

# THE BIBLE VS. EVOLUTION

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#11-1

## LESSON 11. RADIOMETRIC DATING AND AGE OF THE EARTH.

**KEY SCRIPTURE:** "...scoffers will come in the last days, walking according to their own lusts, and saying, "Where is the promise of His coming? For since the fathers fell asleep, all things continue as they were from the beginning of creation." For this they willfully forget: that by the word of God the heavens were of old, and the earth standing out of water and in the water, by which the world that then existed perished, being flooded with water." 2 Peter 3:3-6 (NKJV)

### Preparing to Teach the Lesson:

The Bible cautions us to beware of what is falsely called knowledge, or, as the King James Version puts it, "science falsely so-called" (1 Tim. 6:20). In the study of the earth's age, a great many philosophical beliefs are falsely called science. Remember that science requires observation, testing, and repetition. When we deal with processes supposed to far exceed the lifetime of any human observer such as radioactive decay and the formation of large-scale geologic features, we cannot apply any of these. Our belief about the age of the earth can be based on science to only a very limited extent. In this lesson we will see just how limited that extent is.

### Today's Aim:

The word "radiometric" means "using radioactivity to perform a measurement." Many think that radiometric dating and the presence of geologic features such as the Grand Canyon prove that the earth began billions of years ago. Perhaps some of your students are among those who have blindly accepted such claims. We are going to examine the geologic time scale and radiometric dating methods and see that neither proves anything. Those who believe the earth is billions of years old do so for philosophical reasons, not scientific.

### Introducing the Lesson:

In the last lesson we considered Biblical passages that imply that the earth is not more than a few thousand years old. We examined arguments from outer space considered to show a great age, as well as arguments that point to the conclusion that the universe is relatively young. We saw that there is no way to scientifically prove the age of the universe; no matter what we believe, we have to take a step of faith. The same applies to the earth itself.

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1. There are three main arguments for an old earth: (a) Belief that it takes millions of years to form a **fossil**, (b) Radiometric **dating**, and (c) **Geologic** features such as the Grand Canyon that are supposed to have taken hundreds of millions of years to form.

As we look at these arguments, we will see that there are answers to them. We will then consider some positive indications that the earth may be much younger, to which there are as yet no evolutionary responses.

## I. RESPONSE TO OLD-EARTH ARGUMENTS:

### A. FOSSIL FORMATION.

It doesn't take millions of years to make a fossil. An animal or plant can turn into a fossil very rapidly if three conditions are met:

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- It must be buried rapidly so it is cut off from contact with oxygen in the atmosphere. Without oxygen, the process of decay does not occur.
- There must be a great deal of heat and pressure.
- There must be a high concentration of minerals in the surrounding soil or water.

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2. Lab experiments have turned chicken bones into fossils in 5 to 10 years and garbage into crude oil in **20** minutes.

If there are enough minerals in the water, objects can acquire a thick coating even if they do not actually turn into fossils. For example, fishermen in the harbor in Durban, S. Africa sometimes use old automobile spark plugs as fishing sinkers. If the line breaks and the spark plug sinks to the bottom, it can acquire a thick coating of minerals in just a few years.

Producing crude oil in experiments like this is not the solution to our energy problems. Most of the heat energy is lost to the environment.

## B. PROBLEMS WITH RADIOMETRIC DATING.

### What is Radioactivity?

All known matter is made up of one or more elements such as hydrogen, oxygen, iron, uranium, and about a hundred others. An atom is the smallest particle of an element that has all the chemical properties of that element. Radiometric dating depends on the fact that the atoms of some elements such as uranium tend to break down, or decay, into a non-radioactive element such as lead.

3. Radioactivity received its name because decaying atoms release energy in the form of **radiation**.

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At the center of each atom is its nucleus, which contains one or more positively charged particles known as protons and may also contain neutrons (electrically neutral).

