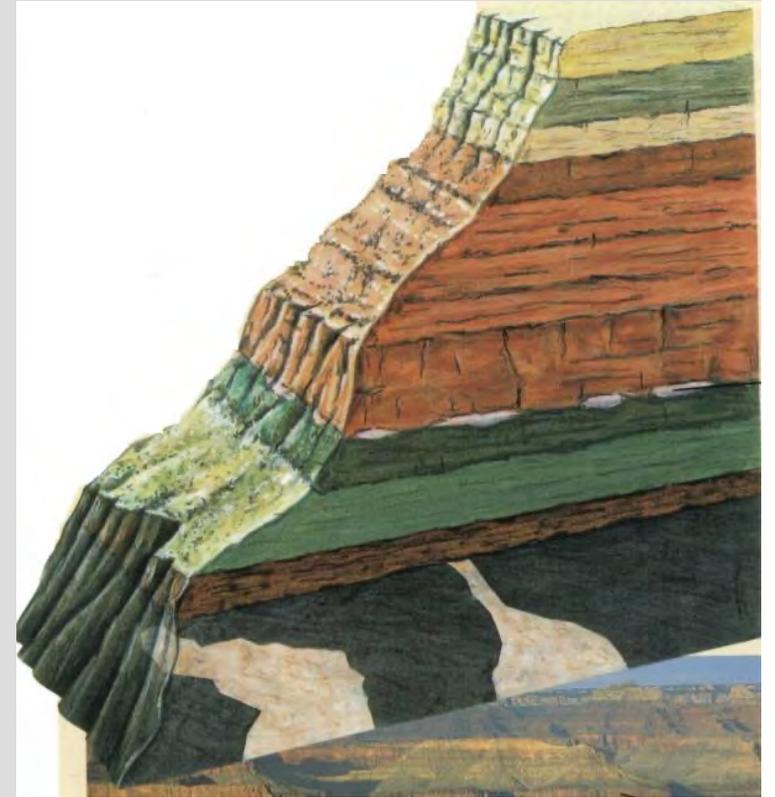


Dating Fossils and Rocks



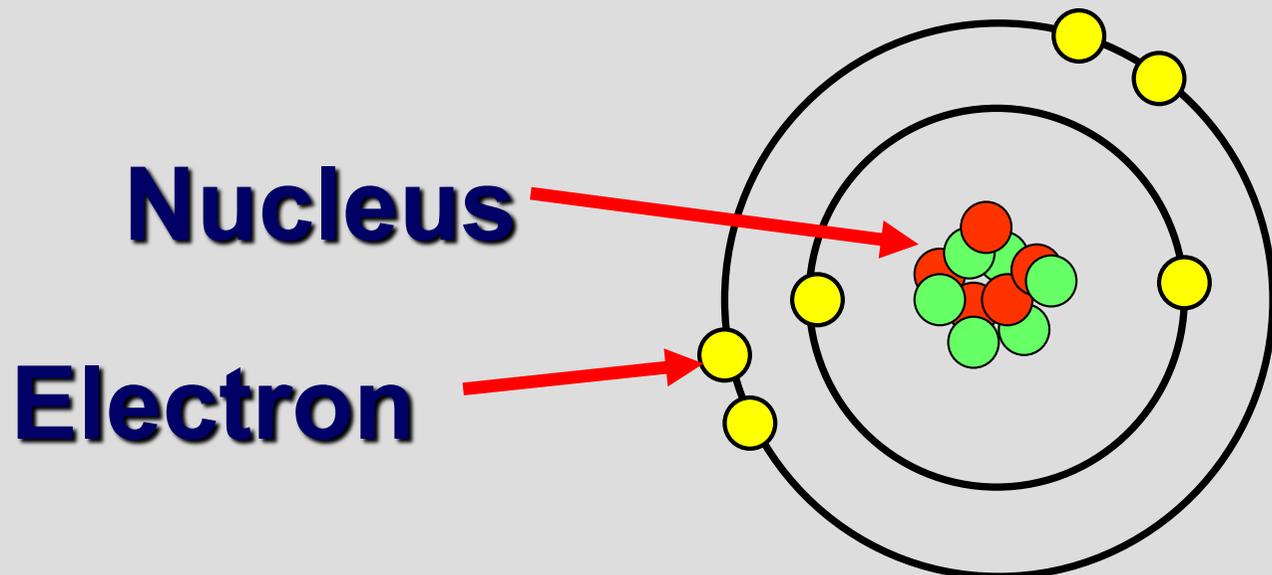
Mike Riddle
www.Train2Equip.com

Topics

- ◆ A primer on radioactive decay
- ◆ Carbon-14 dating
- ◆ Radioisotope dating

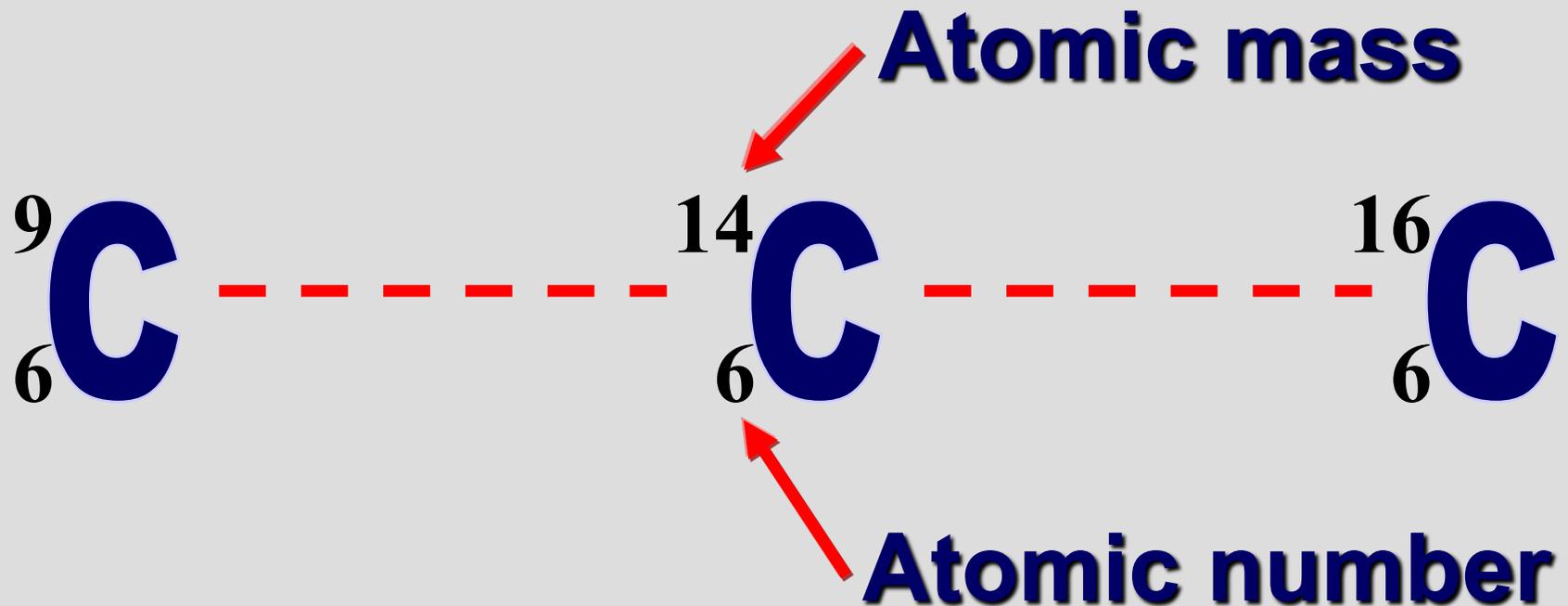
The Atom

- ◆ Fundamental unit of matter
- ◆ Made up of components called subatomic particles
 - Proton (positive charge)
 - Neutron (no electrical charge)
 - Electron (negative charge)



What Is Carbon?

