, it must have been present from the time the rock formed. Since its half-life is 3 minutes, the rocks must have crystallized within an hour of their formation.

Visual #12-75

The Polonium haloes do not prove that the earth is young, but they point toward the conclusion that whenever it came into existence, it did so within a matter of hours. This cuts hundreds of millions of years off its evolutionary age. And if evolutionists are forced to admit that the earth was formed in less than a day, they have no valid reason to reject divine creation. Neither is there any need for Christians to compromise by following the Gap Theory or Progressive Creation.

IV. OLD-EARTH ARGUMENT #3: RADIOMETRIC DATING.

Visual #12-76

An atom has a nucleus composed of *protons* and *neutrons*, with *electrons* moving somewhere around the outside in regions called *orbitals*. Despite the fact that there is a repulsive force between the positively charged protons in the nucleus, most nuclei that have more than one proton do not fly apart. Scientists do not know why, so they use the term "strong nuclear force"

to describe whatever keeps the nuclei together. However, some nuclei *do* break down. As they do, they release various types of radiation - hence the name radioactivity.

Scientists use radioactivity to try to determine how old things are. They measure the ratio between an unstable radioactive "parent" element whose atoms release various types of decay particles and a *radiogenic* (radioactively produced) "daughter" which they eventually turn into.

Visual #12-77

The two types of radioactivity that produce new elements are *alpha* and *beta* decay. (The third type, *gamma*, does not produce new elements.)

- The first releases an alpha particle composed of two protons and two neutrons. As these leave the nucleus, they lower the atom's atomic number by two and its mass number by four.
- Beta decay occurs when a neutron in the nucleus breaks down, releasing a high-energy electron or beta particle and leaving behind a proton where the neutron was. Since neutrons don't count in determining the atomic number but protons do, beta decay actually increases the atom's atomic number by one. However, since an electron has only about 1/1800th the mass of a neutron, beta decay leaves the mass number unchanged.

Nobody is quite sure why radioactive decay occurs; it just does. The process may occur in one step (e.g. Carbon-14 changes to Nitrogen-14 by beta decay), or it may go through many intermediate stages, as in the case of Uranium-238. This isotope goes through 14 steps (both alpha and beta decay) on its way to becoming Lead-206.

Visual #12-78

Since we are not sure why an individual atom undergoes radioactive decay, we cannot predict when it will happen. However, large numbers of radioactive atoms (trillions or more, which may be only a tiny fraction of an ounce) have been found to behave in a statistically predictable way. If we take any given sample of a radioactive element, the amount of time it takes for half of it to decay is known as its *half-life*. For instance, suppose we have a 100 kilogram sample of uranium. After one half-life, half (50 kg) will still be uranium but the other half will have decayed into lead. After another half-life, half of what was left will have decayed so that only one-fourth of the uranium (25 kg) remains, while three-fourths (75 kg) has decayed into lead. After another half-life, only one-eighth of the original uranium (12.5 kg) remains while seven-eights (87.5 kg) has decayed into lead, and so on.

Each radioactive isotope has a different half-life. By calculating the ratio of parent-to-daughter of the isotopes in a rock sample and making several major assumptions (see below), we can estimate how many half-lives the sample has gone through and thus estimate its radiometric age.

The most commonly used radioactive dating methods, along with the currently accepted half-lives of the parent elements, are as follows.

Visual #12-79

PARENT	DAUGHTER	HALF-LIFE
Carbon-14 decays to	Nitrogen-14	5730 years
Potassium-40 decays to	Argon-40	1.3 billion years
Uranium-235 decays to	Lead-207	713 million years
Uranium-238 decays to	Lead-206	4.51 billion years
Rubidium-87 decays to	Strontium-87	47 billion years

(Slusher, 1981, 12-45)

Since almost all the parent would be gone within about ten half-lives, the ages detectable by any of these methods are limited to a few half-lives.

A. UNCERTAINTIES OF RADIOMETRIC DATING.

Though Carbon-14 is the best-known radiometric dating technique, its short half-life limits its usefulness to ages of a few thousand years. If we want to determine the age of an object

believed to be extremely old such as a volcanic (igneous) rock, we must use one of the methods that depend upon long half-lives.

Visual #12-80

A reliable clock must meet three criteria: (1) Initial conditions must be known, (2) the rate of change must be known, and (3) the clock must not have been tampered with at any time. Radiometric dating fails on all three points.

1. INITIAL RATIO OF PARENT TO DAUGHTER.

Visual #12-81

Rocks contain many elements. In cases of radioactive decay, some of the parent is present as well as some of the daughter and a great many other minerals. In order to date a rock, we compare the present ratio of parent to daughter to the ratio at the time the rock was formed. Thus, we must know what the ratio of parent to daughter was at the beginning. But since no human observer was present to record this ratio in the distant past, we have no way to know this.

a. Origin of Radioactive Elements.

Visual #12-82

Many radiometric methods start with the assumption that any given sample started with 100% parent and 0% daughter. However, since evolutionists do not know how heavy elements were formed, their own ideas would lead us to conclude that some of the daughter elements might have been building blocks in manufacturing the parent. Thus, they must admit that if the earth cooled from molten rock, some of each isotope considered to be a radiogenic daughter might have been present from the beginning.

b. Imperfect Mixing.