Negatively charged electrons are in *orbitals* around the nucleus. (Though we usually picture them like tiny planets, they actually behave more like clouds.) The number of protons is the atomic number; this determines what element the atom is. For example, hydrogen has one proton, carbon has six, and uranium has ninety-two. Since positive repels positive, every atom in the universe that has more than one proton in its nucleus should fly apart. However, some force we do not understand holds them together. Scientists have named it the strong nuclear force, but they do not know what it is.

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4. The Bible tells us why all the **atoms** in the universe do not fly apart: “He is before all things, and by Him all things consist” (Col. 1:17).

In some way we don't understand, neutrons are involved in the process of holding multi-proton atoms together. Unlike the number of protons, the number of neutrons in the nucleus of an atom can vary. Atoms that have the same number of protons -- that is, they are the same element as each other -- but a different number of neutrons are known as *isotopes*. For example, all carbon has 6 protons; when we add 6 neutrons we get the isotope carbon-12, while carbon-14 has 8 neutrons. All uranium has 92 protons; U-235 also has 143 neutrons, while

U-238 has 146. (Subtract the atomic number from the isotope number, e.g. 235 or 238, to determine the number of neutrons.)

Some isotopes of different elements are less stable than others. An unstable atom often decays by releasing various particles from its nucleus. This changes the number of protons, thus changing the atom into a different element.

5. An unstable radioactive element is known as a **parent**; the element it decays into is called the **daughter**.

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Sometimes the daughter is stable, e.g., Carbon-14 turns into Nitrogen-14 in one step and stays there. However, some daughters are also unstable and become parents themselves, e.g., Uranium-238 goes through 13 intermediate stages before it finally turns into stable Lead-206.

We do not know why individual atoms decay. One may go through the process immediately while the one next to it may theoretically take millions of years. Thus, rather than trying to predict the behavior of individual atoms, we describe the rate of decay of a large sample with a statistical measure known as a half-life. Commonly used half-lives range from a few thousand years for Carbon-14 to billions of years for Rubidium-87.

6. A **half-life** is the amount of time it takes for half of the atoms in a radioactive sample to decay. After one half-life, 50% of the parent is left. After another half-life only 25% of the original amount remains, and so on.

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Within about ten half-lives, just about all of the radioactive parent has decayed into the daughter. This puts an upper limit of about ten half-lives on any radiometric dating method.

#### **How most radiometric dating works.**

The most common radiometric dating methods involve Carbon-14, Rubidium-87, Potassium-40, and several isotopes of Uranium. Most of the methods require us to measure the ratio of parent-to-daughter in a rock sample. (C-14 is different; see the next section.) By calculating how many half-lives it would have taken to produce this ratio, we decide how old the rock seems to be.

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7. We must know three things in order for radiometric dating to be accurate:  
a. Initial ratio of **parent**-to-daughter.

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Since we have not been watching since the beginning of the earth, we have absolutely no way to know what this ratio was. Nevertheless, evolutionists start with the assumption that at the beginning of the decay process, the rocks consisted of 100% parent and 0% daughter. This contradicts their own belief that the earth began as a swirling cloud of dust and gas, which came from supernova explosions. If this were the case, the daughter elements would probably have been used as building blocks for the parents during the explosions. There would have had to be a mixture of parent and daughter from the very beginning, rendering the dating methods unreliable.

b. **Decay** rate must have remained absolutely constant the entire time.

Radioactivity was discovered a little over a hundred years ago. Half-lives were determined several decades ago by counting clicks on a Geiger counter over a few days, repeating the process a few months later, and then averaging the values together. But even if we had been observing the decay rate for the whole 100 years, trying to use 100 years worth of data to prove that the earth is 4.5 billion years old is like watching a jet go past for one second then trying to prove that it has been flying at the same speed for the last 522 days.

This is ridiculous, of course. If you tried to go 45 million times beyond the data in any other area of science, you would be laughed out of the lab. However, because evolution is so important to so many people, they accept any kind of pseudo-science that agrees with their belief.

