A Simplified Critique Of The Currently Accepted Radiometric Age of Earth At About 4,000,000,000 years

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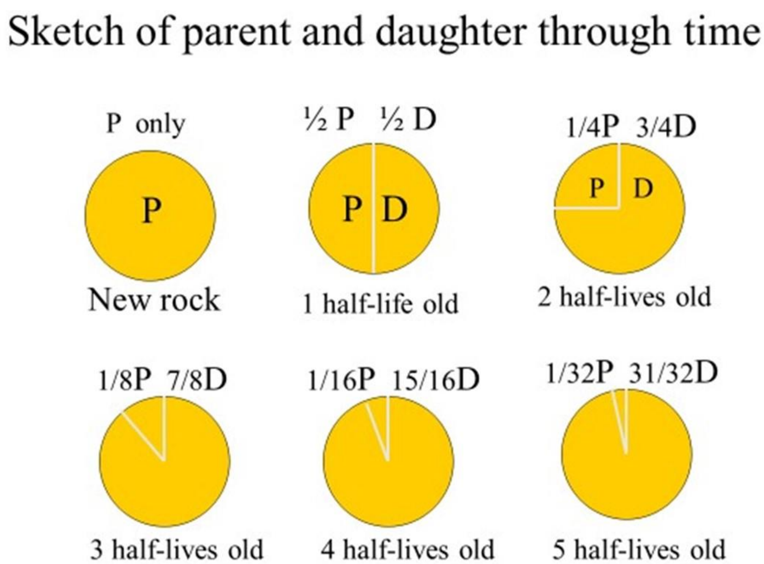
The argument goes like this: the age of earth should be about the same age as the oldest rock on earth. So, if we have the oldest rock in our possession to measure the elements that rock contains assuming that the rate of radioactive change has been constant and the method used does not exclude rocks that are too old or too young. The distinguishing characteristic of each of the 100+ different elements found in nature is the number of protons in their atomic nucleus. Carbon atoms, for example, always have 6 protons in the nucleus. Uranium atoms always have 92. But the number of neutrons, can vary so they are referred to as isotopes of that element. For example carbon 12 is the most abundant isotope of carbon with 6 protons and 6 neutrons in the nucleus for a total of 12 particles in the nucleus. But an isotope of carbon, carbon 14, has 8 neutrons instead of 6 and has a property called radioactivity. Usually elements stay the same with no changes in the number of protons (positively charged) and neutrons (no charge). But as time passes, radioactive elements (generically called parents) will change because they have unstable nuclei. Unstable means that particles inside the center of a radioactive atom spontaneously change at a predictable rate. For example a radioactive atom can change what is inside its nucleus by throwing out one or more protons or by throwing out the negative part of a neutron which is called a beta particle having the same properties as electrons outside the nucleus. When a beta particle leaves the nucleus the positive part stays behind and has all the properties of a proton. So, radioactive parent atoms become a different element because the number of protons changed. This change can happen in two ways. When one or more protons leave the nucleus the total number of protons (and total positive charge in the nucleus) must decrease. The other occurs when a neutron in the nucleus throws out its negative part leaving the positive part behind in the nucleus, now counted as a proton instead of a neutron, thus increasing the total number of protons (and total positive charge in the nucleus) by one. So some radioactive parents can become daughter elements with more protons than their parent (called a beta decay) while others can become daughters with fewer protons (called an alpha decay). These parent to daughter changes usually, repeat again and again as the daughters become the next parents, and so on until a nonradioactive daughter is formed: it is the only stable form of the daughter and ceases to be radioactive. Several different parent-daughter combinations are used in dating rocks, probably the most widely known is uranium-lead. Uranium 238 (parent) turns into lead 206 (stable daughter). The numbers after the element's name are atomic masses which is the combined number of protons and neutrons in the nucleus of one atom. Actually, there are 13 intermediate radioactive daughter elements between uranium 238 and lead 206, but in practice, only the amount of parent and stable daughter (lead 206 in this example) are used to determine age. As you can see from the simplified drawing below, the amount of parent decreases while the amount of daughter increases as the rock gets older. One half-life is 4.51 billion years for

uranium 238 to lead 206; other parent-daughter combinations are also used and each one has its own half-life time.