Magma, the molten rock that spews out of volcanoes, contains many imperfectly mixed elements from inside the earth. Because of this imperfect mixing, there is no way to know if the ratio of parent-to-daughter in the magma at the site of the volcano is the same as the ratio anywhere else. Thus, the parent-to-daughter ratio in any given rock may not accurately represent the overall ratio in the earth's interior. This makes it even harder to determine how much of the daughter was there when the rock came out of the volcano and how much is radiogenic. We cannot legitimately use the parent-to-daughter ratio to determine the rock's age. In other words, the initial conditions are unknown and unknowable.

c. The Early Environment.

Creationists believe that by the third or fourth day of the creation week, the earth was capable of supporting modern organisms. If this is true, conditions would have been similar to those in the present. There would probably have been a mixture of parent and daughter from the beginning.

Either way, our assumptions about the initial parent-to-daughter ratio are nothing more than guesses. If we are wrong, the ages we obtain may be wrong by billions of years.

2. CONSTANT RATE OF DECAY.

Visual #12-83

Has the rate of radioactive decay remained constant throughout the entire time since the rock was formed?

Radioactivity was discovered at the end of the nineteenth century. Radioactive decay rates were first determined several decades later by measuring clicks on a Geiger counter over a few days (Taylor, 1987, 296-297). Many scientists through the years repeated the counting process, yielding the published half-lives which are the averages of the values obtained.

The fact that we use an average implies that some values are not exactly the same as others, calling into question the accuracy and precision of the whole process. But even if we had been constantly observing the rate of decay for a hundred years, it takes

an incredible amount of *extrapolation* (going beyond the data) to insist that the rate has remained absolutely constant for the earth's supposed age of 4.6 billion years.

Visual #12-84

Imagine you observe a jet flying past for one second. Could you tell how fast it had been traveling for the last 522 days? Of course not! Yet this is the same amount of extrapolation - 45,000,000 times the available data - as applying 100 years of observation to our planet's supposed age of 4.5 billion years.

Those who insist that radioactive decay rates are constant should be honest enough to admit that we don't know why individual atoms decay. Within any given sample of radioactive material, some atoms decay immediately, while others may not change for millions of years. Some scientists believe the process is completely random, but others think an atom decays when it is struck by some subatomic particle such as a neutrino. If the former group is right, the decay rate may be constant. However, if the latter is correct, an event that increased the neutrino density (such as a supernova, which occurs about every 25 years in our galaxy) would greatly speed up the decay rate.

A number of experiments have shown that decay rates are not so constant as we thought. Between 1949 and 1972 scientists were able to induce changes in the decay rates of 14 different elements by using changes in pressure, temperature, chemical state, electric potential, and stress of monomolecular layers. Some of the elements that show a definite difference in decay rate are Beryllium-7, Nobelium-90, Cesium-133 and -137, Carbon-14, and Uranium (Slusher, 1981, 20-22; White, 1985, 69-71).

More recent studies show that under *plasma* conditions, extremely high temperatures where electrons are completely removed from nuclei, beta decay rates can be up to a billion times faster than normal (Woodmorappe, 2001). Though we cannot be certain why this happens, we can make a logical guess. Suppose the decay of a radioactive nucleus is not purely random but has some as yet unknown cause. Under normal circumstances, the electrons in orbit around the nucleus seem to have a shielding effect. Removing those electrons would remove this effect, allowing the decay rate to increase drastically.

Such a scenario ties in nicely with Humphreys' (1994) and Boudreaux's (2003) ideas about the origin of the chemical elements. They believe that rather than starting with only hydrogen, God began the universe as an enormous ball of water perhaps two light-years in diameter. The internal gravity of the water ball would have been sufficient to start the process of nuclear fusion and produce the known naturally-occurring elements.

What kind of conditions would have existed inside the ball of water? Plasma! Thus, as new radioactive isotopes were coming into existence by fusion, others would be forming by accelerated decay. What would seem to be millions or billions of years of decay products could have formed in a matter of hours.

This causes a serious problem for evolutionists who depend on radioactive decay rates to show that the earth is old. Their scenario of elements being produced in stars and supernovae also requires plasma conditions! Thus, decay rates would have been far faster at the beginning than at present so that as the earth cooled, it would have already had a large volume of radioactive decay products. This would destroy the reliability of radiometric dating methods.

Visual #12-85

More recent studies (Sturrock, Buncher, et al., 2010; Stober, 2010) reveal the surprising fact that not only are radioactive decay rates *not* constant, they vary predictably according to the earth's position with respect to the sun. Researchers at Purdue and Stanford Universities have detected several anomalies in radioactive decay rates.

(1) They go through a cycle of fastest to slowest every 33 days, believed to be the rotation rate of the sun's core.
(2) In the wintertime when we are slightly closer to the sun the decay rates accelerate a tiny bit; in the summertime when we are farther away, they slow down slightly.
(3) Decay rates seem to drop slightly just before solar flares.

Scientists have long thought that radioactive decay was a completely random, uncaused process. However, this study has forced some of them to consider the possibility that there may be unknown processes going on inside the sun and releasing unknown particles or forces that affect decay rates. If so, there would be no way to be sure that radioactive decay rates have always been absolutely constant.

Regardless what the cause of decay might be, decay rates can be increased. That's how atomic bombs work. We have no way to be sure that they have always been the same as they are today. Thus, the past rate of change in radiometric systems cannot be known.

Because of our inability to know the initial ratio of parent-to-daughter and the uncertainty of decay rates, we cannot use radiometric dating to do any more than set upper limits on the age of any object.