Those who insist that decay rates can never change should remember that we have no idea why individual radioactive atoms decay. Though something holds the protons together in the nucleus, they are still trying to fly apart and release some of the stored energy. Scientists have discovered that in order for a physical process to release stored energy, some external source must get the process started by furnishing a boost known as the energy of activation. For instance, the gas in your car engine contains a great deal of chemical energy, but the energy is not released until the spark plug ignites it.

So what is it that furnishes the energy of activation for each atom that decays? Nobody knows. Some think that every so often a hard-to-detect particle such as a neutrino collides with an atom and gives it the energy boost to get the process started. At any rate, unless we discover for sure what is furnishing the energy of activation, we have no way to know that radioactive decay rates have always been the same. Ongoing experiments (you can find some of these through a simple Internet search) seem to indicate that in at least 14 different radioactive isotopes, decay rates can change after all.

c. No parent or daughter can have been added or **removed** the entire time.

There is no way to know this, especially since some of the components involved in radiometric dating are soluble in water. We have no guarantee that any rock has never gotten wet in 4.5 billion years.

8. Because of these uncertainties, radiometric dating is **unreliable**. We can only use it to determine maximum possible ages. True ages could be anything less.

The long half-life methods such as Uranium or Rubidium dating have nothing to do with dating living things anyway, because these elements do not occur in living things. The only radioactive substance they contain is Carbon-14.

So what is carbon dating, how does it work, and is it reliable?

### **Carbon Dating.**

The normal form of nitrogen, N-14, has seven protons and seven neutrons. As N-14 atoms circulate in the upper atmosphere, some are struck by cosmic radiation. This turns a proton in the nucleus into an unstable neutron, changing the atom from nitrogen to carbon. The resulting C-14 is unstable, decaying back into N-14 with a half-life calculated at about 5730 years. Meanwhile, it mixes with the rest of the atoms in the atmosphere. Since many of these are C-12 atoms (the normal, stable form of carbon), there is a certain ratio of C-14 to C-12 in the

atmosphere at any given time.

Some of this carbon gets into plants, which build up their cell structures by absorbing it from the atmosphere. Thus, as long as a plant is alive, it should have the same ratio of C-14 to C-12 as the atmosphere does. After it dies, its stable C-12 remains but its C-14 begins to turn back into N-14. Since animals eat plants to build their own cells, the principle is the same for them. By measuring the ratio of C-14 to C-12 in animal or plant remains, scientists try to determine how long ago the organism quit taking in air, and thus how long ago it died.

It's not quite so easy. There are a number of serious problems that limit the accuracy and reliability of carbon dating.

Visual  
#11-12

9. Problems with C-14 dating:

- a. The **carbon** in most fossils has been replaced by other minerals.

You can't carbon date something that doesn't contain carbon.

- b. If the animal or plant lived in an environment unusually low in C-14, carbon dating will give a **false** result much greater than the true age.

This is a frequent problem in dating creatures that live underwater. Their environment does not absorb gases from the air as readily as the environment of land animals and plants, so they start with a relatively low amount of C-14.

- c. Carbon dating works by the assumption that the ratio of C-14 to C-12 in the atmosphere is **constant**. This is not true.

Direct atmospheric measurements show that C-14 is still forming over 20% faster than it is decaying. Since the ratio of C-14 to C-12 is continually increasing, the farther back we go in the past, the less C-14 was available to begin with. Thus, the older an object is, the less reliable its C-14 date.

- d. Because of its short half-life, C-14 dating works for ages of only a few **thousand** years.

Within about 50,000 years, even a large sample of C-14 would have just about all decayed to nitrogen. Most of the time, labs work with very tiny amounts. Even under perfect, ideal circumstances - and there is no such thing - this limits the ages we can measure with carbon dating. Any time you hear a reported age greater than about 30,000 years, you automatically know it was not obtained by carbon dating. Because of all the uncertainties involved, even those that are less are highly suspect.