Measuring the relative amounts of parent and daughter, and knowing the half-life, the rock's age can be calculated. For example, if a rock has equal amounts (1/2 of each from the diagram) of uranium 238 and lead 206 then it is one half-life old or 4.51 billion years old. If the ratio is not 1:1 as in the previous example but 1:3 (1/4 parent and ¾ daughter) then it is 2 half lives old or 2x4.51=9.02 billion years old. The assumptions we will discuss next are situations that may have occurred to a rock before the geologist first saw it. I am in no way implying that the geologist deliberately caused the rock to have a certain date.

Assumption 1

Before the geologist grabbed the rock, how do we know there was no daughter element in the rock to begin with? It is assumed that all of the daughter element was produced by the parent element after the molten lava or magma had cooled. In other words, initially there was only parent, no daughter. So, if there was initial daughter present in the lava or magma, the rock would appear older than it is. John G. Funkhouser and John J. Naughton, writing in the Journal Of Geophysical Review[1] tell how they dated the Kaupulehu lava flow in Hualalai, Hawaii, that was

[1] Vol73, No14, July 15, 1968, p.4601-4607

known to have erupted in 1800-1801, and obtained ages that are clearly unreasonable. A series of radiometric dates obtained using potassium 40 (solid parent), which decays to argon 40 (gaseous daughter) yielded results of a minimum of 160 million years to a maximum of 2.96 billion years for a 170-year-old lava flow! Put another way, would someone who weighs about 150 . pounds believe a scale showing their weight to be 1.3 million tons? Realizing their results are preposterous, their article concludes with this statement:

> *"... therefore, such gases [argon] represent a portion of the environment in the magma chamber."*[2]

Translating this statement into plain English the daughter element Argon 40 that should have resulted from potassium 40 after the lava cooled was present in the lava when it erupted from the magma chamber so the rock looks old but is not.

It is very important to understand a fundamental bias with this dating method. Since the parent's half-life is very long, (for example potassium 40 to argon 40 is 1.3 billion years), dating a rock with any long parent-daughter half-lives cannot yield ages in the thousands of years, even if that is the real age for the rock. For example potassium to argon has a minimum result of about 250,000 years. This limitation is due to the accuracy of detecting such very small quantities of the daughter. This is a huge bias!

This minimum age is even higher when using longer half-life elements, such as uranium-lead with a minimum age of 1,000,000 years. So radiometric dating, except for carbon 14, cannot measure the age of a rock that is thousands of years old. If lead 206 is present in a rock whose age is known to be thousands of years old, or less, like this Hawaiian example, daughter likely was present in the lava when cooling or came into the rock after cooling which is the second assumption we will address shortly. In short, there is a huge likelihood that rocks dated radio-metrically will be much older- by at least 10,000 times older- than the Biblical age for earth using genealogies.

At this point, you might be wondering how such long half-life times are even measured in the first place. After all, we have not practically speaking watched a sample of radioactive parent for millions or billions of years to measure the half-life directly. So here is how it's done. A very accurately measured quantity of pure parent is placed in a scintillator machine that counts the number of beta and alpha particles that leave this pure parent in a measured amount of time, say 6 months. Since each detection represents one new daughter atom, the total number of changed atoms is known for this time period. Using a simple proportion, if a certain number of parent atoms changed over 6 months, the amount of time is calculated for half of the total number of parent atoms that would change to daughter atoms is calculated. That would be the half-life. But for a rock all we know is the relative amounts of parent to daughter elements in the rock so the geologist sees only the final result of a period of time required to produce that ratio

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[2] Ibid p.4605

assuming all the daughter came from the parent that was in that rock, not from anywhere else.

