

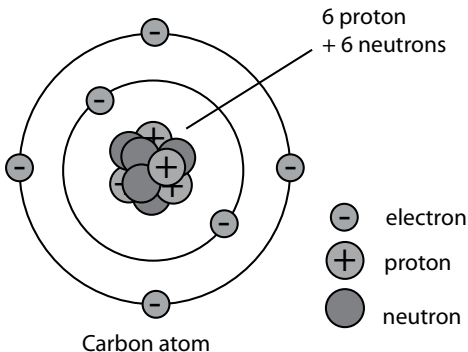
DOESN'T CARBON-14 DATING DISPROVE THE BIBLE?

Mike Riddle

Scientists use a technique called 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 the biblical creation account, specifically the meaning of the word “day” in Genesis chapter 1 and its length. With our focus on one particular form of radiometric dating, carbon dating, we will see that carbon dating strongly supports a young earth.

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.



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.)

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 happens at a known 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 dating fossils (once-living things) using carbon-14 dating, and the other is for dating rocks and the age of the earth.

Carbon-14 Dating

Carbon-14 (^{14}C), 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 ^{14}C dates of tens of thousands of years are common.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 chapter 1 defines the days of creation to be literal days (the use of 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 ^{14}C dating by

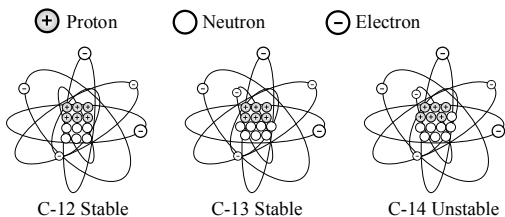
asking several questions:

1. Is the explanation of the data derived from empirical, observational 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 ^{14}C dating consistent with what we observe?
4. Do all scientists accept the ^{14}C 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 be used to put time constraints on some inorganic material such as diamonds (diamonds contain carbon-14). Because of the rapid rate of decay of ^{14}C , it can only give dates in the thousands-of-year range and not millions.

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

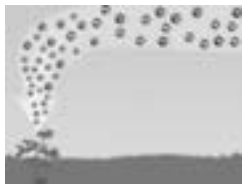


Carbon-14 is used for dating because it is unstable (radioactive), whereas ^{12}C and ^{13}C are stable. Radioactive means that ^{14}C will decay (emit radiation) over time and become a different element. During this process

(called “beta decay”) a neutron in the ^{14}C atom will be converted into a proton. By losing one neutron and gaining one proton, ^{14}C is changed into nitrogen-14 ($^{14}\text{N} = 7$ protons and 7 neutrons).

If ^{14}C is constantly decaying, will the earth eventually run out of ^{14}C ? 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 ^{14}N atoms (the atmosphere is made mostly of nitrogen and oxygen) and convert them into ^{14}C atoms (a proton changes into a neutron).

Once ^{14}C is produced, it combines with oxygen in the atmosphere (^{12}C behaves like ^{14}C and also combines with



oxygen) to form carbon dioxide (CO_2). Because CO_2 gets incorporated into plants (which means the food we eat contains ^{14}C and ^{12}C), all living things should have the same ratio of ^{14}C and ^{12}C in them as in the air we breathe.

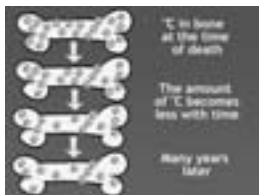


HOW THE CARBON-14 DATING PROCESS WORKS

Once a living thing dies, the dating process begins. As long as an organism is alive it will continue to take in ^{14}C ; however, when it dies, it will stop. Since ^{14}C is radio-



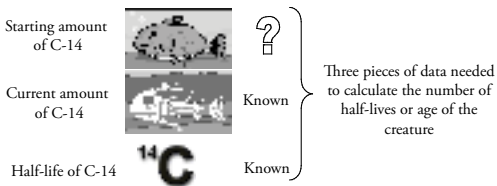
active (decays into ^{14}N), the amount of ^{14}C in a dead organism gets less and less over time. Therefore, part of the dating process



involves measuring the amount of ^{14}C that remains after some has been lost (decayed). Scientists now use a device called an “Accelerator Mass Spectrometer” (AMS) to determine the ratio of ^{14}C to ^{12}C , 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 ^{14}C decay?
2. What was the starting amount of ^{14}C 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 ^{14}C is 5,730 years. For example, a jar starting with all ^{14}C atoms at time zero will contain half ^{14}C atoms and half ^{14}N 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-quarter ^{14}C atoms and three-quarter ^{14}N atoms.