- ◆ Carbon-14 is also referred to as:
 - C-14
 - Radiocarbon
- ◆ Types of carbon (isotopes)



Unstable isotopes (Atoms)

An atom is generally stable if the number of protons equals the number of neutrons in the nucleus

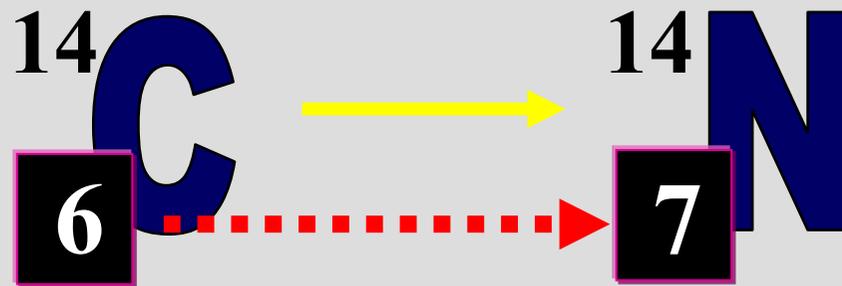
Atom (Isotope)	Protons	Neutrons
Stable Carbon	6	6
Stable Nitrogen	7	7
Stable Oxygen	8	8
Carbon 14	6	8

What is Radioactive Decay?

The nucleus of an atom (decays) changes into a new element



The proton number (atomic number) must change



How long does this take?

What is Half-Life?

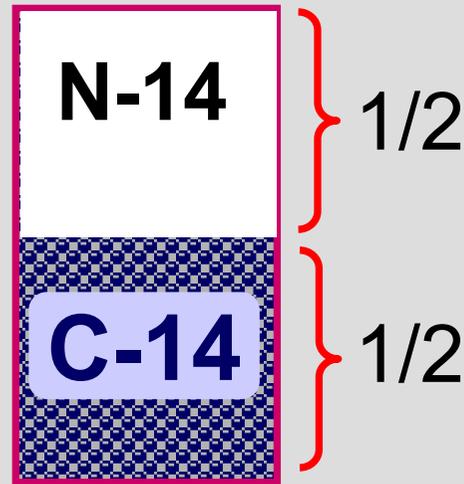
- ◆ The rate of decay is measured by how long it takes for half an element to decay (half-life)
- ◆ The half-life of C-14 is 5,730 years