Steven Austin used potassium-argon dating on a lava dome in Mt. St. Helens that solidified in 1986. Using the whole rock gave an age of 350,000 years and dating only the feldspar and glass from those rocks yielded an age of 2,800,000 years. Since the article was written in 1996, the lava was only 10 years old! He concludes:

> *"These ages' are, of course, preposterous. The fundamental dating assumption (no radiogenic argon was present when the rock formed') is questioned by these data. Instead, data from this Mt. St. Helens dacite argue that significant 'excess argon' was present when the lava solidified in 1986.* [3]

It isn't often that rocks of known age are dated. The reason is obvious: why spend several hundred dollars to find out the age of a rock when the age is already known? So, what kind of rock is dated? A rock of unknown age, of course. But what check do you have that the radiometric date is accurate? A different parent-daughter pair is measured for the same rock and, if all results agree, then the age is accepted as true. Do you see any problems with this kind of thinking?

David Seidemann, writing in the Geological Society Of America Bulletin[4] tells of how rocks from drill cores obtained from the floor of the Pacific and Atlantic oceans were dated using the same potassium (K) argon (Ar) method that also resulted in major discrepancies. Not only did samples from the same rock chip vary from 12.3 to 22.8 million years of age but also fossils found in sediments in the drill cores indicate an age of 40 million years." How do they explain the difference?

> *"K-Ar dates of these rocks may be subject to inaccuracies as the result of seawater alteration. Inaccuracies may also result from the presence of excess radiogenic argon 40 trapped in rapidly cooling rocks at the time of their formation. Because of the problems involved caution must be used in interpreting the meaning of conventional K-Ar dates for the deep-sea rocks".*[5]

On page 1661, Seidemann makes the following statement:

> *"In summary, potassium is added to deep-sea basalts as the result of submarine weathering. ... One would not expect uniform addition of potassium to basalts, but would expect the extent of its addition to any given part of the basalt to be* ***dependent on variables such as grain size, the extent of fissuring, and the proximity to a potassium source.*** *' (emphasis mine)*

Other articles, in addition to Seidemann's, throw considerable doubt on the reliability of dates obtained from deep-sea rocks. By the way, if the age of ocean crust is thrown into question, then so is the rate of continental drift since dates of oceanic crust are used to obtain drift rates.

Assumption 2

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[3] CEN Tech Journal, Vol. 10, No. 3, 1996, p.335
[4] V. 88, Nov. 1977, P. 1660–1666, emphasis mine
[5] ibid, table 2, p. 1663

After the lava or magma cooled, but before the geologist grabbed the rock how do we know if any parent or daughter entered or left the rock?

If parent entered the rock or if daughter left the rock, it would date younger than it should. Using similar reasoning, if parent left the rock or if daughter entered the rock, it would date older than it should. This follows from the diagram above where older rocks have less parent and more daughter. Uranium and lead are both soluble in water, lead turns to a gas when heated and argon is a gas that can easily leave a rock.

Changing our focus from rocks of the ocean floor to moon rocks, consider this from an article by Everly Driscoll in Science News entitled "Dating Of Moon Samples: Pitfalls and Paradoxes":

> *"Much controversy during the past two years has centered around the interpretation that should be given to the ages of lunar material-ages yielded by studying its radioactive history. If all the age-dating methods (rubidium-strontium, uranium-lead, and potassium-argon) had yielded the same age, the picture would be neat. But they haven't. The lead ages, for example, have been consistently older. "*

He goes on to describe how Leon T. Silver from the California Institute Of Technology was able to remove 3 to 11% of the lead when the sample was heated to 550 degrees centigrade for one hour and 50% in one hour at 970 degrees centigrade. Driscoll's article concludes:

> *"In the experiment with lead, most of the variation in the ages of the samples can be explained by merely adding or subtracting volatile lead. If indeed parents and daughters are moving about on the lunar surface this way, this could be confusing the interpretation of the ages."* [6]

It is also interesting to note that

> *"...by separating material 36 microns and smaller from the larger stuff, Silver found a 200-million year shift in the apparent age of the Apollo 11 soil."*

So, we are left wondering if the size of the rock used for analysis can change the results. And when you examine the Moon's surface it is obvious that craters abound…shoulder to shoulder…each one produced by the impact of a rock and each one producing a lot of heat.