- e. External factors such as **fires** can interfere with the accuracy of carbon dating.

High temperatures and other environmental factors can add or remove carbon or nitrogen or otherwise interfere with the accuracy of the method.

Well, if we can't date the fossils directly, how about they sedimentary rocks that contain them? Unfortunately, radiometric methods don't work on them either.

Visual  
#11-13

Visual  
#11-14

Radiometric dating requires a significant size radioactive sample, much bigger than the fine particles found in sedimentary rock. The only rocks suitable for radiometric dating are volcanic or *igneous* rocks. Even in this case, they often show wildly erroneous “ages.”

Because of all the uncertainties of radiometric dating, the process is notoriously unreliable. Refer to the visual for examples of radiometric dates that are obviously wrong.

10. Many obviously wrong radiometric ages show us that radiometric dating is **unreliable**.

Now let's consider the third argument for a great age of the earth, its geologic features.

### C. GEOLOGIC FEATURES.

Since we can't use radiometric dating to determine the ages of fossils and the rocks that contain them, How did geologists come up with all the multimillion year ages for the earth's rock layers?

Visual  
#11-15

11. Geologic dates depend on a circular argument: the rocks date the **fossils**, but the **fossils** date the rocks.

Ages were assigned to most types of fossils long ago based on the assumption that evolution had occurred. Radiometric dating of nearby rocks is only accepted when it agrees with these previously assigned ages. In this case geologists say they have found a “tie-point.” This almost never happens. As of 1982, there were only fifteen tie-points in the whole world where radiometric ages matched the assigned fossil ages. This shows amazingly strong disagreement with evolutionary beliefs.

Visual  
#11-16

12. Strata of the geologic column are identified by a characteristic group or **suite** of fossils, not by radiometric means. The members of the suites are the same basic types no matter where in the world we find them.

This flies in the face of evolution. Since there are still one-celled organisms in the world as well as humans and everything in between, different groups must have been evolving at different rates at different places. We should not see a pattern of clearly defined fossil communities that are essentially the same no matter where in the world we find them; yet that is precisely how geologists decide what “age” a rock layer is. They look for a characteristic suite of fossils.

Geologic ages are based on assumptions, not scientifically testable techniques. Among these assumptions are the beliefs that evolution occurred and that there has never been a worldwide flood. Evolutionists recognize that if there was one, the earth's geologic features could have piled up quickly rather than slowly.

Visual  
#11-17

13. The foundation of the geologic time scale is “uniformitarianism,” the untestable doctrine that everything happens by slow, gradual, uniform processes. In other words, there can never have been a worldwide **flood**.

Visual  
#11-18

14.If there really was a worldwide flood, we would 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. This is exactly what we find in nature.

Visual  
#11-19

Refer to the visual of the geologic column. This is not found complete anywhere in the world; it exists only in the imagination of evolutionists. The most complete section is at the Grand Canyon, which has six: Precambrian, Cambrian, Devonian, Mississippian, Pennsylvanian, and Permian. Every layer, supposedly representing successive time periods, can be found in the wrong evolutionary order at least one place in the world.

As for the Grand Canyon, geologists have no universally accepted theory as to its origin. Perhaps they should learn a lesson from the Havasupai Indians, who live at the Canyon. They believe it was scoured out by the receding waters of a great flood.

Before we ask how the Canyon was eroded, we ought to ask how all the sediment got there. Remember that in order for an animal or plant to turn into a fossil, it must be buried quickly. If not, it will rot and fall apart.

Visual  
#11-20

15.Since the Grand Canyon is full of **fossils** from bottom to top, this supports the belief that the sediment was deposited rapidly.

Visual  
#11-21

Let's consider the geology of the Canyon. It is not just a big hole in the ground, but an enormous gash running through an elevated area. If the Colorado River were responsible for carving it out, the river would have had to run uphill for a mile at the beginning to start the erosion process. However, gravity works as well in Arizona as anywhere else. Water does not flow uphill.