3. NO PARENT OR DAUGHTER ADDED OR REMOVED.

Visual #12-86

Has any of the parent or daughter been added or removed at any time while the system has been in operation?

If there was any disturbance to the system while the decay process was going on, the age estimates are not reliable. Consider the fact that the earth's crust is constantly changing due to erosion, earthquakes, floods, and many other such disruptions. In order to furnish trustworthy radiometric ages, samples of radioactive elements found in the crust would have had to remain undisturbed throughout hundreds of millions of years, while entire continents eroded around them many times over. This is not only unreasonable, it is ridiculous.

Some radioactive parents and decay products are water soluble, e.g., uranium salts and lead salts. If the rock gets wet even one time, the radioactive age is unreliable. Is there any rock on earth we can be sure has never gotten wet a single time in 4.5 billion years? Of course not.

Radioactive dating is not reliable because there is no way to know that we are correct about any of these factors. All we can do is assume. Our assumptions enable us to set upper and lower limits on the age of a rock, but the accuracy of these limits depends on the accuracy of our assumptions. We can never be sure of the exact age. If we are wrong in any one of these assumptions, we may obtain an age which is incorrect by thousands or even billions of years.

B. POTASSIUM-ARGON DATING.

Visual #12-87

One of the radiometric methods used most commonly to indicate great ages is potassium-argon. Despite the confidence evolutionists place in it, the technique is full of uncertainties.

Potassium is abundant in rocks throughout the world. It occurs in three isotopes: K-39 and K-41, which are both stable and account for over 99.9% of the known potassium, and K-40, which is unstable and accounts for just over 0.01%. Its half-life is calculated at about 1.26 billion years.

Researchers have observed a "branching" phenomenon: almost 89% of the time that K-40 decays, its nucleus ejects an electron (beta decay) and turns into Calcium-40, but about 11% of the time it turns into Argon-40 by exotic processes involving electron capture or positron decay. Ca-40 is not used in the dating method because most of its abundance in

the rocks is not thought to be radiogenic, so it is impossible to tell what portion in any given rock might be the result of radioactive decay. Ar-40 is used because it is a much rarer substance and is a noble gas that does not react with other elements.

Potassium-Argon dating depends upon three main assumptions.

1. The earth's rocks began in a molten state, and cooled over hundreds of millions of years.

2. Any K-40 that decayed while the rocks were still molten would have left no traces because the Ar-40 would have leaked out into the atmosphere.

3. Once the rock hardened, no Ar-40 could escape. The ratio of the remaining K-40 to Ar-40 allows us to tell the age of the rock.

An obvious problem is that if a rock ever stopped being a closed system, that is, if it "opened up" and allowed any of the Ar-40 to escape to the atmosphere, the K-Ar ratio would no longer give reliable results. This could happen if the rock did something as simple as heat up. It would not even need to melt all the way. If it softened even a little bit, some of the gas could escape. Even evolutionists have to admit that there have been many volcanic events in the earth's history. If any of these affected a rock that contained K-40 and Ar-40, the radiometric ages could be off by billions of years.

C. PROBLEMS WITH CARBON-14 DATING.

Visual #12-88

The uncertainties above make it plain that radioactive dating is inconclusive and cannot be used to measure the age of the earth. However, since most people have at least heard of Carbon-14 and are are under the mistaken impression that fossils are dated by it, let us look at how the technique works and what its limitations are.

Carbon-14 comes from Nitrogen-14, the most abundant gas in the atmosphere. Nitrogen normally has seven protons and seven neutrons. Scientists believe that some nitrogen atoms are struck by cosmic radiation as they circulate in the upper atmosphere. The most commonly accepted model says that the radiation alters the atom by knocking one of its inner electrons into the nucleus, where it combines with a proton to produce an unstable neutron in a process known as *k-capture*. The result is C-14, an unstable atom with six protons and eight neutrons. (By comparison, the normal isotope of carbon, C-12, has only six neutrons and is stable.) The unstable neutron eventually decays back into a proton, changing the atom back into N-14.

Carbon gets into living things through plants and similar photosynthetic organisms which are at the bottom of the food chain. As long as these are alive, they build their cell structures from scratch by photosynthesis. They use a mixture of C-14 and C-12 in the same ratio as that in the atmosphere, presently about a trillion C-12 atoms to every one C-14. After they die, they stop taking in either form of carbon. The unstable C-14 in their cells begins to decay back into Nitrogen-14, but the stable C-12 does not change. Likewise, as long as an animal lives it should have the same C-14/C-12 ratio as the plants it eats. At the animal's death, it also stops taking in either form of carbon. Since the C-14 is unstable, the ratio of C-14 to C-12 in its carcass will begin to change too.

The present ratio of C-12 to C-14 in the atmosphere is estimated at about a trillion to one. In order to estimate ages by C-14 dating, we measure the ratio of these two isotopes in the object being dated, expecting that if it were alive it would contain the same ratio as the atmosphere. If the ratio is lower – e.g., two trillion to one, or one half the expected amount – we would estimate that the organism stopped taking in C-14 one half-life ago and thus must be one half-life old, or about 5700 years.

There are several reasons this technique is not used to date any but the most recent fossils.

1. ***LOSS OF CARBON CONTENT.***

Visual #12-89

The carbon in most fossils has been replaced by other minerals. You can't carbon date something that doesn't contain carbon.

Even in cases where there is enough carbon to allow carbon dating, several other factors limit the accuracy of the technique.