Half-Life Illustration

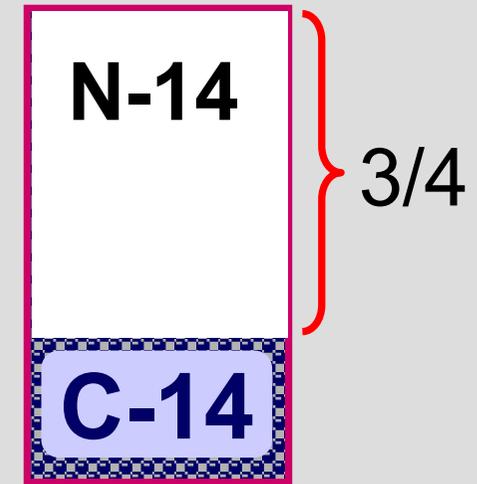
Time = 0



5,730 years
1 half-life

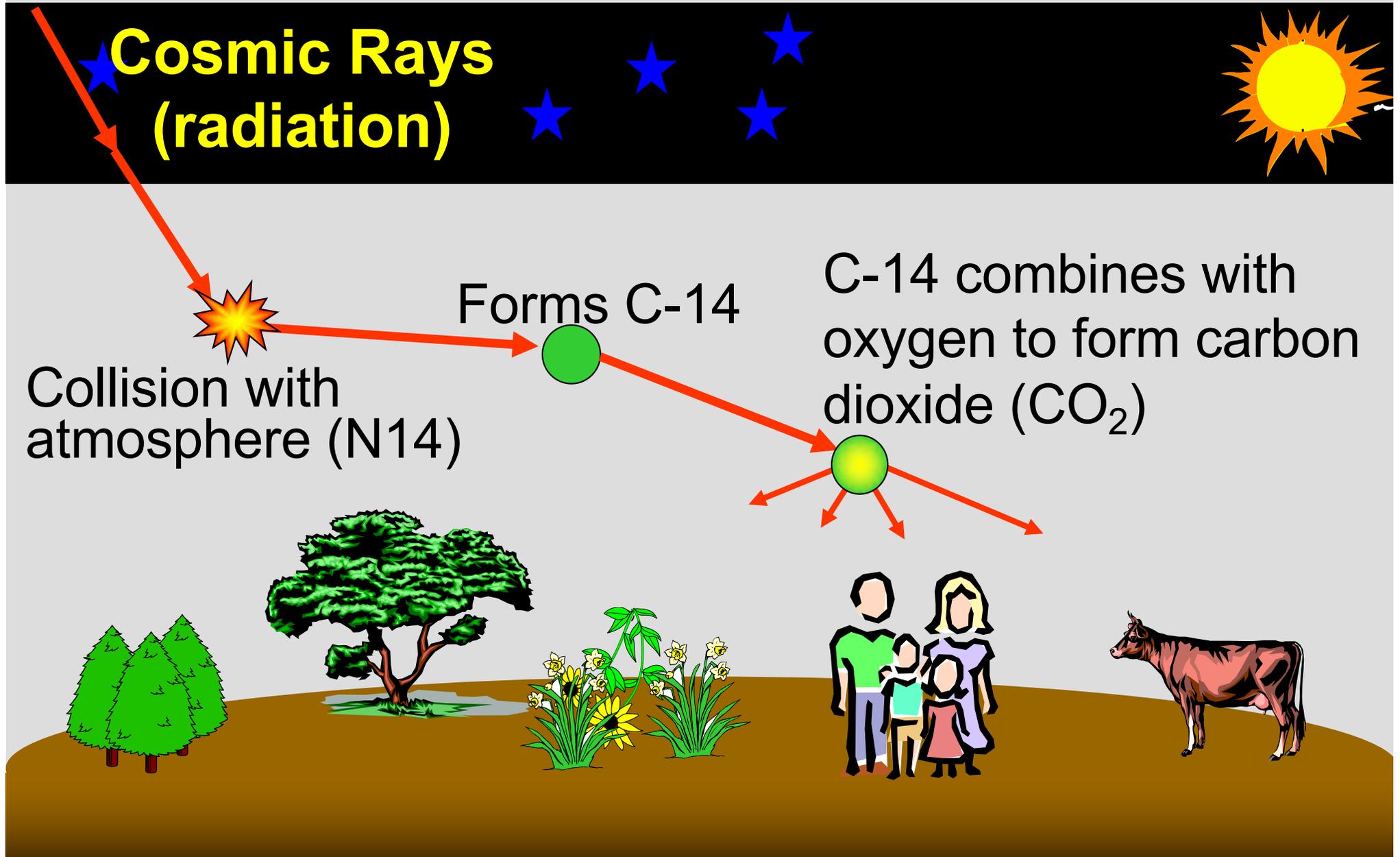


11,460 years
2 half-lives



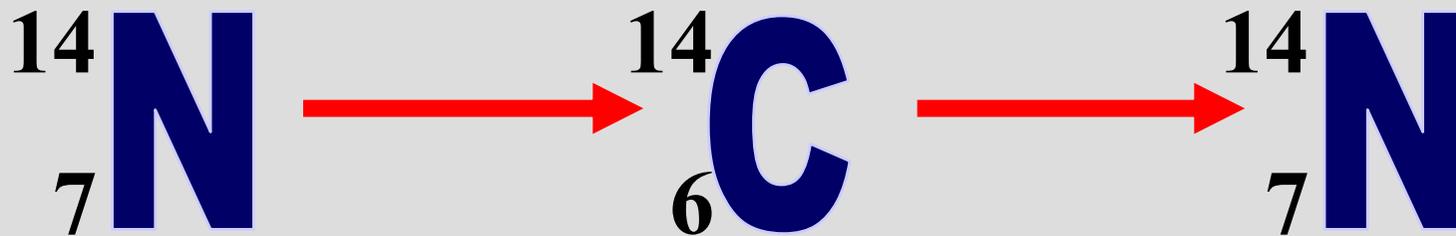
**If C-14 is constantly decaying,
will we run out of C-14 in the atmosphere?**

How Carbon-14 Is Produced



Carbon-14 Life Cycle

Cosmic radiation



Carbon-14 is produced in the atmosphere

Carbon-14 decays into Nitrogen-14

Review

- ◆ There are different types of carbon
- ◆ There are stable and unstable atoms (isotopes)
- ◆ Radioactive decay
- ◆ Half-life (Carbon-14 = 5,730 years)
- ◆ C-14 life-cycle (N-14 \rightarrow C-14 \rightarrow N-14)

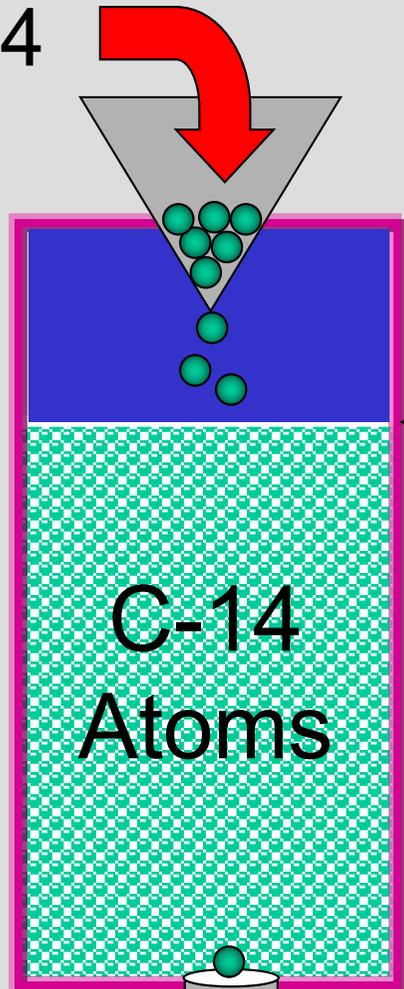
Next Topics

Equilibrium

How the carbon clocks works

Equilibrium: The Assumption

Carbon 14
being
added



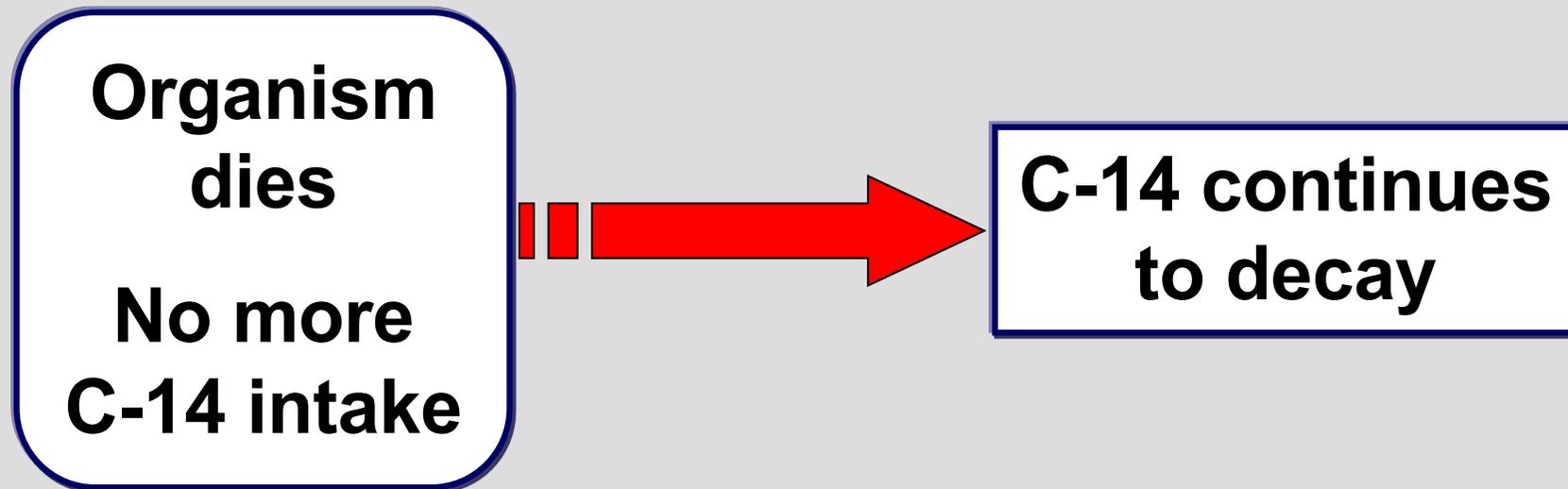
The amount of
C-14 in the
atmosphere
stays constant

Amount added
equals
amount removed

Carbon 14
being
removed

Starting the Carbon Dating Clock

Once a plant or animal dies
the clock starts



How the Carbon Clock Works

The C-14 dating method relies on measuring the amount of C-14 in the fossil

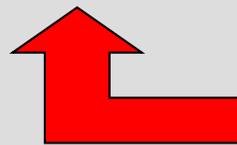
Three Scenarios

1. There is a lot of C-14 remaining in the fossil
2. There is very little C-14 remaining in the fossil
3. There is no detectable C-14 in the fossil

What We Need to Know

What do we need to know to determine how many half-lives have expired?

1. How fast it decays (measured in half-lives). This is known (5,730 years).
2. The starting amount of C-14 in the fossil.