Since the half-life of ^{14}C is known (how fast it decays), the only part left to determine is the starting amount of ^{14}C in a fossil. If scientists know the original amount of ^{14}C 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 ^{14}C when a creature died, scientists need to

find a method to determine how much ^{14}C has decayed. To do this, scientists use the main isotope of carbon, called carbon-12 (^{12}C). Because ^{12}C is a stable isotope of carbon, it will remain constant; however, the amount of ^{14}C will decrease after a creature dies. All living things take in carbon (^{14}C and ^{12}C) from eating and breathing.

Therefore, the ratio of ^{14}C to ^{12}C in living creatures will be the same as in the atmosphere. This ratio turns out to be about one ^{14}C atom for every 1 trillion ^{12}C atoms. Scientists can use this ratio to help determine the starting amount of ^{14}C .

When an organism dies, this ratio (1 to 1 trillion) will begin to change. The amount of ^{12}C will remain constant, but the amount of ^{14}C 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 ^{14}C Remaining (Age of Fossil)	100	50	25	12.5	6.25	3.125
Percent ^{12}C Remaining	100	100	100	100	100	100
Ratio	1 to 1T	1 to 2T	1 to 4T	1 to 8T	1 to 16T	1 to 32T
Number of Half-Lives	0	1	2	3	4	5
Years Dead	0	5,730	11,460	17,190	22,920	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 ^{14}C to ^{12}C in the atmosphere has always been the same as it is today (1 to 1 trillion). If this assumption is true, then the AMS ^{14}C 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 ^{14}C 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 pro-

duction rate of ^{14}C in the atmosphere is not equal to the removal rate (mostly through decay), this ratio will change. In other words, the amount of ^{14}C 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 ^{14}C to ^{12}C is not a constant, which would make knowing the starting amount of ^{14}C 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 ^{14}C 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

Dr. Libby chose to ignore this discrepancy (i.e., the nonequilibrium state), and he attributed it to experimental error. However, the discrepancy has turned out to be very real. The ratio of $^{14}\text{C} / ^{12}\text{C}$ 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

What does this mean? If it takes about 30,000 years to reach equilibrium and ^{14}C 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 ^{14}C 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 ^{14}C 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

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

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

If the production rate of ^{14}C in the atmosphere was less in the past, dates given using the carbon-14 method would incorrectly assume that more ^{14}C had decayed out of a specimen than what has actually occurred. This would

result in giving older dates than the true age.

Genesis Flood

What role might the Genesis 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 ^{14}C and cause the $^{14}\text{C}/^{12}\text{C}$ 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

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 ^{14}C 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 (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.

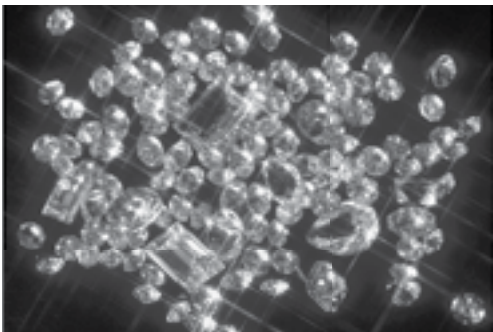
Samples were taken from ten different coal layers that, according to evolutionists, represent different time periods in the geologic column (Cenozoic, Mesozoic, and Paleozoic). The RATE group obtained ten coal samples from the U.S. Department of Energy Coal Sample Bank. These coal samples were collected from major coalfields across the United States. The coal samples, which dated millions to hundreds of millions of years old based on standard evolution time estimates, all contained measurable amounts of ^{14}C .

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 ^{14}C .

