1. Carbon-14 Dating—Understanding the Basics Andrew A. Snelling
2. Carbon-14 in Fossils and Diamonds An Evolution Dilemma Andrew A. Snelling
3. A Creationist Puzzle 50,000-Year-Old-Fossils Andrew Snelling

# Doesn’t Carbon-14 Dating Disprove the Bible? Mike Riddle

**Carbon-14 Dating—Understanding the Basics**

by Andrew A. Snelling

September 14, 2010

Many people assume that rocks are dated at “millions of years” based on radiocarbon (carbon-14) dating. But that’s not the case. The reason is simple. Carbon-14 can yield dates of only “thousands of years” before it all breaks down.

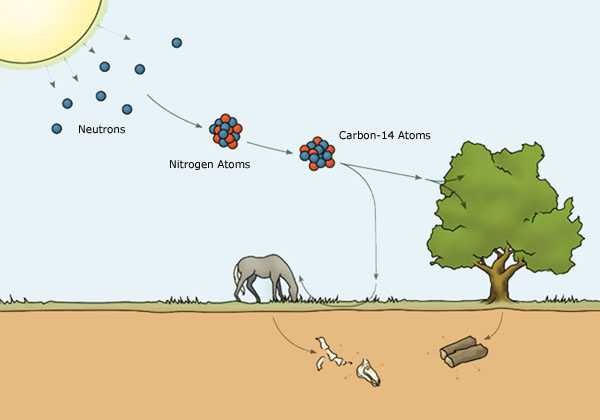
The most well-known of all the radiometric dating methods is radiocarbon dating. Although many people think radiocarbon dating is used to date rocks, it is limited to dating things that contain the element carbon and were once alive (like fossils).

**How Radiocarbon Forms**

Unlike radiocarbon (14C), the other radioactive elements used to date rocks—uranium (238U), potassium (40K), and rubidium (87Rb)—are not being formed on earth, as far as we know. Thus it appears that God probably created those elements when He made the original earth.

In contrast, radiocarbon forms continually today in the earth’s upper atmosphere. And as far as we know, it has been forming in the earth’s upper atmosphere since the atmosphere was made back on Day Two of Creation Week (part of the expanse, or firmament, described in Gen 1:6–8).

So how does radiocarbon form? Cosmic rays from outer space are continually bombarding the upper atmosphere of the earth, producing fast-moving neutrons (subatomic particles carrying no electric charge) (*Figure 1a*).[1](http://www.answersingenesis.org/articles/am/v5/n4/carbon-dating#fnList_1_1) These fast-moving neutrons collide with atoms of nitrogen-14, the most abundant element in the upper atmosphere, converting them into radiocarbon (carbon-14) atoms.



**CARBON-14 IS CREATED (Figure 1a):** When cosmic rays bombard the earth’s atmosphere, they produce neutrons. These excited neutrons then collide with nitrogen atoms in the atmosphere, changing them into radioactive carbon-14 atoms.

**CARBON-14 IS ABSORBED (Figure 1b):**Plants absorb this carbon-14 during photosynthesis. When animals eat the plants, the carbon-14 enters their bodies. The carbon-14 in their bodies breaks down to nitrogen-14 and escapes at the same rate as new carbon-14 is added. So the level of carbon-14 remains stable.

**CARBON-14 IS DEPLETED (Figure 1c):** When an animal dies the carbon-14 continues to break down to nitrogen-14 and escapes, while no new carbon-14 is added. By comparing the surviving amount of carbon-14 to the original amount, scientists can calculate how long ago the animal died.

Since the atmosphere is composed of about 78% nitrogen,[2](http://www.answersingenesis.org/articles/am/v5/n4/carbon-dating" \l "fnList_1_2) a lot of radiocarbon atoms are produced—in total about 16.5 pounds (7.5 kg) per year. These rapidly combine with oxygen atoms (the second most abundant element in the atmosphere, at 21%) to form carbon dioxide (CO2).

This carbon dioxide, now radioactive with carbon-14, is otherwise chemically indistinguishable from the normal carbon dioxide in the atmosphere, which is slightly lighter because it contains normal carbon-12. Radioactive and non-radioactive carbon dioxide mix throughout the atmosphere, and dissolve into the oceans.

Through photosynthesis carbon dioxide enters plants and algae, bringing radiocarbon into the food chain. Radiocarbon then enters animals as they consume the plants (*Figure 1b*). So even we humans are radioactive because of trace amounts of radiocarbon in our bodies.

**Determining the Rate of Radiocarbon Decay**

After radiocarbon forms, the nuclei of the carbon-14 atoms are unstable, so over time they progressively decay back to nuclei of stable nitrogen-14.[3](http://www.answersingenesis.org/articles/am/v5/n4/carbon-dating#fnList_1_3) A neutron breaks down to a proton and an electron, and the electron is ejected. This process is called beta decay. The ejected electrons are called beta particles and make up what is called beta radiation.

Because it breaks down quickly, carbon-14 is useful for dating creatures that died in the past few thousand years, not millions of years ago.

Not all radiocarbon atoms decay at the same time. Different carbon-14 atoms revert to nitrogen-14 at different times, which explains why radiocarbon decay is considered a random process.

To measure the rate of decay, a suitable detector records the number of beta particles ejected from a measured quantity of carbon over a period of time, say a month (for illustration purposes). Since each beta particle represents one decayed carbon-14 atom, we know how many carbon-14 atoms decay during a month.

Chemists have already determined how many atoms are in a given mass of each element, such as carbon.[4](http://www.answersingenesis.org/articles/am/v5/n4/carbon-dating#fnList_1_4) So if we weigh a lump of carbon, we can calculate how many carbon atoms are in it.

If we know what fraction of the carbon atoms are radioactive, we can also calculate how many radiocarbon atoms are in the lump. Knowing the number of atoms that decayed in our sample over a month, we can calculate the radiocarbon decay rate.

The standard way of expressing the decay rate is called the half-life.[5](http://www.answersingenesis.org/articles/am/v5/n4/carbon-dating#fnList_1_5) It’s defined as the time it takes half a given quantity of a radioactive element to decay. So if we started with 2 million atoms of carbon-14 in our measured quantity of carbon, then the half-life of radiocarbon would be the time it takes for half, or 1 million, of those atoms to decay. The radiocarbon half-life or decay rate has been determined at 5,730 years.

**Using Radiocarbon for Dating**

Next comes the question of how scientists use this knowledge to date things. If carbon-14 has formed at a constant rate for a very long time and continually mixed into the biosphere, then the level of carbon-14 in the atmosphere should remain constant.