Returning back to earth, when three different radiometric dates yielded ages with a 1.5 billion year discrepancy for the same rock sample, J. L. Kulp and W.R. Eckelmann conclude:

> *"The process of lead removal during the life of a radioactive mineral appears to be rather common, particularly among the older samples."*

Assumption 2 may be more significant to your health than you think. The high public concern about radon 222 gas as a health hazard began in December, 1984, when Stanley Watras (a construction engineer) set-off a radiation detector on his way into the Limerick Nuclear Power

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[6] V.101, January 1, 1972, p. 12–13, Bulletin Of The Geological Society Of America, V. 66, June, 1955, p. 768, emphasis mine

Plant in Pottstown, Pennsylvania[7] The detector was there to alert workers of any radiation that they may have picked-up inside the plant but Watras set it off on his way in! The problem was traced to his home in nearby Boyertown where his home had radon levels about 700 times greater than current federal standards. Since then an ambitious study has found that radon 222 is escaping from the ground in many areas of the United States." What does radon have to do with dating rocks? Radioactive decay of uranium 238 to lead 206 involves 13 intermediate radioactive daughter elements and number 6 in the series is radon 222.

If radon is no longer in the rock then the lead 206 stable daughter that eventually results from that amount of radon won't be there either! How would the radiometric age of a rock be affected if it lost radon? It would appear younger. How would the radiometric age of a rock be affected if it was the recipient of radon from other rocks? It would appear older.

Another interesting problem is that different minerals in the same rock yield different ages. For example, Joan C. Engels found that when the mineral hornblende only was extracted from the rock and dated, it yielded an age of 171 million years whereas the mineral biotite treated in the same way yielded an age of 70 million years using potassium-argon dating and both minerals came from the same rock." In another study, to explain how two different mica minerals (biotite and muscovite) from the same rock could have potassium-argon ages differing by as much as 323 million years, N. S. Brewer states:

> *"It is concluded that excess radiogenic argon 40 entered the micas in a zone at least 1.5 kilometers thick and 200 square kilometers in area."*[8]

P K. Wanless, et al., in an article entitled "Excess Radiogenic Argon In Biotites" concludes that

> *"this study has revealed evidence for biotite incorporating enormous quantities of argon from the immediate environment. In this case the high apparent ages obtained for biotites are not the consequence of preferential loss of potassium since this element was found to be present in average to high abundance in all samples."*[9]

Consider this statement from A. Hayatsu in the Canadian Journal Of Earth Science

> *"In conventional interpretation of K-Ar age data it is common to discard ages which are substantially too high or too low compared with the rest of the group or with the other available data such as the geological time scale. The discrepancies between the rejected and accepted are arbitrarily attributed to excess or loss of argon"*[10] .

Just think how thrilled my students would be if they could throw away their low grades while keeping all their high grades. Is it possible that the published dates of rocks are only those dates that the author wants you to see because he thinks the others are wrong? One moon rock was

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[7] . "Radon Risk And Remedy" by David J. Brenner, 1989, p. 3-4 and 35-44
[8] Earth and Planetary Science Letters, V. 6, 1969, p. 321
[9] Earth and Planetary Science Letters, V. 7, 1969, p. 167-168
[10] V. 16, 1979, p. 974, emphasis mine

far older than the rest[11]—do you think they believed its age, or did they think it was "contaminated" with too much lead. It was judged to be too old.