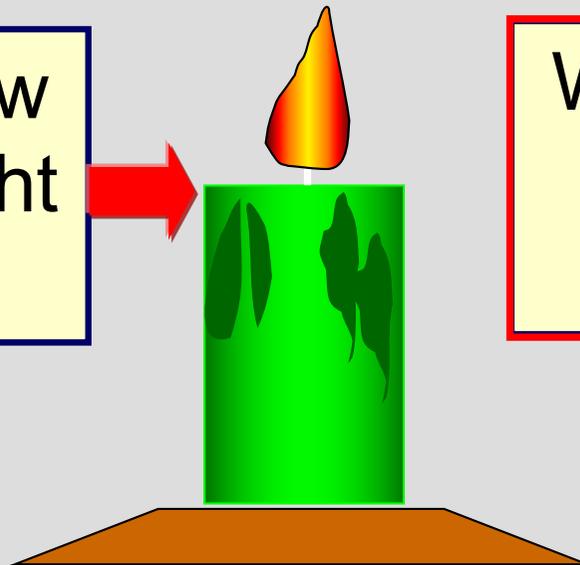
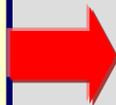
A critical Detail

Understanding the Starting Point

Illustration

- ◆ You enter a room and see a burning candle
- ◆ The candle is burning at 1 inch per hour
- ◆ How long has the candle been burning?

We need to know
the starting height
of the candle



We need to know
the starting
amount of C-14

Understanding the Starting Point

If we find 1,000 C-14 atoms in a fossil, do we know how much C-14 has decayed?

NO

We need to know the starting amount of C-14.

How is this done?

Determining the Starting Amount

- ◆ There are two types of carbon used in the dating process: C-12 and C-14
- ◆ C-12 is a stable isotope (it does not decay)
- ◆ When an organism is alive it has the same ratio (C-12 to C-14) that is found in the atmosphere (1-trillion to 1)



Same ratio

I'm alive

I'm a fossil



Different ratio

How the C-12 / C-14 Ratio Works

Amount of stable C-12	Amount of unstable C-14	Ratio	Years Dead	# Half-lives
100 Trillion	100	1-T to 1	0	0
100 Trillion	50	2-T to 1	5,730	1
100 Trillion	25	4-T to 1	11,460	2
100 Trillion	12	8-T to 1	17,190	3
100 Trillion	6	16-T to 1	22,920	4
100 Trillion	3	32-T to 1	28,650	5

A Critical Assumption

Has the ratio of C-12 to C-14 always been the same (1-trillion to 1)?

This is a key assumption

- ◆ If this assumption is true then carbon-14 dating is a reliable dating method
- ◆ If this assumption is false then carbon-14 dating is not a reliable dating method

Dr. Willard Libby and Equilibrium

Richard, Milton, *Shattering the Myths of Darwinism*, 1997, p. 32. (W. F. Libby, *Radiocarbon Dating*, 1955)

“He found a considerable discrepancy in his measurements indicating that, apparently, radiocarbon was being created in the atmosphere somewhere around 25 percent faster than it was becoming extinct.

Since this result was inexplicable by any conventional scientific means, Libby put the discrepancy down to experimental error.”

The Facts About Equilibrium

Richard, Milton, *Shattering the Myths of Darwinism*, 1997, p. 32.

“During the 1960s, Libby’s experiments were repeated by chemists... The new experiments, though, revealed that the discrepancy observed by Libby was not merely an experimental error – it did exist.”

The Facts About Equilibrium

Richard Lingenfelter, “Production of C-14 by cosmic ray neutrons”, *Review of Geophysics*, 1963, p.51.

“There is strong indication, despite the large errors, that the present natural production rate exceeds the natural decay rate by as much as 25 percent.”

Are there any factors that can affect the amount of carbon in the atmosphere?

Factors Affecting Carbon-14 Dating

Factors that would cause dates to appear older than they actually are include:

- ◆ Cosmic ray penetration of the earth's atmosphere
- ◆ The strength of the earth's magnetic field
- ◆ The CO₂ levels in the atmosphere
- ◆ The Genesis Flood

Atmospheric Levels of Carbon

- ◆ The Genesis Flood buried much carbon from living organisms to form coal and oil
- ◆ This buried carbon (mostly C-12) is about 100 times the total carbon in the present biosphere

What does this mean?

- ◆ The CO₂ level in the pre-Flood biosphere was different (a higher ratio of C-12 to C-14)
- ◆ C-14 dates using the present ratio of C12/C14 will give incorrect ages – ages that are too old

The Flood and C-14 Dating

James Perloff, *Tornado in a Junkyard*, 1999, p. 140.

“Assuming the Flood did occur, little if any C-14 may have existed before then. This would give anything older than the Flood a false appearance of great age.”

Example of Dating Assumptions

Find a fossil with a measured ratio of 16 trillion to 1 (C12 to C14)



This means 4 half-lives have expired giving a date of about 23,000 years

What if the ratio started at:

2 trillion to 1: 3 half-lives instead of 4 – age 17,000

8 trillion to 1: 1 half-life instead of 4 – age 5,000

The Assumption: Equilibrium

Elizabeth K. Ralph and Henry M. Michael, “Twenty-five Years of Radiocarbon Dating,” *American Scientist*, Sep/Oct 1974

“We know that the assumption that the biospheric inventory of C^{14} has remained constant over the past 50,000 years or so **is not true.**”



The assumption carbon-14 dating is based upon is FALSE

Carbon-14 and Age

- ◆ Anything older than 60,000 years should have no detectable C-14
- ◆ If we detect C-14, it is good evidence that it is not millions of years old

Coal should not contain any detectable C-14.
However, coal has been found to contain C-14

Fossil woods estimated to be over 200
million years old still contain C-14

C-14 and Recent Dates

R. E. Taylor, “Major Revisions in the Pleistocene Age Assignments for North American human Skeletons by C-14 Accelerator Mass Spectrometry”, *American Antiquity*, Vol. 50, 1985, pp. 136-140.

Ancient human skeletons, when dated by the new Accelerator Mass Spectrometer technique, give surprisingly recent dates. In one study of eleven sets of ancient human bones, all were dated at about 5,000 radiocarbon years or less.

Carbon-14 Summary

- ◆ Carbon-14 can only be used to date organic material
- ◆ Carbon-14 dating accuracy is dependent upon a consistent ratio between C-12 and C-14 (equilibrium)
- ◆ The assumption of equilibrium is FALSE
- ◆ There are factors that can affect C-14 in the atmosphere (Genesis Flood)
- ◆ Ancient fossils as well as coal contain C-14 residue

One More Thing About Age

- ◆ About 30,000 years to reach equilibrium
- ◆ Over 25% out of equilibrium
- ◆ Conclusion: The earth is young



I'm
Young
after all

Carbon-14 Dating: Conclusion

Robert E. Lee, “Radiocarbon: Ages in Error,”
Anthropological Journal of Canada, 1981, pp. 26-27.

“The troubles of the radiocarbon dating method are undeniably deep and serious. Despite 35 years of technological refinement and better understanding, the underlying assumptions have been strongly challenged....

It should be of no surprise, then, that fully half of the dates are rejected. The wonder is, that the remaining half came to be accepted.

continued

The implications of pervasive contamination and ancient variations in carbon-14 levels are steadfastly ignored by those who base their argument upon the dates....

While the method cannot be counted on to give good, unequivocal results, the numbers do impress people, and save them the trouble of thinking excessively.”