If the level is constant, living plants and animals should also maintain a constant carbon-14 level in them. The reason is that, as long as the organism is alive, it replaces any carbon molecule that has decayed into nitrogen.

After plants and animals perish, however, they no longer replace molecules damaged by radiocarbon decay. Instead, the radiocarbon atoms in their bodies slowly decay away, so the ratio of carbon-14 atoms to regular carbon atoms will steadily decrease over time (*Figure 1c*).

Let’s suppose we find a mammoth’s skull and we want to date it to determine how long ago it lived. We can measure in the laboratory how many carbon-14 atoms are still in the skull. If we assume that the mammoth originally had the same number of carbon- 14 atoms in its bones as living animals do today (estimated at one carbon-14 atom for every trillion carbon-12 atoms), then, because we also know the radiocarbon decay rate, we can calculate how long ago the mammoth died. It’s really quite simple.

This dating method is similar to the principle behind an hourglass.[6](http://www.answersingenesis.org/articles/am/v5/n4/carbon-dating#fnList_1_6) The sand grains that originally filled the top bowl represent the carbon-14 atoms in the living mammoth just before it died. It’s assumed to be the same number of carbon-14 atoms as in elephants living today. With time those sand grains fall to the bottom bowl, so the new number represents the carbon-14 atoms left in the mammoth skull when we found it.

The difference in the number of sand grains represents the number of carbon-14 atoms that have decayed back to nitrogen-14 since the mammoth died. Because we have measured the rate at which the sand grains fall (the radiocarbon decay rate), we can then calculate how long it took those carbon-14 atoms to decay, which is how long ago the mammoth died.

That’s how the radiocarbon method works. And because the half-life of carbon-14 is just 5,730 years, radiocarbon dating of materials containing carbon yields dates of only thousands of years, not the dates over millions of years that conflict with the framework of earth history provided by the Bible, God’s eyewitness account of history.

**Footnotes**

1. S. Bowman, *Interpreting the Past: Radiocarbon Dating* (London: British Museum Publications, 1990).
2. S. S. Zumdahl, *Chemical Principles*, 2nd edition (Lexington, Massachusetts: D. C. Heath and Company, 1995), p.171.
3. A. Dickin, *Radiogenic Isotope Geology*, 2nd edition (Cambridge, UK: Cambridge University Press, 2005), pp. 383–398.
4. Ref. 2, p. 55, 1995. For radiocarbon this number is ~6.022 x 1023atoms per 14 grams of carbon-14.
5. G. Faure and T. M. Mensing, *Isotopes: Principles and Applications*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2005), pp. 614–625.
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**Carbon-14 in Fossils and Diamonds**

**An Evolution Dilemma**

by Andrew A. Snelling

If the radioactive element carbon-14 breaks down quickly—within a few thousand years—why do we still find it in fossils and diamonds? It’s a dilemma for evolutionists, who believe the rocks are millions of years old.

Many people think that scientists use radiocarbon to date fossils. After all, we should be able to estimate how long ago a creature lived based on how much radiocarbon is left in its body, right?

**Why Isn’t Radiocarbon Used to Date Fossils?**

The answer is a matter of basic physics. Radiocarbon (carbon-14) is a very unstable element that quickly changes into nitrogen. Half the original quantity of carbon-14 will decay back to the stable element nitrogen-14 after only 5,730 years. (This 5,730-year period is called the half-life of radiocarbon, *Figure 1*).[1](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14#fnList_1_1) [2](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14#fnList_1_2) At this decay rate, hardly any carbon-14 atoms will remain after only 57,300 years (or ten half-lives).

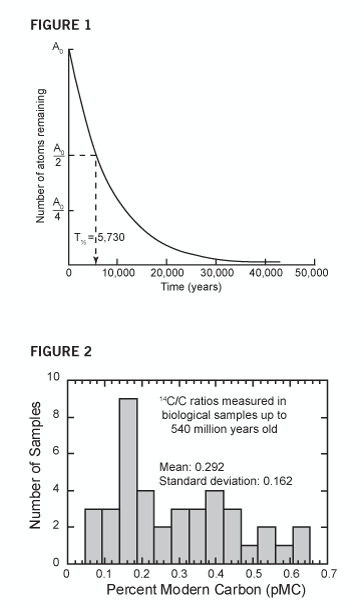
So if fossils are really millions of years old, as evolutionary scientists claim, no carbon-14 atoms would be left in them. Indeed, if all the atoms making up the entire earth were radiocarbon, then after only 1 million years absolutely no carbon-14 atoms should be left!

**The Power of Radiocarbon Detection Technology**

Most laboratories measure radiocarbon with a very sophisticated instrument called an accelerator mass spectrometer, or AMS. It is literally able to count carbon-14 atoms one at a time.[3](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14#fnList_1_3) This machine can theoretically detect one radioactive carbon-14 atom in 100 quadrillion regular carbon-12 atoms!

However, there’s a catch. AMS instruments need to be checked occasionally, to make sure they aren’t also “reading” any laboratory contamination, called background. So rock samples that should read zero are occasionally placed into the instruments to test their accuracy. What better samples to use than fossils, coals, and limestones, which are supposed to be millions of years old and should have no radiocarbon?

**Radiocarbon Found!**

Imagine the surprise when every piece of “ancient” carbon tested has contained measurable quantities of radiocarbon![4](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14#fnList_1_4) Fossils, coal, oil, natural gas, limestone, marble, and graphite from every Flood-related rock layer—and even some pre-Flood deposits—have all contained measurable quantities of radiocarbon (*Figure 2*). All these results have been reported in the conventional scientific literature.

**Figure 1** Radiocarbon has a very short half-life. At current decay rates, the number of radiocarbon atoms is halved every 5,730 years. Because of this exponential decay, carbon-14 atoms can’t survive millions of years.

**Figure 2** Radiocarbon shouldn’t be found in “old” rocks, but it is! Once creatures die, the radiocarbon in their bodies should quickly break down. After millions of years, their remains would be completely free of radiocarbon. But samples of organic materials taken from every rock layer, such as fossils, coal, limestone, natural gas, and graphite, all have measurable radiocarbon. These findings are reported in the secular scientific literature (but they are usually rejected as measurement errors).

This chart shows the percentage of radiocarbon that remains in 40 samples from various layers throughout the geologic column. (This percentage, technically known as percent modern carbon [pMC], shows the ratio of radiocarbon in the rocks and fossils compared to the amount we find in living things).