2. ***ENVIRONMENT.***

If an animal or plant lives in an environment unusually low in C-14, it will not absorb much C-14 and thus will show an artificially high age. This can easily happen in sea creatures living in an area rich in sea shells. The shells consist mostly of calcium carbonate formed from the carbon available in the water. Since relatively little C-14 from the atmosphere reaches them, they use mostly C-12. The shells, the organisms that live in them, and the animals that eat those organisms will all show exaggerated C-14 ages.

3. ***ATMOSPHERIC C-12/C-14 RATIO.***

C-14 dating assumes that the ratio of C-12 to C-14 in the atmosphere has not changed in the last several thousand years. This is not true. Scientists have measured both the rate at which C-14 is produced and the rate at which it decays. The rate of production is about 24% faster than the rate of decay (Slusher, 1981, 50). This means that the farther back in time we go, the less C-14 was available. An object older than a few thousand years would have started with a low amount of C-14, making it show an excessively old age. The farther back we try to go, the less reliable carbon dating is.

4 ***SHORT HALF-LIFE.***

Since Carbon-14 has a half-life calculated at about 5730 years, it is only used to date objects believed to be less than a few tens of thousand of years old. The fact that most fossils are dated at millions of years tells us immediately that they were not carbon dated.

5. ***EXTERNAL FACTORS.***

Like any radiometric method, C-14 dating requires that the system be free from outside interference. If anything (e.g., a fire) adds or removes carbon or nitrogen from the system, the technique is no longer reliable.

6. ***CONCENTRATION OF C-14 IN THE ORGANISM AT DEATH.***

Some of the plants that build up their cell structures by taking carbon from the atmosphere seem to be able to distinguish between the isotopes of carbon, and reject all but C-12 (Folger, 1994, 28). Since their cells start with a low amount of C-14, they would show excessive ages if carbon dated. Likewise, any animal that ate them might also show an erroneous age, since it uses the carbon in the plant cells to build its body cells.

D. OTHER REASONS FOSSILS ARE NOT RADIOACTIVELY DATED..

Visual #12-90

Even if radioactive dating were reliable, there are at least two other reasons why it is of very limited usefulness in dating fossils.

1. ***SEDIMENT TOO FINELY DIVIDED TO DATE.***

In order to be datable, a piece of rock must be large enough to give a good sized sample of the elements involved. However, the sedimentary rocks that contain fossils are composed of finely divided particles of dirt, sand, and other minerals, each of which contains too little radioactive material to date.

2. ***ONLY VOLCANIC ROCKS DIRECTLY DATABLE.***

Only igneous (volcanic) rocks contain enough radioactive material to be radiometrically dated. These originated as molten rock. Any living thing in their path would have been destroyed, not preserved as a fossil.

E. EXAMPLES OF ERRONEOUS RADIOMETRIC DATES.

Visual #12-91

Radioactive dating is nowhere near as reliable as most people think it is. The commonly used methods such as C-14, Rubidium-Strontium, and Uranium-Lead often give wildly erroneous "ages" because of the uncertainties inherent in any radiometric dating technique. A few examples:

- The hair of a frozen mammoth found at Checkurovka, Siberia was carbon dated at 26,000 years, but the peaty soil in which it was preserved was dated only 5,600 years (Fairhall *et al*., 1966, 498-506).
- "The Carbon-14 contents of the shells of the snails of *Melanoides tuberculatus* living today in artesian springs in southern Nevada indicate an apparent age of 27,000 years." (Riggs, 1984, 58-61)
- Tissue from a living mollusk was dated by the carbon-14 method at over 2,300 years (Keith & Anderson, 1963, 634). The water in which it lived was rich in carbon-12 from dissolved limestone, producing an abnormally high ratio of C-12 to C-14.
- Two different C-14 ages 15,000 years apart were obtained from the same block of peat in New Zealand (Goh, Tonkin, & Rafter, 1978, 463-466).
- Dried seal carcasses less than 30 years old have been carbon dated as old as 4,600 years. Likewise, the blood of a seal freshly killed at McMurdo Sound in the Antarctic was tested by Carbon-14. The test said that the seal had died 1,300 years ago (Dort, 1971, 210).
- The rocks containing Louis Leakey's "Nutcracker Man" were dated by the potassium-argon method at 1.75 million years. However, bones found below that stratum, which should be older, were dated at only 10,000 years by the C-14 method (Berger & Libby, 1969, 194-209).
- Lava rocks in Hawaii were dated by the potassium-argon method at almost 3 billion years. However, the rocks were not formed until the volcano erupted in 1801, less than 200 years before (Funkhouser & Naughton, 1968, 4601).
- Moon rocks have been dated by various radiometric techniques. The results of the tests have not been consistent with each other, but varied from 700 million to 28 billion years (Whitcomb & DeYoung, 1978, 98-102).
- Rocks from one of the lava domes at Mt. St. Helens yielded potassium-argon ages ranging from 350,000 to 900,000 years. The radiometric age of several samples of the mineral pyroxene at the same location ranged from 1,700,000 to 2,800,000 years. The actual age of the rocks at the time was a mere ten years (Austin, 1996, 335-343).

These ages were wildly incorrect because they depended upon the assumptions described above, at least one of which was wrong in each case. The uncertainty in the assumptions means we cannot be sure that *any* radioactively dated object is really the age the tests say. All we can realistically do is set an upper limit on the object's age. It could be anything less.