Radioisotope Dating Methods

Dating Rocks

What are they and how do they operate?

What is the basic perception?

How accurate are they?

Are there any hidden assumptions?

Why People Believe

- ◆ Scientists have proven the earth old
- ◆ Peer pressure (specifically the education system)
- ◆ Intellectualism (science versus religion)
- ◆ Don't want to hear the information
- ◆ Young earther's are ignoring the scientific evidence
- ◆ The Bible does not teach how old the earth is
- ◆ Not an important issue, but it must be old
- ◆ Most scientists believe in an old earth
- ◆ Pride

Analyzing statements

- ◆ Who made the statement and what was their bias?
- ◆ Does everyone agree?
- ◆ Am I being given all the information (selective data)?
- ◆ Does it work in all cases – are there exceptions?
- ◆ Are there any hidden assumptions?
- ◆ Are they assuming an answer without presenting supporting evidence?
- ◆ Are they appealing to ignorance?
- ◆ Are their attacks on the opposition valid – are they distorting data to make other views look non-credible?

Textbooks

Biology: Visualizing Life, Holt, Rinehart, Winston, 1998, p.177.

“Using radioactive dating, scientists have determined that the Earth is about 4.5 billion years old, ancient enough for all species to have been formed through evolution.”

Radioactive Decay

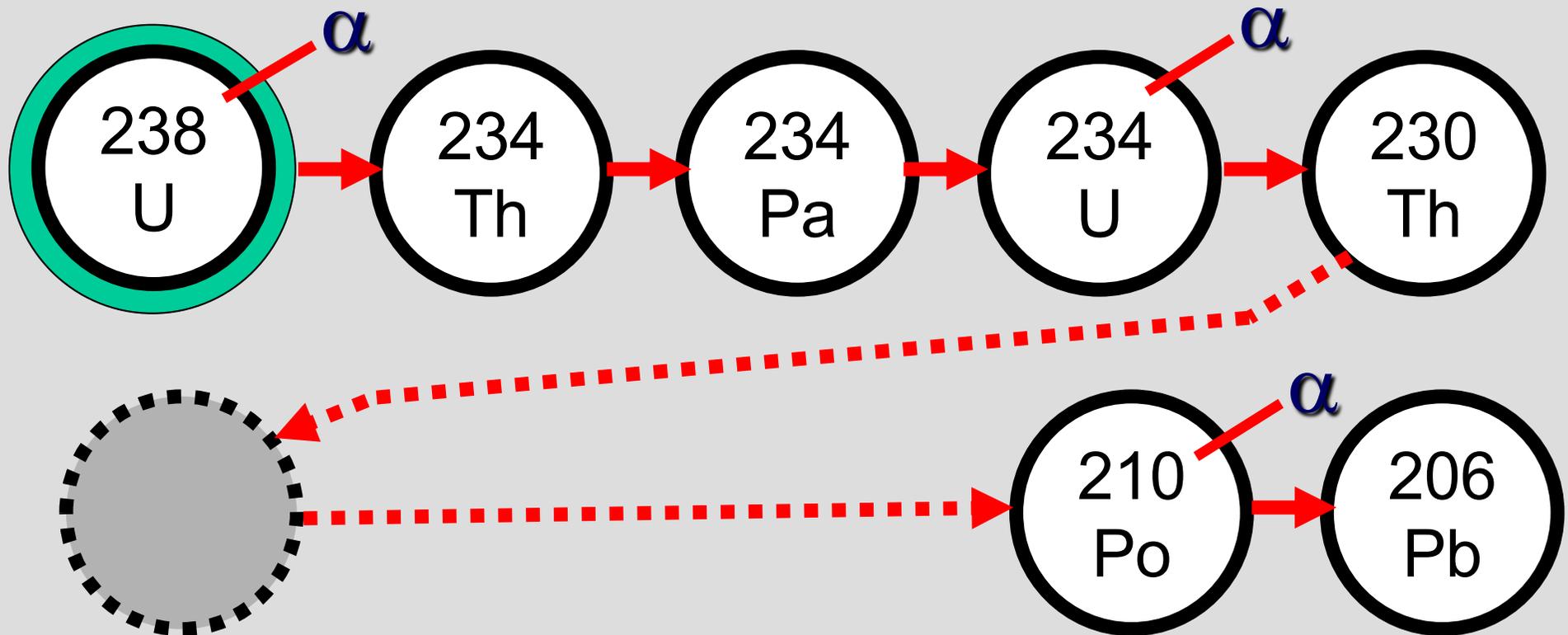
Parent element

Daughter element

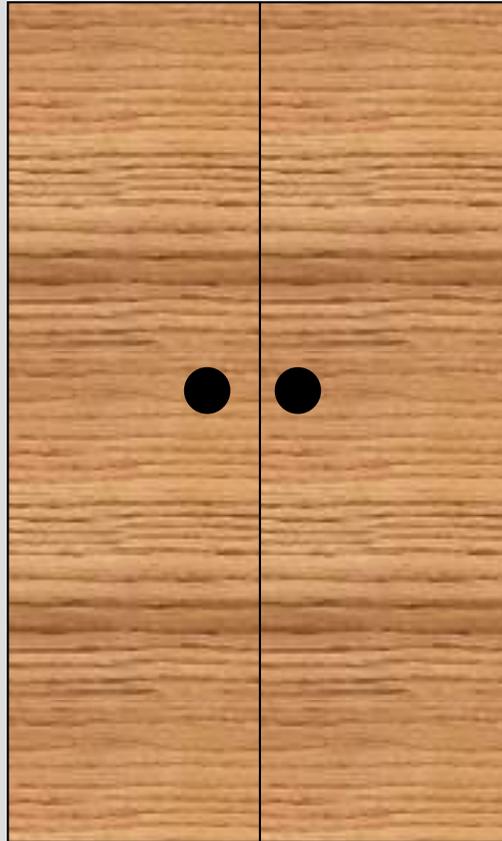


Radioisotope Dating

- ◆ Used to date igneous and metamorphic rocks (basalt)
- ◆ Cannot be used on sedimentary rocks (limestone, sandstone, and shale)



Hour Glass Example



Hour Glass Example



Can you calculate how long you were outside?

Radioisotope Dating Assumptions

- ◆ The starting amount of the daughter element is known
- ◆ All the daughter element is due to radioactive decay
- ◆ The sample was always in a closed environment
- ◆ The decay rate has always been constant

Critical Thinking

Were all dates taken consistent?

Were the assumptions taken into account?