This finding is consistent with the belief that rocks are only thousands of years old, but the specialists who obtained these results have definitely not accepted this conclusion. It does not fit their presuppositions. To keep from concluding that the rocks are only thousands of years old, they claim that the radiocarbon must be due to contamination, either from the field or from the laboratory or from both. However, when the technician meticulously cleans the rocks with hot strong acids and other pre-treatments to remove any possible contamination, these “ancient” organic (once-living) materials still contain measurable radiocarbon.

Since a blank sample holder in the AMS instrument predictably yields zero radiocarbon, these scientists should naturally conclude that the radiocarbon is “intrinsic” to the rocks. In other words, real radiocarbon is an integral part of the “ancient” organic materials. But these scientists’ presuppositions prevent them from reaching this conclusion.

**Radiocarbon in Fossils Confirmed**

*Photo courtesy of Dr. Andrew Snelling*

**Figure 3** Sample from Marlstone Rock Bed, a muddy limestone in one wall of the Hornton Quarries at Edge Hill, west of Banbury in England. Pieces of fossilized wood in Jurassic rocks, supposedly millions of years old, yielded radiocarbon “ages” of only 20,700–28,820 years.

For some years creation scientists have been doing their own investigation of radiocarbon in fossils. Pieces of fossilized wood in Oligocene, Eocene, Cretaceous, Jurassic, Triassic, and Permian rock layers supposedly 32–250 million years old all contain measurable radiocarbon, equivalent to “ages” of 20,700 to 44,700 years (*Figures 3–5*).[5](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14#fnList_1_5) [6](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14#fnList_1_6) [7](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14#fnList_1_7) [8](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14#fnList_1_8) [9](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14#fnList_1_9) [10](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14#fnList_1_10) [11](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14" \l "fnList_1_11)(Creation geologists believe that with careful recalibration, even these extremely “young” time periods would be fewer than 10,000 years.)

Similarly, carefully sampled pieces of coal from ten U.S. coal beds, ranging from Eocene to Pennsylvanian and supposedly 40–320 million years old, all contained similar radiocarbon levels equivalent to “ages” of 48,000 to 50,000 years.[12](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14" \l "fnList_1_12) Even fossilized ammonite shells found alongside fossilized wood in a Cretaceous layer, supposedly 112–120 million years old, contained measurable radiocarbon equivalent to “ages” of 36,400 to 48,710 years (*Figure 5*).[13](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14" \l "fnList_1_13)

**Radiocarbon is Even in Diamonds**

*Photo courtesy of Dr. Andrew Snelling*

**Figure 4** Sample from mudstone on top of the Great Northern Seam in the upper Permian Newcastle Coal Measures in the Newvale No. 2 Coal Mine north of Sydney, Australia. A fossilized tree stump, found in Permian layers, supposedly hundreds of millions of years old, yielded coalified bark with a radiocarbon “age” of 33,700 years.

*Photo courtesy of Dr. Andrew Snelling*

**Figure 5** These fossils were in mudstone of the lower Cretaceous Budden Canyon Formation near Redding, California. A fossilized ammonite (a marine shellfish) was discovered with a piece of fossilized wood (from a land plant) embedded next to it. Located in Cretaceous layers that were supposedly millions of years old, the fossilized shell and wood yielded radiocarbon “ages” of 48,710 and 42,390 years respectively.

Just as intriguing is the discovery of measurable radiocarbon in diamonds. Creationist and evolutionary geologists agree that diamonds are formed more than 100 miles (161 km) down, deep within the earth’s upper mantle, and do not consist of organic carbon from living things. Explosive volcanoes brought them to the earth’s surface very rapidly in “pipes.”

As the hardest known natural substance, these diamonds are extremely resistant to chemical corrosion and external contamination. Also, the tight bonding in their crystals would have prevented any carbon-14 in the atmosphere from replacing any regular carbon atoms in the diamond.

Yet diamonds have been tested and shown to contain radiocarbon equivalent to an “age” of 55,000 years.[14](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14" \l "fnList_1_14) [15](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14" \l "fnList_1_15) These results have been confirmed by other investigators.[16](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14" \l "fnList_1_16) So even though these diamonds are conventionally regarded by evolutionary geologists as up to billions of years old, this radiocarbon has to be intrinsic to them.

This carbon-14 would have been implanted in them when they were formed deep inside the earth, and it could not have come from the earth’s atmosphere. This is not such a problem for creationist scientists, but it is a serious problem for evolutionists.

**The Radiocarbon “Puzzle”**

Evolutionary radiocarbon scientists have still not conceded that fossils, coals, and diamonds are only thousands of years old. Their uniformitarian (slow-and-gradual) interpretation requires that the earth’s rocks be millions or billions of years old. They still maintain that the carbon-14 is “machine background” contaminating all these tested samples.

Among their proposed explanations is that the AMS instruments do not properly reset themselves between sample analyses. But if this were true, why would the instrument find zero atoms when no sample is in it?

It should be noted that radiocarbon “ages” of up to 50,000 years don’t match the biblical time frame, either. The Flood cataclysm was only about 4,350 years ago. However, these young radiocarbon “ages” are far more in accord with the Bible’s account than the uniformitarian timescale. The discovery that diamonds have 55,000-year radiocarbon “ages” may help us unravel this mystery.

The article in the next issue of *Answers* magazine will examine how it may be possible to systematically correct radiocarbon “ages.” Once radiocarbon is interpreted properly, it should help creationists date archaeological remains from post-Flood human history, showing how they fit within the Bible’s chronology.

**Footnotes**

1. S. Bowman, *Interpreting the Past: Radiocarbon Dating* (London: British Museum Publications, 1990).
2. G. Faure and T. M. Mensing, *Isotopes: Principles and Applications*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2005), pp. 614–625.
3. A. P. Dickin, *Radiogenic Isotope Geology*, 2nd edition (Cambridge, UK: Cambridge University Press, 2005), pp. 383–398.
4. P. Giem, “Carbon-14 Content of Fossil Carbon,” *Origins* 51 (2001): 6–30.
5. A. A. Snelling, “Radioactive ‘Dating’ in Conflict! Fossil Wood in ‘Ancient Lava Flow Yields Radiocarbon,” *Creation* (January–March 1997), pp. 24–27.
6. A. A. Snelling, “Stumping Old-Age Dogma: Radiocarbon in ‘Ancient’ Fossil Tree Stump Casts Doubt on Traditional Rock/Fossil Dating,”*Creation* (October–December 1998), pp. 48–51.
7. A. A. Snelling, “Dating Dilemma: Fossil Wood in ‘Ancient’ Sandstone,”*Creation* (July–September 1999), pp. 39–41.
8. A. A. Snelling, “Geological Conflict: Young Radiocarbon Date for ‘Ancient’ Fossil Wood Challenges Fossil Dating,” *Creation* (April–June 2000), pp. 44–47.
9. A. A. Snelling, “Conflicting ‘Ages’ of Tertiary Basalt and Contained Fossilised Wood, Crinum, Central Queensland, Australia,” *CEN Technical Journal* 14.2 (2002): 99–122.
10. A. A. Snelling, “Radiocarbon in ‘Ancient’ Fossil Wood,” *Impact* #415,*Acts & Facts*, January 2008, pp. 10–13.
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13. Ref. 11.
14. J. R. Baumgardner, “14C Evidence for a Recent Global Flood and a Young Earth,” in *Radioisotopes and the Age of the Earth: Results of a Young-Earth Creationist Research Initiative*, eds. L. Vardiman, A. A. Snelling, and E. F. Chaffin (El Cajon, California: Institute for Creation Research, and Chino Valley, Arizona: Creation Research Society, 2005), pp. 587–630.
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**A Creationist Puzzle**