Recent work in carbon dating (Baumgardner *et al*., 2003, 127 - 142) shows just how poorly it fits with evolution. In the past, researchers had to count clicks on a detector such as a Geiger counter to estimate how much C-14 was present in a given sample. Because normal background radiation also caused clicks, this technique was uncertain enough that it could not be used beyond about ten half-lives (corresponding to perhaps 57,000 years under perfect circumstances, which don't exist). Anything older should register no C-14 at all and show up as an infinite age.

Visual #12-92

Baumgardner's team performed its C-14 dating by means of an updated technology called *accelerator mass spectrometry* (AMS). The previous technique was limited because the percentage of C-14 is very low to begin with. Only about a thousandth of that amount

– extremely difficult to detect – would be left after ten half-lives. However, AMS allows us to detect the presence of C-14 with about 100,000 times more sensitivity. With it, we should be able to identify samples up to about 43 half-lives old, or 250,000 years.

The team reexamined the carbon-dating literature in light of AMS and also did some carbon dating on their own. Out of hundreds of samples of objects such as dinosaur bones and oil thought to be hundreds of millions of years old, only two failed to yield a detectable amount of C-14. For all the rest, the calculated ages were significantly less than 250,000 years! In fact, many supposed to be 300,000,000 years old instead point to a maximum age of about 90,000 years. (And of course, the true age could be anything less.)

We can only conclude that, rather than showing that the fossils are hundreds of millions of years old, carbon dating shows that they are considerably less than a hundred thousand years old, maybe just a few thousand.

F. ISOCHRON DATING.

Visual #12-93

In an attempt to get around some of the uncertainties of radiometric dating, geologists have devised several dating methods known as *isochrons*. These attempt to eliminate the need to know the initial ratio of parent to daughter.

For a detailed critique of isochron methods, see Arndts, Overn, Bartz, & Kramer, *Radiometric Dating Isochrons and the Mixing Model,* available from Bible-Science Association, P.O. Box 32457, Minneapolis, MN 55432-0457, (612) 755-8606. Following are some of the key points.

Most rocks are a mixture of many elements. In order to perform isochron dating, we need to focus on just two at a time, e.g., Rubidium and Strontium. We first gather a number of rock samples that contain a radioactive isotope (e.g., Rb-87) and a radiogenic daughter (e.g., Sr-87) into which it decays, plus at least one other isotope of the second element (e.g., Sr-86) which is non-radiogenic and occurs naturally. The non-radiogenic isotope is used as a reference. In our example of Rubidium and Strontium, the amounts of Rb-87 and Sr-87 should change through time but the amount of Sr-86 should not. If we compare the two substances involved in the decay process to the one that is not, we should ideally see that the ratio of Rb-87 to Sr-86 decreases while the Sr-87 to Sr-86 ratio increases.

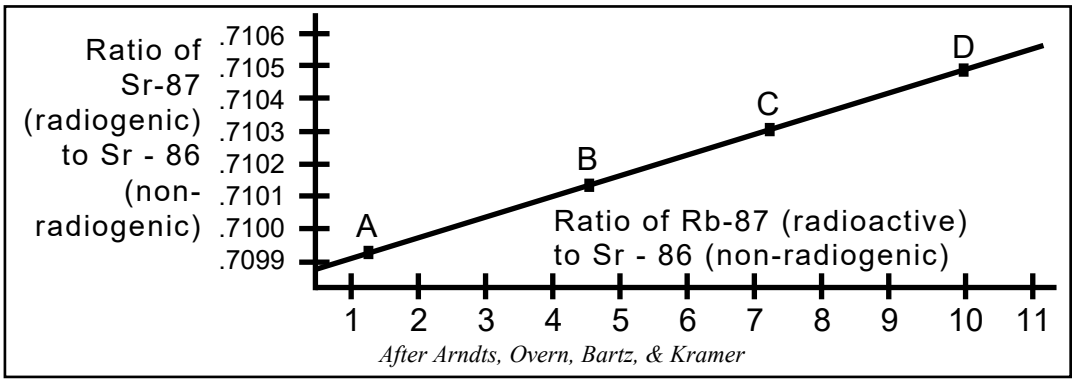
Shown below are some of the combinations used in isochron dating. The left column shows the radiogenic daughter as compared to the original parent isotope, while the right column shows the radiogenic daughter as compared to the non-radiogenic isotope.

Parent/ Non-Radiogenic Isotope		**Radiogenic Daughter/** Non-Radiogenic Isotope
Rb-87/Sr-86	vs.	Sr-87/Sr-86
K-40/Ar-36	vs.	Ar-40/Ar-36
U-232/Pb-204	vs.	Pb-208/Pb-204
U-235/Pb-204	vs.	Pb-207/Pb-204
U-238/Pb-204	vs.	Pb-206/Pb-204
Sm-143/Nd-144	vs.	Nd-143/Nd144

(Arndts, Overn, Bartz, & Kramer, p. 20)

Samples are taken from several places throughout a rock. If any of the combinations shown above are present, the parent/non-radiogenic and radiogenic/non-radiogenic ratios are plotted against each other. If everything goes well, the result looks something like the graph below.

Visual
#12-94



1. RATIONALE OF ISOCHRON DATING.

The technique assumes that when a rock sample formed it contained a mixture of the radioactive parent, the radiogenic daughter, and the non-radiogenic isotope. As time went on, some of the parent decayed into the radiogenic daughter. This made the ratio of parent to non-radiogenic isotope decrease and the ratio of radiogenic daughter to non-radiogenic isotope increase. Since individual atoms decay at different times we compare samples taken from different places in the rock to see how the ratios have changed in different places.