The Canyon begins at the Kaibab Monocline, an upwardly warped part of the Colorado Plateau in north Arizona. Most of the sedimentary layers are smoothly bent across the Canyon, rather than fractured. This indicates they were still soft when the Kaibab area was pushed up. If they had already hardened into rock, they would have shattered rather than bent.

Visual  
#11-22

The Canyon is a mile deep, over 200 miles long, and up to eight miles wide in some places. Over 1000 cubic miles of sediment are missing, enough to make a good size mountain range.

Visual  
#11-23

16.If the Colorado River slowly carved the Canyon, there should be an enormous **delta** at its mouth. There is not.

The river runs through the Canyon's thousand foot deep inner gorge. However, there are many mesas, buttes, and plateaus in the 4,000 foot deep outer gorge. There are no rivers or streams running behind them.

Visual  
#11-24

17.The Colorado River could not have reached behind all the mesas and buttes in the Canyon to carve them out. There must have been a much larger quantity of **water** some time in the past.

About a hundred miles east of the Canyon we see another clue that there was a great flood. The "Petrified Forest" contains tens of thousands of rootless trees which were obviously deposited after floating there.

Visual  
#11-25

18. The presence of thousands of trees with no **roots** at the Petrified Forest indicates that a great flood occurred in the area, floated them in, then flowed away very rapidly.

If we look on a geologic map, we can envision how the Grand Canyon ties in with the Genesis Flood. The Canyon is at the west end of a relatively low part of the Colorado Plateau hundreds of square miles in area, between two higher areas. At the conclusion of the Flood, God raised up the land and pushed down the sea floors. All the water from the plateau needed a place to go. The Kaibab monocline prevented it from leaving until something happened to open a small split - perhaps a meteor impact at nearby Meteor Crater? The water rushed through rapidly, sweeping vast amounts of sediment rapidly into the ocean and leaving the Canyon as a monument to the judgment of God. The Colorado River didn't carve the Canyon; it just drains it.

Those who have doubts about whether a canyon can form quickly should pay attention to the lesson God showed us beginning on May 18, 1980. When the Mount St. Helens volcano in the state of Washington erupted, it dumped massive quantities of superheated mud on the north fork of the Toutle River. The mud dammed up the river for 20 months while beginning to harden into rock. Finally, the weight of the water was too much. The mud dam burst, releasing a rush of water that scoured out a canyon 1/35 the scale of the Grand Canyon in one day.

Visual  
#11-26

19. The eruption of Mount St. Helens in 1980 produced "Engineer's Canyon" on the North Fork of the Toutle River. It is 1/35 the scale of the Grand Canyon and took one **day** to form.

Though sediment is supposed to accumulate at a fraction of an inch each year, this eruption deposited up to 600 feet of sediment in a single day. In addition, there are reports that coal is already beginning to form in the bottom of Spirit Lake at Mount St. Helens, something that was supposed to take millions of years.

Visual  
#11-27

Even though the canyon was carved through relatively soft sedimentary rock, it is still supposed to take hundreds of thousands of years for this much erosion. Even worse for evolution, though, is that the initial steam explosion blasted a 700 foot deep canyon through the granite "Goat Rocks" in one day. This much erosion through HARD rock is supposed to take hundreds of millions of years, yet it happened in a single day.

Uniformitarianism is the foundation of the geologic time scale of billions of years. Because of such events as this eruption, more and more scientists are recognizing that it must be greatly modified or even discarded.

20. With the demise of uniformitarianism, there is no compelling reason to believe the earth is billions of years old. **Evolution** has lost its foundation.

So have "Progressive Creation" and the "Gap Theory."