This is a significant discovery. Since the half-life of ^{14}C is relatively short (5,730 years), there should be no detectable ^{14}C left after about 100,000 years. The average ^{14}C estimated age for all the layers from these three time periods was approximately 50,000 years. However, using a more realistic pre-Flood $^{14}\text{C}/^{12}\text{C}$ 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 its age for the earth, and challenges the evolutionary idea of long geologic ages. According to RATE researchers:

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.⁸

Another noteworthy observation from the RATE group was the amount of ^{14}C 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 in chapter 9 of the RATE book.⁷ 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 ^{14}C 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 ^{14}C . These findings are powerful evidence that coal and diamonds cannot be the millions or billions of years old that evolutionists claim. 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.⁹

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. In conclusion,

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.¹⁰

References

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- ³ C. Sewell, "Carbon-14 and the age of the earth," 1999, www.rae.org/bits23.htm.
- ⁴ M. Stuiver and H. Suess, "On the relationship between radiocarbon dates and true sample ages," *Radiocarbon*, Vol. 8, 1966, p. 535.
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- ⁶ J. Roach, *National Geographic News*, September 9, 2004.
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- ⁸ *Ibid.*, p. 587.
- ⁹ *Ibid.*, p. 609.
- ¹⁰ D. DeYoung, *Thousands...Not Billions*, Master Books, Green Forest, Arkansas, 2005, p. 61.

SOME PHYSICAL PROCESSES THAT SET LIMITS ON A LONG AGE OF THE EARTH

1. Helium in atmosphere
2. Helium in biotite
3. Meteor dust
4. Buildup of carbon 14
5. Human population
6. Natural plutonium
7. Sodium in sea
8. Sediment in sea
9. Erosion of continents
10. Earth's magnetic field
11. Oil leaks in earth
12. Natural gas in earth
13. Orphan radiohalos
14. Neutrons and strontium
15. Coral reef growth
16. Oldest living plants
17. Human civilizations
18. River delta growth
19. Undersea oil seepage
20. Uranium in sea

21. Neutrons and lead
22. Rotation of spiral galaxies
23. Interstellar gas expansion
24. Carbon 14 in meteorites
25. Decay of comets
26. Interplanetary dust removal
27. Lifetime of meteor showers
28. Peat bog growth
29. Multi-layer fossils
30. Hardening of rocks
31. Decay of Saturn's ring
32. Potassium in the sea
33. Titan's methane loss
34. Internal heat of Io
35. Leaching of chlorine
36. Radiogenic lead
37. Niagara Falls
38. Stone age burials
39. Seafloor calcareous ooze
40. Uranium decay
41. Squashed radiohalos
42. Carbon 14 in diamonds
43. Carbon 14 in coal
44. Magnetic planetary fields

45. Recession of the moon
46. Hot spots on the moon
47. Helium in zircons
48. Heat in rocks
49. Blue stars
50. Rings in trees

... and others.

HERE'S THE GOOD NEWS

Answers in Genesis seeks to give glory and honor to God as Creator and to affirm the truth of the Biblical record of the real origin and history of the world and mankind.

Part of this real history is the bad news that the rebellion of the first man, Adam, against God's command brought death, suffering and separation from God into this world. We see the results all around us. All of Adam's descendants are sinful from conception (Psalm 51:5) and have themselves entered into this rebellion (sin). They therefore cannot live with a holy God, but are condemned to separation from God. The Bible says that "all have sinned, and come short of the glory of God" (Romans 3:23) and that all are therefore subject to "everlasting destruction from the presence of the Lord and from the glory of His power" (2 Thessalonians 1:9).

But the good news is that God has done something about it. "For God so loved the world, that He gave his only-begotten

Son, that whoever believes in Him should not perish, but have everlasting life” (John 3:16).

Jesus Christ the Creator, though totally sinless, suffered, on behalf of mankind, the penalty of mankind’s sin which is death and separation from God. He did this to satisfy the righteous demands of the holiness and justice of God, His Father. Jesus was the perfect sacrifice; He died on a cross; but on the third day, He rose again, conquering death, so that all who truly believe in Him, repent of their sin and trust in Him (rather than their own merit) are able to come back to God and live for eternity with their Creator.

Therefore: “He who believes on Him is not condemned, but he who does not believe is condemned already, because he has not believed in the name of the only-begotten Son of God” (John 3:18).

What a wonderful Savior—and what a wonderful salvation in Christ our Creator!

(If you want to know more of what the Bible

says about how you can receive eternal life, please write or call the *Answers in Genesis* office nearest you—see inside front cover.)



For information on AiG’s “walk-through-the-Bible” Creation Museum (which will be very evangelistic) located near Cincinnati, Ohio, opening in 2007, go to: *www.CreationMuseum.org*.