How have scientists corrected the excess or loss of daughter to "reasonable" values? By relying on more assumptions! Two examples will illustrate this line of reasoning. To correct for an excess amount of lead, other minerals in the rock that do not contain the parent, such as the mineral feldspar, are analyzed for the amount of two forms of lead: lead 206 which is the ultimate daughter of uranium 238 and lead 204 which is not a product of radioactive decay. The assumption is made that the proportion of lead 204 to lead 206 found in the feldspar is the same as the proportion that "contaminated" the mineral zircon, which contains both parent (uranium) and daughter (lead), and is the mineral used for dating the rock. It is assumed that the two minerals were formed at the same time, while the quantity of lead 204 does not change in either. By finding this proportion of leads in the feldspar and knowing the total lead 204 and 206 in the zircon, it is a simple matter to find the initial quantity of lead 206 that "contaminated" the zircon and subtracting this from the total lead 206 in the zircon leaves that amount of lead which was produced in situ by decay of the uranium. This corrected amount of lead is then used to find the age of the rock. As a second example, to correct for too much argon, a similar ratio process is used. Our atmosphere today contains about 1% argon of which one part is argon 36 and 295.5 parts are argon 40. It is assumed that this ratio has always been the same, so that any argon 40 trapped in the rock from the atmosphere (or from that which is dissolved in sea water if it formed underwater) can be found by measuring the amount of argon 36 in the rock and multiplying by 295.5. This is the amount of argon 40 contamination and is then deducted from the total argon 40 to give that amount produced by radioactive decay. But argon 36 is produced in the upper atmosphere by cosmic ray bombardment and is subject to change by a variety of factors including the activity of stars and changes in the strength of earth's magnetic field. So the point is that methods used to estimate contamination add more assumptions to the list of three assumptions that plague all radiometric dating efforts.

Assumption 3

They say that the half-life doesn't change — how do they know?

The half-life values used in radiometric dating have been known for less than 100 years since radioactivity was discovered by the French physicist Henri Becquerel in 1896. How sure are we that such values have not changed over thousands, millions, or billions of years? According to the 1986 edition of Encyclopedia Britannica, Edwin A. Olson writes

> *"In the laboratory, for example, it is impossible to alter the rate of radioactive decay by any combination of pressure and temperature known to exist within the earth's crust. The same is true with respect to gravitational, magnetic, and electric fields as well as the*

[11] *Nunes, P., et al., Excess Lead in "Rusty Rock" 66095 and Implications for an Early Lunar Differentiation, Science, V.182, Nov. 30, 1973, p. 916-920*

chemical state in which a given radioactive element is found. In short, the process of radioactive decay is immutable under all conditions significant to geology and archeology."[12]

But John Anderson and George Spangler have concluded from their experiments that radioactive decay rates are not constant and

"... the deviations are a function of the environment. "They strongly suggest that, at a minimum, an unreliability factor must be incorporated into age dating calculations".[13]

In his article "Perturbations Of Nuclear Decay Rates", G. T. Emery states that

"Studies have varied the decay characteristics of 12 other radionuclides with changes in the energy state of the orbital electrons; by pressure, temperature, electric and magnetic fields, stress in monomolecular layers, etc."[14]

What is the explanation for the following observation of a compound of titanium and radioactive tritium?

"... as the mixture was heated, its radioactivity declined sharply. No process know to physics could account for such a baffling phenomenon; radioactivity should be unaffected by heat. Nevertheless, as the temperature increased from 115 degrees Celsius to 160 degrees Celsius, the emission of beta particles fell by 28 percent."[15]

It is important to note that researchers in both articles were working with short half-life elements, not the ones used in dating rocks.

If rocks are subjected to external radiation the radioactive decay rate increases, which effectively decreases the half-life. This happens in all nuclear reactors and nuclear weapons. What if an exploding star- a supernova-bathed the earth with neutrinos, fourteen supernovas have occurred in our galaxy in recorded history and one, in 1987, was observed in the Large Magellanic Cloud - one of two galaxies orbiting our own. For the first time in history, scientists were able to measure neutrinos passing through the earth from this distant supernova 1987a. What if a star closer to the earth released more neutrinos? B. Juneman speculates that -

"This would knock our carbon 14, potassium-argon, and uranium-lead dating measurements into a cocked hat!"[16]

Consider this statement from the book "The Science Of Evolution" by W. O. Stansfield (1977).