We have barely scratched the surface. Since time does not permit us to deal with the earth's geologic features in detail, this would be a good subject for your students to study on their own. One area of special interest would be French sedimentologist Guy Berthault's recent work ("Drama in the Rocks, available on

[www.youtube.com](http://www.youtube.com)) showing that sedimentary layers need not pile up slowly. They accumulate automatically under running sediment-carrying water.

So far we've been looking at responses to evolutionary arguments for an old earth. Let's look now at just a little of the positive evidence pointing toward the conclusion that the earth is much younger than evolution demands.

## II. POSITIVE EVIDENCE FOR A YOUNG EARTH.

### Helium in the Atmosphere.

The first argument we will look at has to do with helium, one of the gases that occurs in the atmosphere. Several radioactive decay series such as uranium-to-lead release helium as a byproduct. Once the gas mixes into the atmosphere, there is no known way for it to escape. In order for it to have enough energy to break free of the earth's gravity, temperatures in the upper atmosphere would have to be many times higher than they actually are.

Visual  
#11-28

21. If every bit of the helium in the atmosphere came from the radioactive decay we are aware of, it would have taken less than **4** million years to reach the present amount.

Four million years sounds like a long time. However, it is less than 1/1000 of the length of time evolution demands. If there was any helium at the beginning, if there is more radioactive decay than we know of, or if there is an additional source of helium, the atmosphere could be any age less.

### Carbon-14 Production.

Visual  
#11-29

Remember that carbon-14 is produced by cosmic radiation striking nitrogen-14 in the upper atmosphere. If there was no C-14 in the atmosphere in the beginning, the amount would build up until it decayed as fast as it formed. However, direct measurements show that C-14 is still forming more than 20% faster than it is decaying. At present rates, it would take less than 20,000 years to reach equilibrium.

22. The rate of carbon-14 production indicates an age of the atmosphere of considerably less than **20,000** years.

### The Missing Meteorites.

Visual  
#11-30

Every year a few meteorites make it through the atmosphere and land on the ground. Several thousand have been found. If only one landed per year for 4.5 billion years as the geologic column built up, every layer of the column should contain tens of millions of meteorites. However, no one has ever found a single meteorite buried in an undisturbed layer below the Recent.

23. The complete absence of **meteorites** in lower geologic layers indicates that the geologic column did not accumulate over billions of years.

The fragments of the Canyon Diablo meteorite at Meteor Crater in Arizona are several layers down, but were not deposited there as the sediment built up. The meteor crashed through after all the layers were in place. The crater is like a 500 foot deep version of the impression a bullet makes when fired into soft mud. Even

though evolutionary geology says the lower layers had fully hardened millions of years before the impact, the crater shows that the layers were still soft when the meteorite hit. Evolutionary geology is clearly wrong.

**Pleochroic Haloes.** (from Robert Gentry, *Creation's Tiny Mystery*)

Imagine you set off a firecracker in a bucket of water. Five minutes later no traces of the explosion are left. 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  
#11-31

In a way, radioactive decay is like the firecracker explosion. Radioactive atoms release fast-moving particles of various amounts of energy as they decay, including alpha particles (two protons and two neutrons). An alpha particle moving through a molten rock such as lava leaves no traces. However, if an atom emits one inside a hardened rock such as granite, the particle damages the rock and leaves a miniature scorch mark inside it. A few million or billion radioactive atoms (not very many as atoms go) can produce a cumulative effect in the form of concentric spheres known as *pleochroic haloes*. If we look at the diameter of a halo as well as the daughter element remaining at the center, we can tell what the parent element was.

Dr. Robert Gentry is widely recognized as the world's foremost authority on these haloes, having personally studied well over a hundred thousand. Thousands of these were produced by the decay of polonium, a very short-lived radioactive element. Its three isotopes have half-lives of 138.4 days (Po-210), 3 minutes (Po-218), and 164 microseconds (Po-214). Within a short time after polonium appears, virtually all of it decays. In the case of Po-214, the decay is essentially complete within one second.