Four Assumptions

1. The starting amount of daughter element is known
2. All the daughter element is due to radioactive decay
3. The sample was always in a closed environment
4. The decay rate has always been constant

Parent Element

Potassium



Daughter Element

Argon

Examples of Dating

◆ Sunset Crater, Northern Arizona

- Potassium-argon: 200,000+
- Reality: AD 1065

◆ Lava flows at Mt. Ngaurhoe, New Zealand

- Potassium-argon: 275,000
- Reality: 1949, 1954, 1975

◆ Hualalai basalt, Hawaii

- Potassium-argon: 1.4 – 22 million
- Reality: AD 1801

◆ Mt. Etna basalt, Sicily

- Potassium-argon: 140,000 – 350,000
- Reality: 1972



Examples of Dating

Rocks that were created since the 1980 eruption of Mount St. Helens dated up to 2.8 million years old



Basaltic rocks of Uinkaret Plateau

six K-Ar model ages	0.01 to 17 million
five Rb-Sr model ages	1270 to 1390 million
one Rb-Sr isochron age	1340 million
one Pb-Pb isochron age	2600 million



Paleozoic

Precambrian

Gardenas Basalt (Precambrian)

five K-Ar model ages	791 to 853 million
six Rb-Sr model ages	980 to 1100 million
one K-Ar isochron age	715 million
one Rb-Sr isochron age	1070 million

Radioisotope Dating

Reliability and Consistency

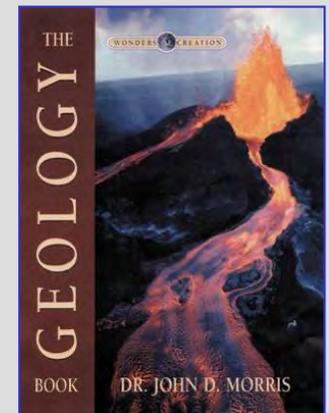
If the dates are never right when we know the age of the rocks, how can we be sure they are correct when we don't know the exact date of the rocks?

Radioisotope Dating

John Morris, Ph.D. Geological Engineering, *The Geology Book*, 2000, p. 52.

Reliability and Consistency

“When the same rock is dated by more than one method, it will often yield different ‘ages.’ And when the rock is dated more than one time by the same method, it will often give different results.”

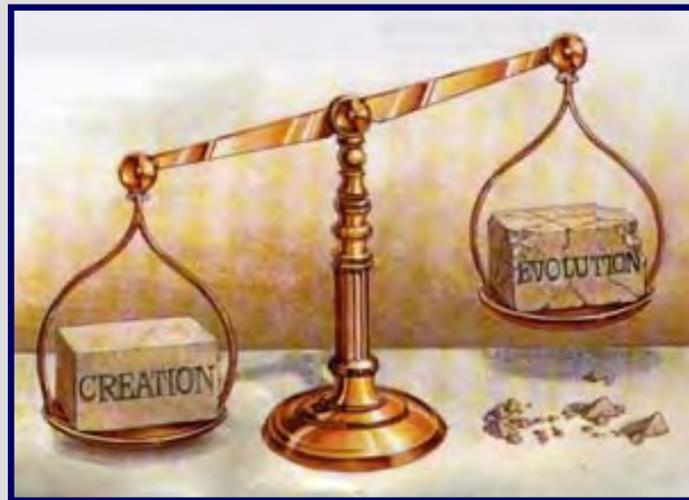


Assumptions

If you base your theory on a wrong assumption, all your work can be correct, but the result will be wrong.