**50,000-Year-Old-Fossils**

by Andrew Snelling

Evolutionists aren’t the only ones who run into challenges when trying to reconcile radiocarbon dating with their view of history. How do creationists explain dates of 50,000 years?

Conventional geologists claim that fossils, coals, and diamonds are millions to billions of years old. Yet it has now been firmly established that they still contain measurable amounts of radiocarbon, which has a half-life (decay rate) of only 5,730 years.[1](http://www.answersingenesis.org/articles/am/v6/n2/creationist-puzzle" \l "fnList_1_1)

This creates a dilemma for conventional geology, as explained in Part 2 of this series.[2](http://www.answersingenesis.org/articles/am/v6/n2/creationist-puzzle" \l "fnList_1_2) Absolutely no radiocarbon should be left in fossils, coals, and diamonds, because after just one million years it should have decayed away.

Yet the radiocarbon in these fossils, coals, and diamonds equates to “ages” of up to 55,000 years. This is much older than the biblical time frame of earth history, which attributes most fossils and coals to the global Flood of Noah’s day, about 4,350 years ago. What should Bible-believing Christians think about this apparent discrepancy?

**Assumptions Change Estimate of Age**

To solve this puzzle it is necessary to review the assumptions on which radiocarbon dating is based. These include:

* The production rate of carbon-14 has always been the same in the past as now.
* The atmosphere has had the same carbon-14 concentration in the past as now.
* The biosphere (the places on earth where organisms live) has always had the same overall carbon-14 concentration as the atmosphere, due to the rapid transfer of carbon-14 atoms from the atmosphere to the biosphere.[3](http://www.answersingenesis.org/articles/am/v6/n2/creationist-puzzle" \l "fnList_1_3)

None of these assumptions is strictly correct, beyond a rough first approximation. Indeed, scientists have now documented that the atmosphere’s concentration of carbon-14 varies considerably according to latitude. They have also determined several geophysical causes for past and present fluctuations in carbon-14 production in the atmosphere.[4](http://www.answersingenesis.org/articles/am/v6/n2/creationist-puzzle" \l "fnList_1_4)

Specifically, we know that carbon-14 has varied in the past due to a stronger magnetic field on earth and changing cycles in sunspot activity. So when objects of known historical dates are dated using radiocarbon dating, we find that carbon-14 dates are accurate back to only about 400 BC.

The conventional scientific community ignores at least two factors that are crucial to recalibrating radiocarbon (so that it accounts for major changes in the biosphere and atmosphere that likely resulted from the Flood): (1) The earth’s magnetic field has been progressively stronger going back into the past, and (2) the Flood destroyed and buried a huge amount of carbon from the pre-Flood biosphere.

**The Effect of a Past Stronger Magnetic Field**

The evidence for the earth’s having a progressively stronger magnetic field in the past is based on reliable historical measurements[5](http://www.answersingenesis.org/articles/am/v6/n2/creationist-puzzle" \l "fnList_1_5) and “fossil” magnetism trapped in ancient pottery.[6](http://www.answersingenesis.org/articles/am/v6/n2/creationist-puzzle" \l "fnList_1_6), [7](http://www.answersingenesis.org/articles/am/v6/n2/creationist-puzzle" \l "fnList_1_7)

A stronger magnetic field is significant because the magnetic field partly shields the earth from the influx of cosmic rays, which change nitrogen atoms into radioactive carbon-14 atoms. So a stronger magnetic field in the past would have reduced the influx of cosmic rays.

This in turn would have reduced the amount of radiocarbon produced in the atmosphere. If this were the case, the biosphere in the past would have had a lower carbon-14 concentration than it does today.

The best estimates indicate that the earth’s magnetic field was twice as strong 1,400 years ago, and possibly four times as strong 2,800 years ago. If this is true, the earth’s magnetic field would have been much stronger at the time of the Flood, and the carbon-14 levels would be significantly smaller.

So if you mistakenly assume that the radiocarbon levels in the atmosphere and biosphere have always been the same as they are today, you would erroneously estimate much older dates for early human artifacts, such as post-Babel wooden statuettes in Egypt. And that is exactly what conventional archaeology has done.

**The Effect of More Carbon in the Pre-Flood Biospere**

An even more dramatic effect on the earth’s carbon-14 inventory would be the destruction and burial of all the carbon in the whole biosphere at the time of the Flood. Based on the enormous size of today’s coal beds, oil, oil shale, natural gas deposits, and all the fossils in limestones, shales, and sandstones, a huge quantity of plants and animals must have been alive when the Flood struck. It is conservatively estimated that the amount of carbon in the pre-Flood biosphere may have been many times greater than the amount of carbon in today’s biosphere.[8](http://www.answersingenesis.org/articles/am/v6/n2/creationist-puzzle" \l "fnList_1_8)

We cannot yet know for certain how much radiocarbon (carbon-14) was in this pre-Flood carbon (a mixture of normal carbon-12 and carbon-14). Yet if the earth’s atmosphere started to produce carbon-14 (14C) at the Fall, then many radiocarbon atoms could have been in the pre-Flood biosphere by the time of the Flood, about 1,650 years after Creation.

However, if there was a whole lot more normal carbon (carbon-12, or 12C) in the pre-Flood biosphere, then the proportion of 14C to 12C would have been much less than the proportion in today’s biosphere.

So when scientists fail to account for so many more plants and animals in the pre-Flood biosphere and wrongly assume that plants buried in coal beds had the same proportion of carbon-14 as plants do today, their radiocarbon dating yields “ages” much higher than the true Flood age of about 4,350 years.