Visual  
#11-32

Granite is supposed to have formed as the earth cooled over hundreds of millions of years, yet many blocks of it contain polonium haloes. In evolutionary terms this is impossible. If the earth took more than a few hours to cool, let alone hundreds of millions of years, there would be no Po-218 or Po-214 haloes. Yet there they are. Dr. Gentry's conclusion? Instantaneous creation of the granite. He has challenged anyone to come up with a plausible alternative, but no one has been able to. 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.

Visual  
#11-33

24. The presence of polonium haloes in granite does not prove the earth is young, but it cuts hundreds of millions of years off its possible age and shows that whenever it was formed, the process may have taken as little as a few **seconds**.

Your students may wonder how evolutionists can ignore evidence such as the above. The answer is simple: their belief is based on postulates, not evidence. Since evolution is the only possible explanation and since it would require billions of years, the earth must be that old no matter what evidence there might be to the contrary.

Visual  
#11-34

We cannot scientifically prove the age of the earth one way or the other, but the preceding arguments show that it is reasonable to believe it could be only a few thousand years old. Those who refuse to admit that the Word of God could possibly be right are on dangerous ground. Would you want to be the one to call God a liar?

## LESSON REVIEW:

- I. Most people believe the Earth is old because that's what they have been told.
- II. The three most common reasons people think the Earth is old are:
  - They think it takes millions of years to form fossils.
  - They think radiometric dating proves ages of millions of years.
  - They think it takes millions of years to form geologic features like the Grand Canyon.
- III. Lab experiments have shown that fossils can form in just a few years.
- IV. Radiometric dating requires that we be certain about three things:
  - Initial ratio of parent-to-daughter
  - Unvarying rate of decay
  - NO parent or daughter added or removed the entire time.There is no way we can be sure about any of these things,
- V. Carbon dating is used for ages measured in thousands of years, not millions.
- VI. Geologic dating depends on a circular argument. The rocks date the fossils, but the fossils date the rocks.
  - Geologic strata are assigned an age based on the characteristic "suite" of fossils they contain rather than by any testable method.
  - The ages of the strata in the geologic column are based on the assumption that geologic processes occur only at slow, steady, gradual rates. This is called uniformitarianism. It was foretold in 2 Peter 3:3-7.
  - The geologic ages require us to deny that there has ever been a worldwide Flood.
  - The contents of the rock strata around the world are exactly what we would expect to have been produced by a worldwide Flood.
- VII. The Grand Canyon points toward a global catastrophe rather than gradual deposition and erosion over billions of years.
  - It contains fossils from bottom to top, but only six of the Earth's geologic "ages" are present.
  - There are over a thousand cubic miles of sediment missing from the Canyon. If it was eroded gradually, there should be an enormous delta at the mouth of the Colorado River. There is not.
  - Many mesas, buttes, and plateaus in the Canyon have no flowing water behind them. They must have been eroded by a much greater flow of water in the past.
  - The aftermath of the 1980 eruption of Mt. St. Helens in the state of Washington produced a 1/35 scale version of the Grand Canyon in one day. It also eroded a 700 foot deep canyon through granite, a very hard rock.
- VIII. A few of the indications that the earth is much less than billions of years old:
  - Atmospheric helium would accumulate in less than 4 million years.
  - Atmospheric carbon-14 would accumulate in less than 20,000 years.
  - If the earth is billions of years old, there should be millions of meteorites in lower geologic layers. Yet not a single one has ever been discovered.
  - Pleochroic Polonium haloes show that whenever the earth was formed, the process could have taken place in as little as a few minutes rather than hundreds of millions of years.

**Suggested Topics for Further Study:**

Temperature and thickness of the earth's crust  
Berthault's experiments in sedimentation  
Pressure of oil in underground deposits  
Decay of the earth's magnetic field  
Fossils spanning multiple strata  
Fossils found in "wrong" strata  
Out-of-order strata  
Mountain-building  
Continental drift  
"Overthrusting"  
etc.