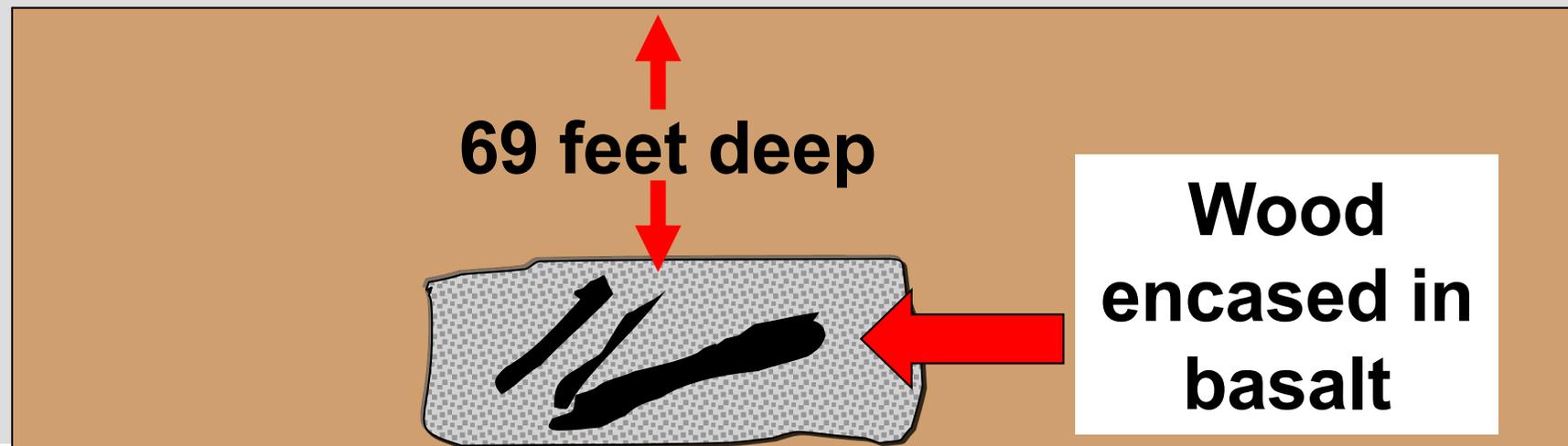


Scientific Evidence for a Young Earth



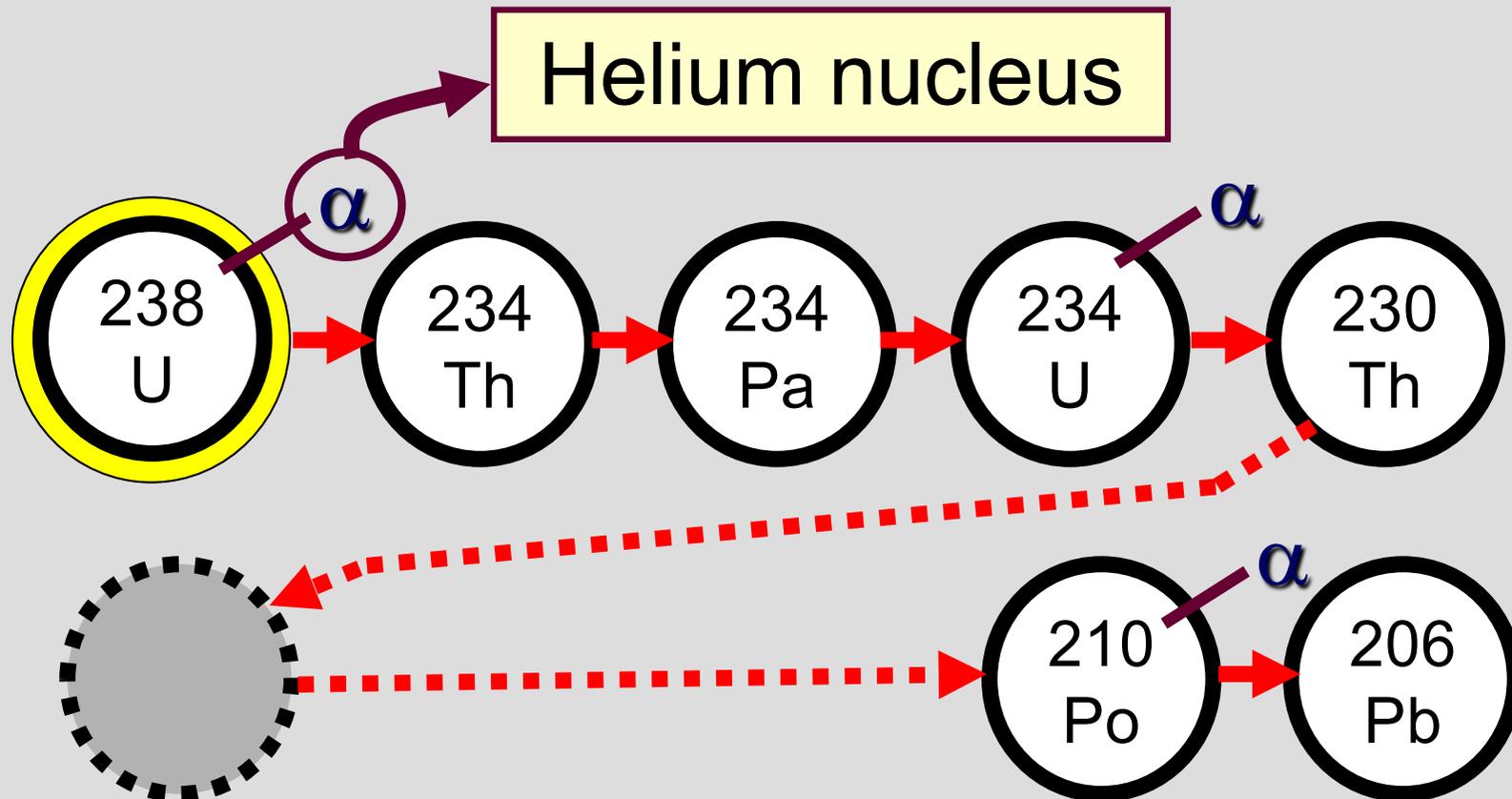
Conflict in Dating

- ◆ In 1993 scientists found wood (trees) buried in basalt flows (69 feet deep)
- ◆ Wood samples sent to two laboratories to be carbon-14 dated **44,000 years**
- ◆ Basalt sent to two laboratories to be potassium-argon dated **45 billion years (obviously false)**



Helium in the Atmosphere

- ◆ Uranium ultimately decays into lead
- ◆ During this process helium atoms are formed

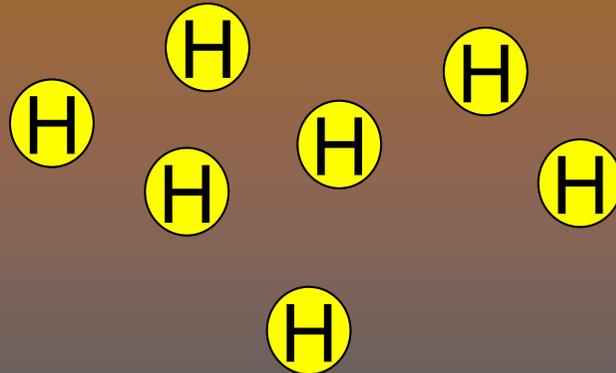


Helium in the Atmosphere

Atmosphere

Not enough
helium for an
old earth

Helium
atoms



Radioactive
Decay

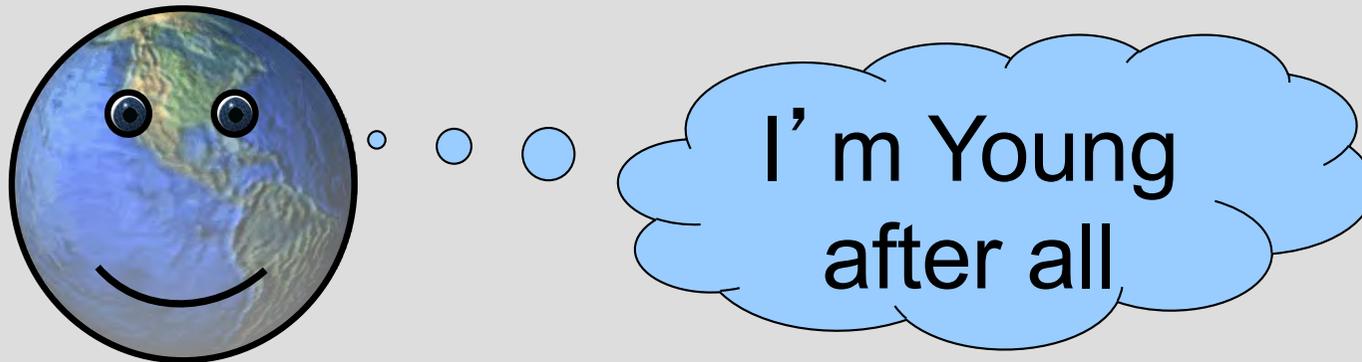
Helium in Granite

- ◆ Radioactive decay (uranium to lead) produces helium atoms
- ◆ Helium does not remain long in rocks – it migrates rapidly to the surface and into the earth's atmosphere
- ◆ If the earth is billions of years old, we should not find large amounts of helium in granite (zircon crystals)
- ◆ Over 58% of the helium still remains in the granite (zircon crystals)

What does this mean?

Evidence for a Young Earth

- ◆ There has not been enough time for the helium to diffuse out of the granite (zircon crystals)
- ◆ The evolution model of billions of years does not match the data
- ◆ The creation model of a young earth best matches the data (about 6,000 years)



RATE Group

RATE: Radioisotope and the Age of The Earth



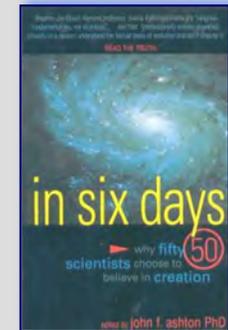
John Baumgardner, Ph.D. Geophysics
Larry Vardiman, Ph.D. Atmospheric Physics
D. Russell Humphreys, Ph.D. Physics
Eugene Chaffin, Ph.D. Nuclear Physics
Andrew Snelling, Ph.D. Geology
Steven Austin, Ph.D. Geology
Donald DeYoung, Ph.D. Physics
John Morris, Ph.D. Geological Engineering
Kenneth Cumming, Ph.D. Biology
William Hoesch, M. S. Geology
Stephen Boyd, Ph.D. Hebraic and Cognitive Studies

Evidences for a Young Earth

- ◆ Helium in the Earth's atmosphere
- ◆ Nuclear decay rates (Radioisotope dating)
- ◆ Sodium in the oceans
- ◆ Rapid disintegration of comets
- ◆ Erosion of continents
- ◆ Sediments in the ocean
- ◆ Decay of the Earth's magnetic field
- ◆ Carbon-14 ratio in the atmosphere
- ◆ Radio halos for polonium in granites
- ◆ Population statistics
- ◆ Recession of the moon
- ◆ Many more

Who Believes in a Literal 6-Day Creation?