**A Prediction Fulfilled**

Now if this model of the earth’s past radiocarbon inventory is correct, then a logical prediction follows. Since all pre-Flood plants would have had the same low radiocarbon levels when they were buried, and they all formed into coal beds during that single Flood year, then those coal beds should all have the same low radiocarbon content.

They do! Samples from coal beds around the United States, ranging from Eocene to Pennsylvanian deposits, supposedly 40–320 million years old, all contain the same low radiocarbon levels equivalent to “ages” of 48,000–50,000 years.[9](http://www.answersingenesis.org/articles/am/v6/n2/creationist-puzzle" \l "fnList_1_9)

This makes sense only if these coal beds were all formed out of pre-Flood plants during the year-long Flood, about 4,350 years ago. Carbon-14 dates of the same value are expected in creation theory but contrary to the expectations of conventional old-earth theory.

**The “Puzzle” Is Being Solved**

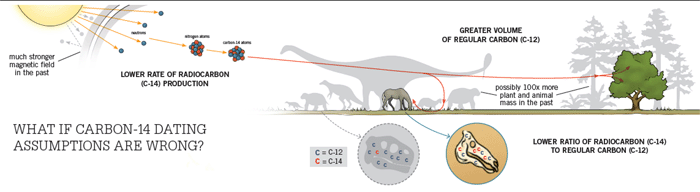
So the radiocarbon “puzzle” can be solved, but only in the biblical framework for earth history. Research is therefore underway to find a means of recalibrating the radiocarbon “clock” to properly account for the Flood and its impact on dates for the post-Flood period to the present.

For example, conventional radiocarbon dating gives an age of “48,000 years” for a coal bed deposited during the Flood, about 4,350 years ago. This could be explained if the 14C/12C ratio at the time of the Flood was only 1/200th the ratio of the present world.

If scientists assume the ratio is 200 times greater than it really was, then their radiocarbon age estimate would be exaggerated by 43,650 years.[10](http://www.answersingenesis.org/articles/am/v6/n2/creationist-puzzle" \l "fnList_1_10)

In reality, calculations (described above) have led to estimates that the pre-Flood biosphere may have had more than 100 times the carbon-12 as the present earth. Using this information, we may be able to calculate how much carbon-14 was actually on the early earth at the Flood. This, in turn, would allow us to develop a proper interpretation of all carbon-14 dates.

Once the research is completed, one of the many exciting benefits is that it should be possible to begin more accurately dating any archeological artifact within the true chronology found in God’s Word.



Radiocarbon dating of fossils compares the amount of radioactive carbon atoms (C-14) to regular carbon atoms (C-12). Conventional dating methods assume the past ratio based on current levels. But what if these assumptions are wrong?

**Lower Rate of Radiocarbon (C-14) Production**

Cosmic rays bombard the earth’s atmosphere and produce neutrons. These neutrons collide with nitrogen atoms, changing them into radioactive carbon atoms (C-14).

Conventional dating assumes radiocarbon (C-14) production has remained stable. But the earth’s magnetic field, which protects the earth from cosmic rays, was once several times stronger than it is today. So we would expect much less radiocarbon to be produced in the past. That would result in much less C-14 compared to C-12.

**Greater Volume of Regular Carbon (C-12)**

Plants absorb carbon atoms during photosynthesis (mostly regular C-12 and little radioactive C-14). With a limited amount of radiocarbon to go around, more plants would mean less radiocarbon per plant.

Coventional dating assumes the volume of plants and animals in the world has remained relatively stable. But the abundance of fossils indicates that the pre-Flood world’s shallow seas and temperate climate supported much more plants and animals (containing mostly C-12) than today.

**Lower Ratio of Radiocarbon (C-14) to Regular Carbon (C-12)**

Radiocarbon begins to break down after plants and animals die. The amount of radiocarbon remaining determines the time that has passed. Conventional dating assumes the ratio of C-12 to C-14 was the same in animals in the past. But if the ratio was much lower in the animals in the past, then those animals would have much less radiocarbon to break down after they died. This would result in much younger dates than conventional methods assume.

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**Footnotes**

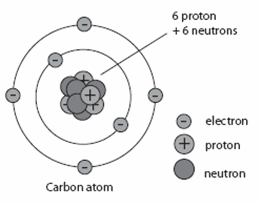
1. A. A. Snelling, “[Radiocarbon Dating Part 1: Understanding the Basics](http://www.answersingenesis.org/articles/am/v5/n4/carbon-dating),” *Answers* (Oct.–Dec. 2010), pp. 72–75.
2. A. A. Snelling, “[Radiocarbon Dating Part 2: Carbon–14 in Fossils and Diamonds—An Evolution Dilemma](http://www.answersingenesis.org/articles/am/v6/n1/carbon-14),” *Answers* (Jan.–Mar. 2011), pp. 72–75.
3. S. Bowman, *Interpreting the Past: Radiocarbon Dating* (London: British Museum Publications, 1990), p. 14.
4. Bowman, ref. 3, pp. 16–30; G. Faure and T. M. Mensing, *Isotopes: Principles and Applications*, 3rd edition (Hoboken, New Jersey: John Wiley & Sons, 2005), pp. 614–625; A. P. Dickin, *Radiogenic Isotope Geology*, 2nd edition (Cambridge: Cambridge University Press, 2005), pp. 383–398.
5. T. G. Barnes, “Decay of the Earth’s Magnetic Field and the Geochronological Implications,” *Creation Research Society Quarterly*8.1 (1971): 24–29.
6. D. R. Humphreys, “Reversal of the Earth’s Magnetic Field during the Genesis Flood,” in *Proceedings of the First International Conference on Creationism*, ed. R. E. Walsh, C. L. Brooks and R. S. Crowell, (Pittsburgh, Pennsylvania: Creation Science Fellowship, 1986), 2:113–126. What is “fossil” magnetism? The clay used to make pottery often contains mineral grains that are slightly magnetic. When the clay is baked, the grain’s magnetic field imprint at the time is “locked in” or fossilized.
7. The strength of the earth’s magnetic field was not affected by field reversals. The sun also regularly experiences field reversals without loss of strength in the magnetic field. D. R. Humphreys, “Physical Mechanism for Reversal of the Earth’s Magnetic Field during the Flood, in *Proceedings of the Second International Conference on Creationism*, ed. R. E. Walsh and C. L. Brooks (Pittsburgh, Pennsylvania: Creation Science Fellowship, 1990), 2: 129–142.
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9. J. R. Baumgardner, “14C Evidence for a Recent Global Flood and a Young Earth,” in *Radioisotopes and the Age of the Earth: Results of a Young-Earth Creationist Research Initiative*, ed. L. Vardiman, A. A. Snelling, and E. F. Chaffin (El Cajon, California: Institute for Creation Research, and Chino Valley, Arizona: Creation Research Society, 2005), pp. 587–630; D. B. DeYoung, *Thousands . . . Not Billions: Challenging an Icon of Evolution, Questioning the Age of the Earth*(Green Forest, Arkansas: Master Books, 2005), pp. 45–62.
10. These numbers are calculated in terms of half-lives, discussed in this series’ previous article. If the modern ratio is 200 times greater than the ratio at the Flood, the error ends up being 7.618 carbon-14 half-lives, or 43,650 years!