"It is obvious that radiometric techniques may not be the absolute dating methods they are claimed to be. Age estimates on a given geological stratum by different radiometric methods are often quite different (sometimes by hundreds of millions of years). There is

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[12] P.782, emphasis mine
[13] Pensee, Fall, 1974, p. 33
[14] Annual Review Of Nuclear Science, V. 22, 1972, p. 165, emphasis mine

[15] New Scientist, Jan. 8, 1994, p.16, emphasis mine

[16] Industrial Research, Sept. 1972, p. 15

no absolutely reliable long-term radiological "clock". The uncertainties inherent in radiometric dating are disturbing to geologists and evolutionists, but their overall interpretation supports the concept of a long history of geological evolution".[17]

Would you make the same conclusion?

More examples of questionable dating results are[18] *(Ma is millions of years)*

Mt. Etna basalt, Sicily (122 BC) 0.25±0.08 Ma
250,000 years should be 2,000 years old

Mt. Etna basalt, Sicily (AD 1972) 0.35±0.14 Ma
350,000 years should be 0 years old

Mt. Lassen plagioclase, California (AD 1915) 0.11±0.03 Ma
110,000 years should be 70 years old

Sunset Crater basalt, Arizona (AD 1064-1065) 0.27±0.09 Ma; 0.25±0.15 Ma
270,000 years should be 900 years old

And more examples[19]

Kilauea Iki basalt, Hawaii (AD 1959) 8.5±6.8 Ma
8,500,000 years should be 0 years old

Mt. Stromboli, Italy, volcanic bomb (September 23, 1963) 2.4±2 Ma
2,400,000 years should be 0 years old

Mt. Etna basalt, Sicily (May 1964) 0.7±0.01 Ma
700,000 years should be 0 years old

Notice the disclaimer from this dating lab[20]:

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[17] P. 84, emphasis mine

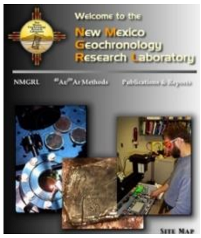
[18] G.B. Dalrymple, "^{40}Ar/^{36}Ar Analyses of Historic Lava Flows," Earth and Planetary Science Letters, 6 (1969): pp. 47-55.

[19] For the original sources of these data, see the references in A.A. Snelling, "The Cause of Anomalous Potassium-Argon `Ages' for Recent Andesite Flows at Mt. Ngauruhoe, New Zealand, and the Implications for Potassium-Argon `Dating'," R.E. Walsh, ed., Proceedings of the Fourth International Conference on Creationism (1998, Pittsburgh, PA, Creation Science Fellowship), pp. 503-525.

[20] http://www.ees.nmt.edu/Geol/labs/Argon_Lab/Methods/Methods.html

"Because the K/Ar dating technique relies on the determining the absolute abundances of both argon 40 and potassium 40, ***there is not a reliable way to determine if the assumptions are valid. Argon loss and excess argon are two common problems that may cause erroneous ages to be determined."***

What do you think? Are there reasons to be skeptical of radiometric dating of rocks?



Continuing with this lab's disclaimers

Certain assumptions must be satisfied before the age of mineral can be calculated with the Potassium-Argon dating technique. These are:

+ The material in question must be a closed system. In other words, no radiogenic 40Ar has escaped from the rock/mineral since it formed. In the case of a volcanic mineral, these means rapid cooling.

+ A correction must be made for atmospheric 40Ar (40Ar from the 40Ar/36Ar ratio = 295.5 subtracted).

+ No non-atmospheric 40Ar was incorporated into the rock/mineral during or after its formation.

+ The rock/mineral must be a closed system with respect to potassium.

+ The isotopes of Potassium in the rock/mineral have not been fractionated, except by 40K decay

+ The decay constants of 40K are accurately known.