As an example: suppose we find a ratio of 0.7100 radiogenic-to-non-radiogenic in one sample and 0.7105 in another, as in the graph above. Since the amount of parent should decrease as the radiogenic daughter increases, we look for a smaller ratio of parent-to-non-radiogenic in the first sample and a larger one in the second. If we find it, we consider that the parent has decreased and the daughter has increased relative to the non-radiogenic reference isotope. We graph these two ratios and use the slope of the resulting line to come up with an age estimate that is supposed to be independent of the initial parent-to-daughter ratio.

2. FATAL FLAWS IN THE METHOD.

Despite bold claims for isochron dating, at least four major flaws render the results meaningless.

a. Imperfect Mixing.

Isochron dating relies on the assumption that the rocks contained a homogenous (perfectly uniform) mixture of elements at the beginning. Is this valid? Certainly not. Even today, we can see that rocks are far from perfectly mixed as they come out of a volcano.

b. Arbitrary Meaning of Slope.

The line on the graph only gives us a slope. We decide what it means. If the slope is 1.09, why should that mean 1.09 billion years instead of 1.09 million, 1.09 thousand, or 1.09 of anything else?

c. Negative Ages.

In some cases, the slope of the line is negative, indicating a negative age (Arndts et al., pp. 16 & 24) - a physical impossibility. Evolutionists must *discard the data*, but creationists point out that imperfect mixing explains this phenomenon.

d. Need for a Closed System.

If any of the non-radiogenic element was ever added or removed the isochron is useless. We have no way to be sure this didn't happen.

Visual
#12-95

The unreliability of the Rb-Sr isochron method is obvious in the dating of two Grand Canyon lava flows: the Cardeñas Basalt at the bottom of the canyon, believed to be about a billion years old, and the Uinkaret Plateau basalt at the top of the canyon,

believed to be only about a million. Rubidium-Strontium showed an age of about 1.07 billion years for the Cardeñas rocks. No surprises here. Exactly the same technique was then applied to the Uinkaret, which showed an age of about 1.34 billion years - over a thousand times too old, and 270 million years older than the rocks at the bottom (Austin, 1994, 127). Either the isochron method is unreliable or else the Grand Canyon is upside down.

G. GEOCHRONS.

Geochrons are merely isochrons on a wider geographic scale. They, too, must assume a perfect mixture of elements at the beginning. This assumption is clearly wrong. We have no way to be sure how much parent and daughter were present in any ancient rock at the time it formed, much less in many rocks spread over a wide area.

Visual #12-96

Remember that most people believe the earth is billions of years old because (1) They think it takes millions of years to form fossils, (2) They believe geologic features took billions of years to form, and (3) They think radioactivity proves the earth is old. None of these reasons is very persuasive.

SUMMARY

Visual #12-97

Evolutionists believe the earth is old not because of any testable scientific methods, but because uniformitarianism requires it. However, uniformitarianism as a scientific principle is dead. There is good evidence that the geologic column is not the result of slow, gradual processes of erosion and sedimentation. It seems to be largely the result of rapid, catastrophic processes.

Few geologists believe in strict uniformitarianism anymore. Some are honest enough to admit that nowadays this belief is invoked only to eliminate the supernatural (Gould, 1965, 227). Many have adopted a sort of hybrid model that allows for periods of uniformity punctuated by catastrophic events. This is similar to what most creationists believe, except for the duration of the periods of uniformity.

The vast time periods required by evolution, the Gap Theory, and Progressive Creation are built on the foundation of uniformitarianism. The foundation is cracked. Nevertheless, many still believe the earth is old because this is the only way they can push God out of their lives. He is not so easy to get rid of. As we saw in Chapter One, everyone has to believe in some influence that is invisible, supernatural, eternal, omnipresent, omnipotent, and self-existent. Creationists and theistic evolutionists call their influence God; atheists call theirs Random Chance. Either must be accepted by faith.

In this chapter we have seen that the first two characteristics of the fossil record, catastrophism and ecological communities, are compatible with the predictions of recent creation. There is no need to compromise with evolution. Nor is there compelling evidence that the earth is billions of years old. There is good evidence that it may be much younger. In the next three chapters we will see that the fossils themselves deal the greatest blow of all to evolutionary theory.

Because this book does not claim to have all the answers, we touched only lightly on the subjects of coal formation, “multiple forests,” and varves in Green River shale when we discussed the Mt. St. Helens eruption. Many other questions are still unanswered, and some interesting old age arguments remain. A number of excellent books go into detail about these arguments. By all means, encourage your students to study further. A good place to start would be to write for a book catalog from I.C.R. or the Bible-Science Association at the addresses in the preface of this book, or to contact Christian Answers on the Internet at www.christiananswers.net, Answers in Genesis at www.answersingenesis.org, ICR at www.icr.org, or Creation Ministries International at www.creation.com.