# Doesn’t Carbon-14 Dating Disprove the Bible?

by Mike Riddle on September 20, 2007

Scientists use a technique called [radiometric dating](https://answersingenesis.org/geology/radiometric-dating/) to estimate the ages of rocks, fossils, and the earth. Many people have been led to believe that radiometric dating methods have proved the earth to be billions of years old. This has caused many in the church to [reevaluate](https://answersingenesis.org/theistic-evolution/) the biblical creation account, specifically the meaning of the word “day” in Genesis 1. With our focus on one particular form of radiometric dating—carbon dating—we will see that carbon dating strongly supports a young earth. Note that, contrary to a popular misconception, carbon dating is not used to date rocks at millions of years old.

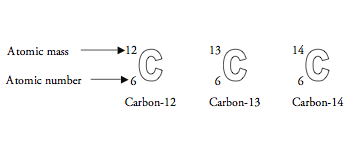
## Basics



Before we get into the details of how radiometric dating methods are used, we need to review some preliminary concepts from chemistry. Recall that atoms are the basic building blocks of matter. Atoms are made up of much smaller particles called protons, neutrons, and electrons. Protons and neutrons make up the center (nucleus) of the atom, and electrons form shells around the nucleus.

The number of protons in the nucleus of an atom determines the element. For example, all carbon atoms have 6 protons, all atoms of nitrogen have 7 protons, and all oxygen atoms have 8 protons. The number of neutrons in the nucleus can vary in any given type of atom. So, a carbon atom might have six neutrons, or seven, or possibly eight—but it would always have six protons. An “isotope” is any of several different forms of an element, each having different numbers of neutrons. The illustration below shows the three isotopes of carbon.

Some isotopes of certain elements are unstable; they can spontaneously change into another kind of atom in a process called “radioactive decay.” Since this process presently happens at a known measured rate, scientists attempt to use it like a “clock” to tell how long ago a rock or fossil formed. There are two main applications for radiometric dating. One is for potentially dating [fossils](https://answersingenesis.org/fossils/) (once-living things) using carbon-14 dating, and the other is for dating rocks and the age of the earth using uranium, potassium and other radioactive atoms.



The atomic number corresponds to the number of protons in an atom. Atomic mass is a combination of the number of protons and neutrons in the nucleus. (The electrons are so much lighter that they do not contribute significantly to the mass of an atom.)

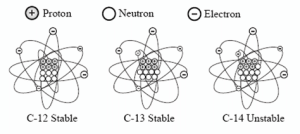
## Carbon-14 Dating

Carbon-14 (14C), also referred to as radiocarbon, is claimed to be a reliable dating method for determining the age of fossils up to 50,000 to 60,000 years. If this claim is true, the biblical account of a young earth (about 6,000 years) is in question, since 14C dates of tens of thousands of years are common.[[1]](#footnote-1)

When a scientist’s interpretation of data does not match the clear meaning of the text in the Bible, we should never reinterpret the Bible. God knows just what He meant to say, and His understanding of science is infallible, whereas ours is fallible. So we should never think it necessary to modify His Word. Genesis 1 defines the days of creation to be literal days (a number with the word “day” always means a normal day in the Old Testament, and the phrase “evening and morning” further defines the days as literal days). Since the Bible is the inspired Word of God, we should examine the validity of the standard interpretation of 14C dating by asking several questions:

1. Is the explanation of the data derived from empirical, observational [science](https://answersingenesis.org/science/), or an interpretation of past events (historical science)?
2. Are there any assumptions involved in the dating method?
3. Are the dates provided by 14C dating consistent with what we observe?
4. Do all scientists accept the 14C dating method as reliable and accurate?

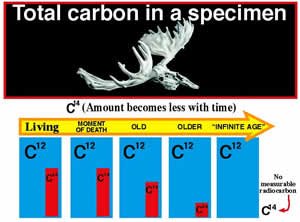
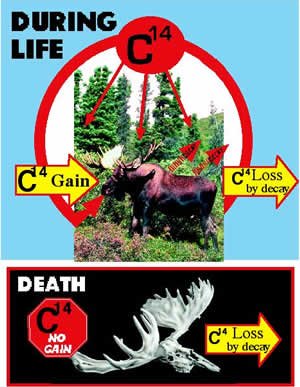
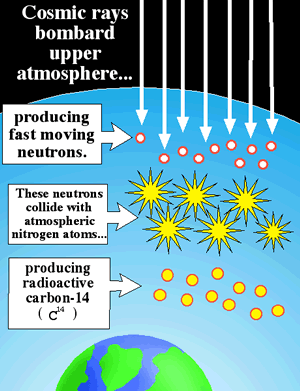
All radiometric dating methods use scientific procedures in the present to interpret what has happened in the past. The procedures used are not necessarily in question. The interpretation of past events is in question. The secular (evolutionary) worldview interprets the universe and world to be billions of years old. The Bible teaches a young universe and earth. Which worldview does science support? Can carbon-14 dating help solve the mystery of which worldview is more accurate?



The use of carbon-14 dating is often misunderstood. Carbon-14 is mostly used to date once-living things (organic material). It cannot be used directly to date rocks; however, it can potentially be used to put time constraints on some inorganic material such as diamonds (diamonds could contain carbon-14). Because of the rapid rate of decay of 14C, it can only give dates in the thousands-of-year range and not millions.

There are three different naturally occurring varieties (isotopes) of carbon: 12C, 13C, and 14C.

Carbon-14 is used for dating because it is unstable (radioactive), whereas 12C and 13C are stable. Radioactive means that 14C will decay (emit radiation) over time and become a different element. During this process (called “beta decay”) a neutron in the 14C atom will be converted into a proton. By losing one neutron and gaining one proton, 14C is changed into nitrogen-14 (14N = 7 protons and 7 neutrons).