+ The quantities of 40Ar and potassium in the rock/mineral are accurately determined.[21]

Radiocarbon Dating

The technique of radiocarbon dating was developed by Willard F. Libby in 1947 and, unlike the other radiometric dating methods discussed above, can only date the remains of something that was once alive. It's radiocarbon age is the time since it's death. In addition to the three assumptions already discussed, radiocarbon dating involves at least three more assumptions

[21] http://www.ees.nmt.edu/Geol/labs/Argon_Lab/Methods/Methods.html

resulting in a history of debate over the reliability of carbon-14 dates. Consider the first paragraph of Robert E. Lee's article "Radiocarbon: Ages In Error":

> *"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, and warnings are out that radiocarbon may soon find itself in a crisis situation. Continuing use of the method depends on a "fix-it-as-we-go" approach, allowing for contamination here, fractionation there, and calibration wherever possible. It should be no surprise, then, that fully half of the dates are rejected. The wonder is, surely, that the remaining half came to be accepted."*[22]

Since the half-life of carbon-14 is relatively short the minimum time formed by cosmic ray bombardment of nitrogen atoms in the upper atmosphere and has a half-life of 5,730 years. Because of the short half life compared to the other parent elements previously described (uranium 238 at 4.51 billion years, potassium 40 at 1.31 billion years), the amount of carbon-14 is, in theory, too small to measure in organic material more than 50,000 years old. Its usefulness is therefore limited to the last 50,000 years. The proportion of radiocarbon (carbon-14) and nonradioactive carbon (carbon-12) in the atmosphere is assumed to have remained constant. Both forms of carbon combine with oxygen to form carbon dioxide in the atmosphere, which is then incorporated into plants through photosynthesis, into animals by feeding on plants, and into marine organisms as they use carbon dioxide dissolved in seawater to make their shells. It is assumed that radiocarbon in the cells of an organism will remain in equilibrium with the atmosphere for as long as the organism is alive. When it dies it stops eating (an obvious characteristic of death), so the amount of carbon-14 that it has when it dies steadily decreases with time since it cannot be replaced by eating. The radiocarbon it contains decays into nitrogen while carbon-12 remains unaffected. The daughter element nitrogen is not measured to get the age because 78% of the air is nitrogen, so the problem of contamination is certain. Thus, the amount of carbon-14 remaining compared to the amount of carbon-12 is used, along with the half-life, to determine the radiocarbon age, which is the time since its death. The older the material the less carbon-14 it contains.

Radiocarbon Assumptions

Since volcanoes erupt enormous quantities of carbon dioxide won't this affect the amount of carbon-12 the earth has at any one time? Has the flux of neutrons and cosmic rays from the Sun and other stars been constant? What if the earth's magnetic field has been stronger or weaker in the past—that would also affect radiocarbon production. Radioactive meteorites coming to earth would increase the production of radiocarbon while the carbon-rich ones would change the amount of carbon 12. Is the ratio of radiocarbon to carbon-12 the same everywhere? Has the half-life of radiocarbon been constant?

On page 83 of William 0. Stansfield's book "The Science Of Evolution" (1977) he writes

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[22] Anthropological Journal Of Canada, V. 19, No. 3, 1981, p. 9, emphasis mine

> *"It now appears that the carbon-14 decay rate in living organisms is about 30% less than its production rate in the upper atmosphere. Since the amount of carbon-14 is now increasing in the atmosphere, it may be assumed that the quantity of carbon-14 was even lower in the past than at present. This condition would lead to abnormally low carbon-14/carbon-12 ratios for older fossils. Such a fossil would be interpreted as being much older than it really is. " (emphasis mine)*

When Jan Mangerud and Steinar Gulliksen dated marine shells in 1975 from Arctic waters, they elected to date specimens that were collected alive before 1940 because

> "*1962 atomic bomb testing has completely disturbed the natural carbon-14 activity; the use of fossil fuels in this century has also influenced the activity but in the opposite direction."*[23]

Sometimes modern carbon itself is so contaminated by radioactive fallout that such materials as ancient American Indian pottery actually date into the future (>100% modern)!" - in other words, they date into the future![24]

In another study, to explain the discrepancy in shell ages from different Arctic waters, Mangerud and Gulliken state:

"The dominant factor in the variation of the apparent age within the oceans seems to be the circulation of water masses. Atmospheric carbon-14 is transferred at the ocean-atmosphere interface. Therefore, in water masses which do not have contact with the atmosphere, radioactive decay will give a higher apparent age, depending on how long the water has been at depth, the rate of transfer of carbon from the surface layer, and possible contribution of older, deeper water."[25]

How can a freshly killed seal have a radiocarbon date of 1,300 years and mummified seal remains thought to be less than 300 years old have a radiocarbon date of up to 4,600 years? Wakefield Dort, Jr., explains the discrepancy as follows:

"...Antarctic sea water has significantly lower carbon-14 activity than that accepted as the world standard."[26]

When Alan C. Riggs radiocarbon dated the shells of snails living in artesian springs in southern Nevada, he found them to be 27,000 years old! He found their low carbon-14 content is due to the low carbon-14 content of carbonate rocks through which the groundwater passed en route to the springs."[27] Groundwater dissolved the carbonate rock and contaminated the carbon in the springs with old carbon deficient in carbon-14. In a laboratory study of living specimens, Meyer Rubin and Dwight W. Taylor determined that approximately 90% of the carbon in shells of clams and snails is derived from atmospheric carbon dioxide dissolved in the water and 10% is derived

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[23] Quaternary Research, V. 5, 1975, p. 263
[24] Radiocarbon, v..22, no 3, p.987-93
[25] Quaternary Research, V.5, 1975, p.267
[26] Antarctic Journal, Sept-Oct, 1971, p.211
[27] Science, V. 224, April 6, 1984, p. 58–61

from the carbon dissolved in the water from other sources.[28]

Charles B. Hunt found a greater discrepancy of radiocarbon dates from wet climates than from dry climates. He attributes the difference to more bacteria and/or fungi attack of wood in wetter climates which, he estimates, introduces as much as 90% by weight of modern carbon replacing original carbon."[29]

Consider this statement from Charles A. Reed:

"the unresolved problem, instead seems to lie in the difficulty of securing samples completely free from either older or younger adherent carbon. At least to the present, no kind or degree of chemical cleaning can guarantee one-age carbon, typical only of the time of the site from which it was excavated. What bids to become a classic example of "carbon-14 irresponsibility " is the 6,000-year spread of 11 determinations from Jarmo, a prehistoric village in northeastern Iraq, which, on the basis of all archaeological evidence, was not occupied for more than 500 consecutive years."[30]

Robert E. Lee gives this advice to collectors of specimens to be radiocarbon dated:

"The material must not be handled as it comes out of the soil, nor dusted off with organic tools such as bristle brushes...A proper container ought to be on handexposure to the air allows fresh dust and pollen to settle. The sample should be gathered as quickly as possible, and wrapped in new aluminum foil - not dropped into a lunch bag or one's pocket. Samples submitted in cloth, plastic, paper, or any kind of tissue are almost useless..."[31]

Lee also comments that *"radiocarbon dates on bone have never been satisfactory". He gives an example from the famous Cooperton Mammoth site in Oklahoma where "a single animal produced leg bones dated at 17,575 and ribs 20,400 years old. Still another figure came from testing its tusks!" Perhaps what we are seeing here is the evolution* of the mammoth from the ribs down![32]

We can add a few more factors to our list that affect radiocarbon dates: where it lived and what it ate. Finally, contamination can be a problem. Lee concludes his article with this quote from another source: "This whole blessed thing is nothing but 13th century alchemy, and it all depends upon which funny paper you read."[33] What do you think?

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[28] Science, V. 141, August 16, 1963, p. 636

[29] scientific Monthly, November, 1955, p. 245)
[30] Science, V. 130, December 11, 1959, p. 1630
[31] Anthropological Journal Of Canada, V. 19, No. 3, 1981, p. 16f
[32] *ibid, p. 15*
[33] *Radiocarbon. Some Notes From Merlin's Diary" (Annals Of The New York Academy of Science, V.*288, p. 181—188