CHAPTER 12 REVIEW QUESTIONS

1. Can we scientifically prove the age of the earth? _____
2. The Bible implies that the age of the earth should be measured in _____ of years.
3. Evolution says that the age of the earth should be measured in _____ of years.
4. The belief that geologic processes happen at slow, steady, gradual rates is called _____.
5. Every old-earth belief denies that there was ever a worldwide _____.
6. Many of the geologic layers are named for the _____ where the suites of fossils were first identified.
7. The "Law of Superposition" says that strata on the bottom are always the _____.
8. What did mud flows at Mt. St. Helens, Armero (Columbia), Vargas (Venezuela), and Drugchu (Tibet) show about how long it can take for sediment to pile up? _____ _____
9. Where do young-earth creationists believe the waters of the Flood went? _____ _____
10. How many generations after the Flood does the Bible say the Tower of Babel was built?_____ _____
11. How many people might there have been by the time of the Tower of Babel? _____ _____
12. An Ice Age in the century after Babel might help explain how unusual animals got to _____ _____
13. Can present processes at present rates explain a Big Bang, formation of the naturally occurring elements, star formation, etc.?_____
14. Where is the complete geologic column found in nature? _____
15. Creationists believe sedimentary layers were deformed while still _____. Evolutionists believe they were already fully _____.
16. How long did it take for 600 feet of sediment to be deposited at Mt. St. Helens? _____
17. How long did it take to erode "Engineer's Canyon" through the sedimentary rock? _____ _____
18. How long did it take to form the 700 foot deep "Step Canyon" through granite? _____ _____

19. Both the South and North Rims of the Grand canyon are more than a _____above the surrounding Colorado Plateau.
20. How much sediment is missing from the Grand Canyon? _____
    _____
21. The nautiloid fossils in the Redwall Limestone indicate that the sediment must have been deposited _____.
22. Do salt domes and coral reefs have to take hundreds of thousand of years to form? _____
23. The fact that there is a great deal of helium trapped inside rocks indicates that the rocks should be dated in the _____ of years, not billions.
24. How many meteorites are known to have accumulated over 4.5 billion years in the sedimentary layers below the surface? _____
25. Pleochroic haloes hint that whenever the earth formed, the process could have taken as short a time as a few _____.
26. In order for radiometric dating to be reliable, we would need to know the initial amounts of both the _____ and _____ elements at the beginning of the earth.
27. In order for radiometric dating to be reliable, we would need to be sure that the rate of radioactive _____ has never changed in the slightest.
28. What have recent studies about radioactive decay rates shown relative to the earth's position compared to the sun? _____
29. In order for radiometric dating to be reliable, we would need to be sure that neither the parent nor the daughter has ever been _____or _____
30. Recent carbon dating results (Accelerator Mass Spectrometry) on fossils supposed to be millions of years old have shown that their ages should be measured in _____ of years instead.

CHAPTER 12 REFERENCES

Ackerman, P. D. 1986. *It's a Young World After All*. Grand Rapids, Mich.: Baker Book House.

Ager, D. V. 1983 (Nov. 10). Fossil Frustrations. *New Scientist* 100:425.

Arndts, R., Overn, W., Bartz, P. & Kramer, M. 1990. *Radiometric Dating Isochrons and the Mixing Model*. Bible-Science Association Reprint Series.

Austin, S. A. 1992 (February). Excessively Old "Ages" For Grand Canyon Lava Flows. *Impact* No. 224 (available from I.C.R.)

Austin, S. A. et al. 1994. *Grand Canyon - Monument to Catastrophe.* Santee, CA: Institute for Creation Research. p. 88, 94, 127.

Austin, S. A. 1996. Excess Argon within Mineral Concentrates from the New Dacite Lava Dome at Mount St. Helens Volcano. *Creation Ex Nihilo Technical Journal.* 10 (3): 335-343.

Austin, S. A., Snelling, A.A. and Wise, K.P. Canyon-length mass kill of orothocone nautiloids, Redwall Limestone (Mississippian) Grand Canyon, Arizona, *Abstracts with Programs*. 1999. Geological Society of America Annual Meeting, Denver, Colorado, p. A-421.

Baumgardner, J., Humphreys, D., Snelling, A., & Austin, S. 2003. Measurable 14C in Fossilized Organic Materials: Confirming the Young Earth Creation-Flood Model. *Proceedings of the Fifth International Conference on Creationism.* Pittsburgh, PA: Creation Science Fellowship. pp. 127-142.

Baumgardner, J. 2018. Understanding how the Flood sediment record was formed: The role of large tsunamis. In *Proceedings of the Eighth International Conference on Creationism,* ed. J.H. Whitmore. Pittsburgh, Pennsylvania: Creation Science Fellowship. pp. 287–305.

Berger, R., & Libby, W. (1969). UCLA Radiocarbon Dates IX. *Radiocarbon*, 11(1), 194-209. doi:10.1017/S0033822200064547. pp. 194-209.

Berggren, W. A. (n.d.). Cenozoic life. Retrieved October 26, 2020, from https://www.britannica.com/science/Cenozoic-Era/Cenozoic-life.

Boudreaux, E. 2003. Origins of Chemical Elements From Water. *Proceedings of the Fifth International Conference on Creationism.* Pittsburgh, PA: Creation Science Fellowship.

Brun, A., Turck-Chieze, S., and Morel, P. 1998. "Standard Solar Models in the Light of New Helioseismic Constraints," *Astrophysical Journal,* Vol. 506, p. 913.

Clarey, T.L., and D.J. Werner. 2018. Global stratigraphy and the fossil record validate a Flood origin for the geologic column. In *Proceedings of the Eighth International Conference on Creationism*, ed. J.H. Whitmore. Pittsburgh, Pennsylvania: Creation Science Fellowship. pp. 327–350.

Cook, M. A. 1960. *Prehistory and Earth Models*. London: Max Parish.

Corcoran, T. 1986. *Mount St. Helens - The Story Behind The Scenery*. KC Publications, P.O. Box 14883, Las Vegas, Nevada 89114.