If 14C is constantly decaying, will the earth eventually run out of 14C? The answer is no. Carbon-14 is constantly being added to the atmosphere. Cosmic rays from outer space, which contain high levels of energy, bombard the earth’s upper atmosphere. These cosmic rays collide with atoms in the atmosphere and can cause them to come apart. Neutrons that come from these fragmented atoms collide with 14N atoms (the atmosphere is made mostly of nitrogen and oxygen) and convert them into 14C atoms (the neutron is accepted and a proton is ejected from the nucleus).

Once 14C is produced, it combines with oxygen in the atmosphere (12C behaves like 14C and also combines with oxygen) to form carbon dioxide (CO2). Because CO2 gets incorporated into plants (which means the food we eat contains 14C and 12C), all living things should have the same ratio of 14C and 12C in them as in the air we breathe.

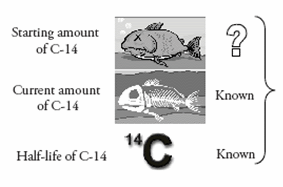
## How the Carbon-14 Dating Process Works

Once a living thing dies, the dating process begins. As long as an organism is alive it will continue to take in 14C; however, when it dies, it will stop. Since 14C is radioactive (decays into 14N), the amount of 14C in a dead organism gets less and less over time. Therefore, part of the dating process involves measuring the amount of 14C that remains after some has been lost (decayed). Scientists now use a device called an “Accelerator Mass Spectrometer” (AMS) to determine the ratio of 14C to12C, which increases the assumed accuracy to about 80,000 years. In order to actually do the dating, other things need to be known. Two such things include the following questions:

1. How fast does 14C decay?
2. What was the starting amount of 14C in the creature when it died?

The decay rate of radioactive elements is described in terms of half-life. The half-life of an atom is the amount of time it takes for half of the atoms in a sample to decay. The half-life of 14C is 5,730 years. For example, a jar starting with all 14C atoms at time zero will contain half14C atoms and half 14N atoms at the end of 5,730 years (one half-life). At the end of 11,460 years (two half-lives) the jar will contain one-quarter14C atoms and three-quarter 14N atoms.

Since the half-life of 14C is known (how fast it decays), the only part left to determine is the starting amount of 14C in a fossil. If scientists know the original amount of 14C in a creature when it died, they can measure the current amount and then calculate how many half-lives have passed.



Since no one was there to measure the amount of 14C when a creature died, scientists need to find a method to determine how much 14C has decayed. To do this, scientists use the main isotope of carbon, called carbon-12 (12C). Because 12C is a stable isotope of carbon, it will remain constant; however, the amount of14C will decrease after a creature dies. All living things take in carbon (14C and 12C) from eating and breathing. Therefore, the ratio of 14C to12C in living creatures will be the same as in the atmosphere. This ratio turns out to be about one 14C atom for every 1 trillion 12C atoms. Scientists can use this ratio to help determine the starting amount of14C.

When an organism dies, this ratio (1 to 1 trillion) will begin to change. The amount of 12C will remain constant, but the amount of 14C will become less and less. The smaller the ratio, the longer the organism has been dead. The following illustration demonstrates how the age is estimated using this ratio.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Percent 14C Remaining | Percent 12C Remaining | Ratio | Number of Half-Lives | Years Dead(Age of Fossil) |
| 100 | 100 | 1 to 1T | 0 | 0 |
| 50 | 100 | 1 to 2T | 1 | 5,730 |
| 25 | 100 | 1 to 4T | 2 | 11,460 |
| 12.5 | 100 | 1 to 8T | 3 | 17,190 |
| 6.25 | 100 | 1 to 16T | 4 | 22,920 |
| 3.125 | 100 | 1 to 32T | 5 | 28,650 |

T = Trillion

## A Critical Assumption

A critical assumption used in carbon-14 dating has to do with this ratio. It is assumed that the ratio of 14C to 12C in the atmosphere has always been the same as it is today (1 to 1 trillion). If this assumption is true, then the AMS 14C dating method is valid up to about 80,000 years. Beyond this number, the instruments scientists use would not be able to detect enough remaining 14C to be useful in age estimates. This is a critical assumption in the dating process. If this assumption is not true, then the method will give incorrect dates. What could cause this ratio to change? If the production rate of 14C in the atmosphere is not equal to the removal rate (mostly through decay), this ratio will change. In other words, the amount of 14C being produced in the atmosphere must equal the amount being removed to be in a steady state (also called “equilibrium”). If this is not true, the ratio of 14C to 12C is not a constant, which would make knowing the starting amount of 14C in a specimen difficult or impossible to accurately determine.

Dr. Willard Libby, the founder of the carbon-14 dating method, assumed this ratio to be constant. His reasoning was based on a belief in evolution, which assumes the earth must be billions of years old. Assumptions in the scientific community are extremely important. If the starting assumption is false, all the calculations based on that assumption might be correct but still give a wrong conclusion.

In Dr. Libby’s original work, he noted that the atmosphere did not appear to be in equilibrium. This was a troubling idea for Dr. Libby since he believed the world was billions of years old and enough time had passed to achieve equilibrium. Dr. Libby’s calculations showed that if the earth started with no 14C in the atmosphere, it would take up to 30,000 years to build up to a steady state (equilibrium).

If the cosmic radiation has remained at its present intensity for 20,000 or 30,000 years, and if the carbon reservoir has not changed appreciably in this time, then there exists at the present time a complete balance between the rate of disintegration of radiocarbon atoms and the rate of assimilation of new radiocarbon atoms for all material in the life-cycle.[[2]](#footnote-2)

Dr. Libby chose to ignore this discrepancy (nonequilibrium state), and he attributed it to experimental error. However, the discrepancy has turned out to be very real. The ratio of 14C /12C is not constant.

The Specific Production Rate (SPR) of C-14 is known to be 18.8 atoms per gram of total carbon per minute. The Specific Decay Rate (SDR) is known to be only 16.1 disintegrations per gram per minute.[[3]](#footnote-3)

What does this mean? If it takes about 30,000 years to reach equilibrium and 14C is still out of equilibrium, then maybe the earth is not very old.

## Magnetic Field of the Earth

Other factors can affect the production rate of 14C in the atmosphere. The earth has a magnetic field around it which helps protect us from harmful radiation from outer space. This magnetic field is decaying (getting weaker). The stronger the field is around the earth, the fewer the number of cosmic rays that are able to reach the atmosphere. This would result in a smaller production of 14C in the atmosphere in earth’s past.