- ◆ The RATE group
- ◆ Danny R. Faulkner Ph.D. Astronomy
- ◆ John Byl Ph.D. Astronomy
- ◆ Tom Greene Ph.D. Astronomy
- ◆ Dave Harrison Ph.D. Astrophysics
- ◆ James Dire Ph.D. Astrophysics
- ◆ Keith Wanser Ph.D. Condensed Matter Physics
- ◆ Elaine Kennedy Ph.D. Geology
- ◆ Duane T. Gish Ph.D. Biochemistry
- ◆ Ross S. Anderson Ph.D. Biochemistry
- ◆ Jonathan Sarfati Ph.D. Physical Chemistry
- ◆ Kelly Hollowell Ph.D. Molecular and Cell Biology
- ◆ Lane P. Lester Ph.D. Genetics
- ◆ Linda K. Walkup Ph.D. Molecular Genetics
- ◆ Ray Bohlin Ph.D. Molecular and Cell Biology
- ◆ Gary E. Parker Ph.D. Biology
- ◆ Robert Herrmann Ph.D. Mathematics
- ◆ Bryant Wood Ph.D. Archaeology
- ◆ Charles Taylor Ph.D. Linguistics (O.T.)
- ◆ Steven Boyd Ph.D. Hebraic and Cognitive Studies
- ◆ Robert Cole Ph.D. Semitic Languages
- ◆ Hermann Austel Ph.D., Professor Bible Exposition



Belief in a Young Earth

Keith Wanser (Ph.D. Condensed Matter Physics),
Creation ex nihilo, 1999, p. 39.

“I am convinced there is far more evidence for a recent, six-day creation and a global Flood than there is for an old earth and evolution.”

Conclusion: Five Facts

1. The earth has not been scientifically proven to be billions of years old
2. The Bible teaches a literal 6-day creation
3. Many scientists believe in a literal 6-day creation about 6,000 years ago
4. New evidence from nuclear decay supports a young earth model
5. There are many scientific evidences for a young earth

GENESIS

Psalm 118:8

It is better to trust in the Lord than to put confidence in man

IN the beginning God created the heaven and the earth. And the earth was without form, and void, and darkness *was* upon the face of the deep. ¹⁰And the spirit of God *was* moving upon the face of the waters. Is. 40:13, 14

³ And God said, Let there be ¹¹light: and there was light. Heb. 11:3

⁴ And God saw the light, that *it was good*: and God divided the light from the darkness.

⁵ ¹²And God called the light Day, and the darkness he called Night. And the evening and the morning were the first day. Ps. 74:16

⁶ ¹³And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters. land

⁷ And God made the firmament, and divided the waters which *were* under the firmament from the waters which *were* above the firmament: and it was so.

⁸ And God called the firmament Heaven. And the evening and the morning were the second day.

⁹ ¹⁴And God said, ¹⁵Let the waters under the heaven be gathered together unto one place, and

let the dry land appear: and it *was so*. Gen. 1:9-10; Job. 8:29; Jer. 5:22; 2 Pet. 3:5

¹⁰ And God called the dry *land* Earth; and the ¹⁶gathering together of the waters he called Sea: and God saw that *it was good*. Ps. 95:5

¹¹ And God said, Let the earth bring forth ¹⁷herb yielding seed, *and* the fruit tree yielding ¹⁸fruit after his kind, whose seed *is* in itself, upon the earth: and it was so. Heb. 6:7 • Luke 6:44

¹² And the earth brought forth ¹⁹grass, *and* herb yielding seed after ²⁰his kind, and the tree yielding ²¹fruit, whose seed *was* in itself, after ²²his kind: and God saw that *it was good*. vegetation; plants • its

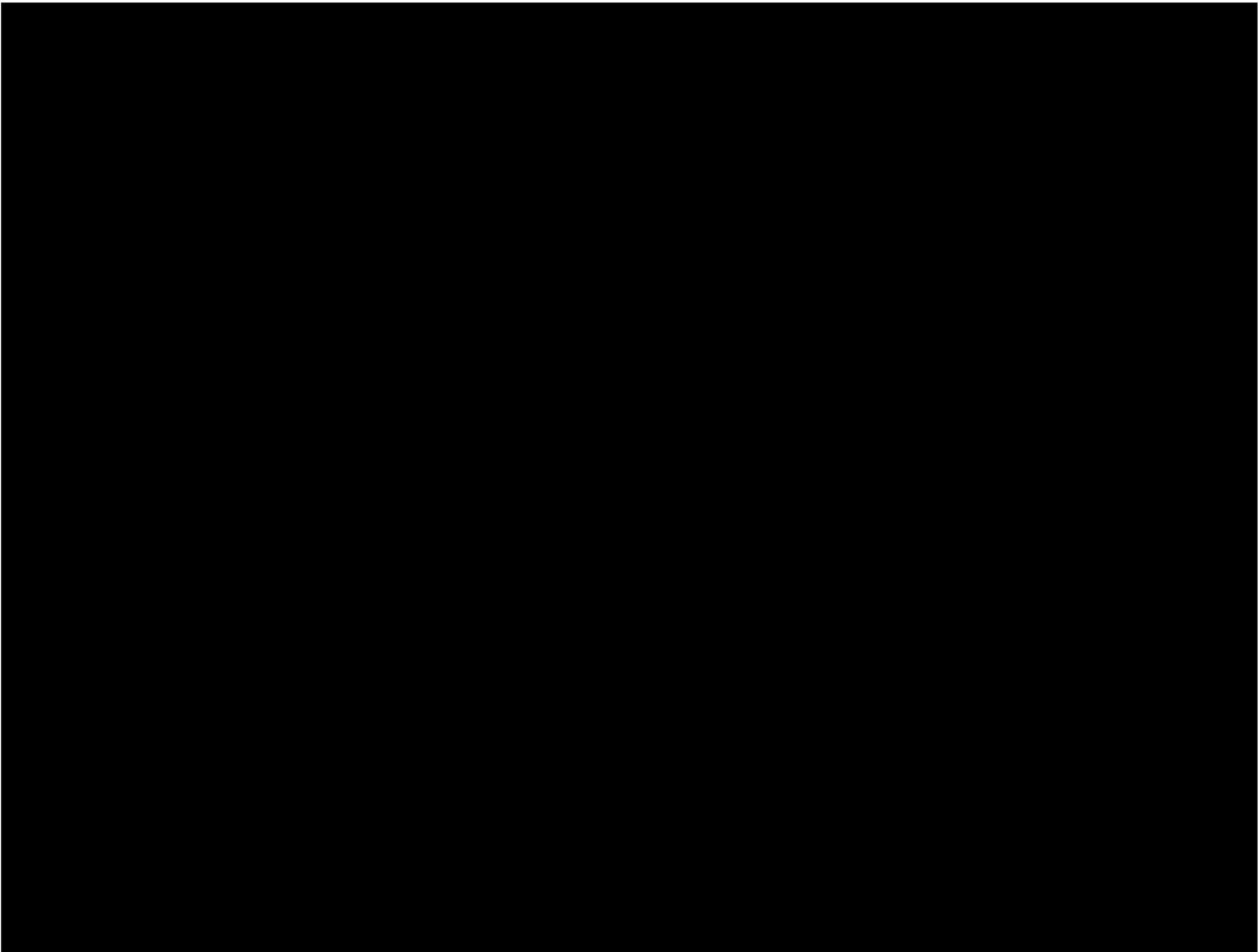
¹³ And the evening and the morning were the third day.

¹⁴ ²³And God said, Let there be lights in the firmament of the heaven to divide the day from the night; and let them be for signs, and for seasons, and for days, and years: Deut. 4:19

¹⁵ And let them be for ²⁴lights in the firmament of the heaven to give light upon the earth: and it was so. luminaries; lightbearers

¹⁶ And God made two great lights; the greater light to rule the day, and the lesser light to rule

Sanctify them through thy truth: thy word is truth



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