Dillinger, J. (2019, August 28). The Worst Mudslides in History. https://www.worldatlas.com/articles/famous-mudslides-in-history.html.

Dort, W., Jr. 1971. Mummified Seals of Southern Victoria Land. *Antarctic Journal of the United States*, Vol. 6. p. 210.

Fairhall, A., Schell, W., & Young, J. (1966). Radiocarbon Dating at the University of Washington III. *Radiocarbon,* 8, 498-506. doi:10.1017/S003382220000031X

Folger, T. 1994 (April). Primordial Landlubbers. *Discover*.

Funkhouser, J.G. & Naughton, J.J. 1968 (July 15). Radiogenic helium and argon in ultramafic inclusions from Hawaii. *Geophysical Research Journal*, Vol. 73. p. 4601.

Gentry, R. V. 1986. *Creation's Tiny Mystery*. Knoxville, TN: Earth Science Assn.

Goh, K., Tonkin, P., & Rafter, T.. 1978. Implications of Improved Radiocarbon Dates of Timaru Peats on Quaternary Loess Stratigraphy. *New Zealand Journal of Geology and Geophysics*, Vol. 21, No. 4. pp. 463-466.

Gould, S. J. 1965 (March). Is Uniformitarianism Necessary? *American Journal of Science*, Vol. 263.
Heerema, S.J., A magmatic model for the origin of large salt formations, *Journal of Creation,* 23(3):116–118, 2009.
Humphreys, D. R. 1994. *Starlight and Time*. Master Books, P.O. Box 727, Green Forest, AR 72638.
International Campaign for Tibet. 2013 (May 20). New devastation in Tibet; death toll exceeds 1,200 (updated Aug. 16). https://savetibet.org/new-devastation-in-tibet-death-toll-exceeds-1200-updated-aug-16/.
Keith, M. & Anderson, G. 1963. Radiocarbon Dating: Fictitious Results with Mollusk Shells. *Science*, Vol. 141 (August 16). p. 634.
Morris, J. & Austin, S. 2003. *Footprints in the Ash.* San Diego, CA: Master Books. p. 74.
Oard, M. 2010a (August). "Is the K/T the Post-Flood boundary?—part 1: introduction and the scale of sedimentary rocks." *Journal of Creation* 24(2). https://creation.com/kt-boundary-flood-1. pp. 95–104
Oard, M. 2014. "Post-Flood log mats potentially can explain biogeography." *Journal of Creation*. https://creation.com/images/pdfs/tj/j28_3/j28_3_19-22.pdf.
Pal, D.C. 2004 (10 Sept.). Concentric rings of radioactive halo in chlorite, Turamdih uranium deposit, Singhbhum Shear Zone, Eastern India: a possible result of 238U chain decay. *Current Science*, Vol. 87, NO. 5.
Patterson, C. 1956. Age of meteorites and the earth. *Geochimica et Cosmochimica Acta 10 (4)*. Pergamon Press, Ltd. London. pp. 230–237.
Riggs, A. C. 1984 (April 6). Major Carbon-14 Deficiency in Modern Snail Shells from Southern Nevada Springs. *Science*, Vol. 224. pp. 58-61.
Russel, K. M. 1976 (October 4). Workers Find Whale in Diatomaceous Earth Quarry. *Chemical and Engineering News*. 54(41):48.
Slusher, H. C. 1981. *Critique of Radiometric Dating*, ICR Technical Monograph No. 2
Snelling, A.A. 2014. Geological issues: Charting a scheme for correlating the rock layers with the Biblical record. In *Grappling with the Chronology of the Genesis Flood*, eds. S.W. Boyd and A.A. Snelling. Green Forest, Arkansas: Master Books. pp. 77-109.
Spielker, E. 1956. Mountain Building Chronology and Nature of Geologic Time-Scale. *Bulletin of the American Association of Petroleum Geologists*, Vol. 40.
Stober, D. 2010. The strange case of solar flares and radioactive elements. Internet site http://news.stanford.edu/news/2010/august/sun-082310.html
Sturrock, P., Buncher, J. *et al*. 2010 (September). Power spectrum analysis of BNL decay rate data. *Astroparticle Physics*, Volume 34, Issue 2. pp. 121-127.
Taylor, I. T. 1987. *In the Minds of Men: Darwin and the New World Order*. TFE Pub., P.O. Box 5015, Stn. F., Toronto, M4Y 2T1, Canada
Van Duzer, C. 2004. *Floating Islands: A Global Bibliography*, Cantor Press, Los Altos Hills, CA.
Whitcomb, J. C. & DeYoung, D. B. 1978. *The Moon: Its Creation, Form, and Significance*. Winona Lake, Indiana: BMH Books. pp. 98-102.
Whitcomb, J. C. & Morris, H. 1982. *The Genesis Flood* (26th Edition). Phillipsburg, NJ: Presbyterian & Reformed Publishing Co.
Whitmore, J. 2010. Aren't Millions of Years Required for Geological Processes? Internet site https://answersingenesis.org/geology/arent-millions-of-years-required-for-geological-processes/
White, A. J. 1985. *How Old is the Earth?* Bath, England: Pitman Press.
Woodmorappe, J. 2001. Billion-fold Acceleration of Radioactivity Demonstrated in Laboratory. *Creation Ex Nihilo Technical Journal* 15(2).
Wysong, R.L. 1976. *The Creation-Evolution Controversy*. Midland, Mich.: Inquiry Press.