The cause for the long term variation of the C-14 level is not known. The variation is certainly partially the result of a change in the cosmic ray production rate of radiocarbon. The cosmic-ray flux, and hence the production rate of C-14, is a function not only of the solar activity but also of the magnetic dipole moment of the Earth.[[4]](#footnote-4)

Though complex, this history of the earth’s magnetic field agrees with Barnes’ basic hypothesis, that the field has always freely decayed.... The field has always been losing energy despite its variations, so it cannot be more than 10,000 years old.[[5]](#footnote-5)

Earth’s magnetic field is fading. Today it is about 10 percent weaker than it was when German mathematician Carl Friedrich Gauss started keeping tabs on it in 1845, scientists say.[[6]](#footnote-6)

If the production rate of 14C in the atmosphere was less in the past, dates given using the carbon-14 method would incorrectly assume that more 14C had decayed out of a specimen than what has actually occurred. This would result in giving older dates than the [true age](https://answersingenesis.org/age-of-the-earth/).

## Genesis Flood

What role might the [Genesis Flood](https://answersingenesis.org/the-flood/) have played in the amount of carbon? The Flood would have buried large amounts of carbon from living organisms (plant and animal) to form today’s fossil fuels (coal, oil, etc.). The amount of fossil fuels indicates there must have been a vastly larger quantity of vegetation in existence prior to the Flood than exists today. This means that the biosphere just prior to the Flood might have had 500 times more carbon in living organisms than today. This would further dilute the amount of 14C and cause the 14C/12C ratio to be much smaller than today.

If that were the case, and this C-14 were distributed uniformly throughout the biosphere, and the total amount of biosphere C were, for example, 500 times that of today’s world, the resulting C-14/C-12 ratio would be 1/500 of today’s level....[[7]](#footnote-7)

When the Flood is taken into account along with the decay of the magnetic field, it is reasonable to believe that the assumption of equilibrium is a false assumption.

Because of this false assumption, any age estimates using 14C prior to the Flood will give much older dates than the true age. Pre-Flood material would be dated at perhaps ten times the true age.

## The RATE Group Findings

In 1997 an eight-year research project was started to investigate the age of the earth. The group was called the [RATE group](http://icr.org/rate/) (Radioisotopes and the Age of The Earth). The team of scientists included:

* Larry Vardiman, PhD Atmospheric Science
* Russell Humphreys, PhD Physics
* Eugene Chaffin, PhD Physics
* John Baumgardner, PhD Geophysics
* Donald DeYoung, PhD Physics
* Steven Austin, PhD Geology
* Andrew Snelling, PhD Geology
* Steven Boyd, PhD Hebraic and Cognate Studies

The objective was to gather data commonly ignored or censored by evolutionary standards of dating. The scientists reviewed the assumptions and procedures used in estimating the ages of rocks and fossils. The results of the carbon-14 dating demonstrated serious problems for long geologic ages. For example, a series of fossilized wood samples that conventionally have been dated according to their host strata to be from Tertiary to Permian (40-250 million years old) all yielded significant, detectable levels of carbon-14 that would conventionally equate to only 30,000-45,000 years “ages” for the original trees.[[8]](#footnote-8) Similarly, a survey of the conventional radiocarbon journals resulted in more than forty examples of supposedly ancient organic materials, including limestones, that contained carbon-14, as reported by leading laboratories.[[9]](#footnote-9)

Samples were then taken from ten different coal layers that, according to evolutionists, represent different time periods in the geologic column (Cenozoic, Mesozoic, and Paleozoic). The RATE group obtained these ten coal samples from the U.S. Department of Energy Coal Sample Bank, from samples collected from major coalfields across the United States. The chosen coal samples, which dated millions to hundreds of millions of years old based on standard evolution time estimates, all contained measurable amounts of 14C. In all cases, careful precautions were taken to eliminate any possibility of contamination from other sources. Samples, in all three “time periods”, displayed significant amounts of 14C. This is a significant discovery. Since the half-life of 14C is relatively short (5,730 years), there should be no detectable 14C left after about 100,000 years. The average 14C estimated age for all the layers from these three time periods was approximately 50,000 years. However, using a more realistic pre-Flood 14C /12C ratio reduces that age to about 5,000 years.



These results indicate that the entire geologic column is less than 100,000 years old—and could be much younger. This confirms the Bible and challenges the evolutionary idea of long geologic ages.

Because the lifetime of C-14 is so brief, these AMS [Accelerator Mass Spectrometer] measurements pose an obvious challenge to the standard geological timescale that assigns millions to hundreds of millions of years to this part of the rock layer.[[10]](#footnote-10)

Another noteworthy observation from the RATE group was the amount of 14C found in diamonds. Secular scientists have estimated the ages of diamonds to be millions to billions of years old using other radiometric dating methods. These methods are also based on questionable assumptions and are discussed elsewhere.[[11]](#footnote-11) Because of their hardness, diamonds (the hardest known substance) are extremely resistant to contamination through chemical exchange. Since diamonds are considered to be so old by evolutionary standards, finding any 14C in them would be strong support for a recent creation.

The RATE group analyzed twelve diamond samples for possible carbon-14 content. Similar to the coal results, all twelve diamond samples contained detectable, but lower levels of 14C. These findings are powerful evidence that coal and diamonds cannot be the millions or billions of years old that evolutionists claim. Indeed, these RATE findings of detectable 14C in diamonds have been confirmed independently.[[12]](#footnote-12) Carbon-14 found in fossils at all layers of the geologic column, in coal and in diamonds, is evidence which confirms the biblical timescale of thousands of years and not billions.

Because of C-14’s short half-life, such a finding would argue that carbon and probably the entire physical earth as well must have a recent origin.[[13]](#footnote-13)

## Conclusion

All radiometric dating methods are based on assumptions about events that happened in the past. If the assumptions are accepted as true (as is typically done in the evolutionary dating processes), results can be biased toward a desired age. In the reported ages given in textbooks and other journals, these evolutionary assumptions have not been questioned, while results inconsistent with long ages have been censored. When the assumptions were evaluated and shown faulty, the results supported the biblical account of a global Flood and young earth. Christians should not be afraid of radiometric dating methods. Carbon-14 dating is really the friend of Christians, and it supports a young earth.

The RATE scientists are convinced that the popular idea attributed to geologist Charles Lyell from nearly two centuries ago, “The present is the key to the past,” is simply not valid for an earth history of millions or billions of years. An alternative interpretation of the carbon-14 data is that the earth experienced a global flood catastrophe which laid down most of the rock strata and fossils.... Whatever the source of the carbon-14, its presence in nearly every sample tested worldwide is a strong challenge to an ancient age. Carbon-14 data is now firmly on the side of the young-earth view of history.[[14]](#footnote-14)

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11. Ibid., 609. [↑](#footnote-ref-11)
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