ARTICLES

RADIOMETRIC AGE AND THE TRADITIONAL HEBREW-CHRISTIAN VIEW OF TIME

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WHAT THIS ARTICLE IS ABOUT

Traditional Biblical interpretations indicate a period of about 6000 years since creation week. Other interpretations based on radiometric dating suggest that life has been on earth over half a million times longer. This article analyzes some of the scientific data related to radiometric age dating. Of special interest are the facts that: 1) Inconsistencies exist in several areas, 2) the practice of dating an organism or geologic event by dating the rocks associated with it may be unsound since the rocks may be older than the organism or event dated, 3) some radiometric dates are dependent on the size of particles measured, 4) some sequential series of radiometric dates showing increase in age with depth in the earth are due to the nature of the process of ejection from volcanoes and not an increase in age.

The marginal entries in most of the older English Bibles allow less than 6000 years since the Creation described in the first chapters of Genesis. Outside the Hebrew-Christian tradition our world generally has been considered to be of vast antiquity.

The Babylonian scholar Berossus (3rd century BC) placed Creation at 2,148,323 BC, the first of the "10 ancient kings" (Adam in Gen 5?) at 468,323 BC, and the Flood at 36,323 B.C.[1] The Greek philosopher Plato (4th century BC) considered that the Flood occurred about 200 million years ago.[2] Apollonius of Egypt (2nd century BC) proposed a mere 155,625 years for the age of the world.[3] The Hindu classics written in the middle of the first millennium after Christ describe the history of the world in terms of endlessly repeating grand cycles of 4.32 billion years duration, each containing one thousand subcycles 4.32 million years in length.[4] Chinese scholars as early as the 3rd century BC thought of world history in terms of endlessly repeating cycles and subcycles. I-Hsing (8th century AD) placed the beginning of the latest "Grand Period" or cycle at 96,962,464 BC.[5]

Within the last 100 years the dominance in European civilization of the traditional Hebrew-Christian viewpoint concerning the age of our world has been replaced by the "scientific" view that planet Earth has been in existence for about 4.56 billion years and has supported complex forms of life over the last 600 million years. The "scientific" view is presumed generally to be firmly based on unquestionable radiometric data.

The "scientific" view of Earth's age was developed in preliminary form many decades before the discovery of radioactivity. In 1778 Comte de Buffon cautiously broke with Hebrew-Christian tradition in proposing that planet Earth had been in existence more than 75,000 years.[6] In a lecture delivered to the Royal Society of Edinburgh in 1785, and in a book published ten years later, James Hutton placed the origin of Earth at a vastly remote and indefinite time.[7] In this lecture he set the horizons for geologic time with the classic expression "...no vestige of a beginning, — no prospect of an end." Immanual Kant placed the original creation "a series of millions of years and centuries" into the past.[8] Erasmus Darwin, whose grandson wrote *The Origin of Species*, actively promoted the concept of evolutionary development of organisms over "millions of ages,"[9] and the evolutionist Jean Baptist de Lamarck, at the beginning of the 19th century spoke of time in "millions of years."[10]

During the development of geological science in the early 19th century the span of geologic time was placed in the three million to 1.6 billion year range.[11] These early speculations were based on estimates of sedimentation rates and the total sediment presumed to have accumulated during each of the various divisions of geologic time. The demands of evolution theory were strongly coercive toward estimates that supported the longest time span that could be contrived reasonably. Evolution theorists such as Charles Darwin and T.H. Huxley were uncomfortable with the limited amount of time provided by these early estimates.[12]

The 20th century development of radiometric dating produced a geologic time scale that appears to be firmly founded on sound physical science principles and precise measurements. By extending geologic time to over four billion years radiometric dating initially appeared to provide adequate time for a dust-to-man evolutionary development. But the understanding of biochemistry, molecular biology and genetics that has developed within the last quarter century has brought a realization that *any phase* of the presumed process of organic evolution (formation of the necessary biochemicals, development of primitive living cells, evolution of primitive cells into modern organisms) is unreasonable within the entire span of the radiometric time scale. Thus even if one considers the current popular interpretations of radiometric data to be correct, he must have faith that organic evolution has progressed from cell to man somehow[13] despite insufficient time provided by radiometric dating for the age of the earth.

Individuals who are not acquainted with the research reports in the scientific literature are seldom aware that a high degree of interpretation and selection among available data has been necessary in the development of a radiometrically calibrated geologic time scale. Only data that fit into generally accepted paleontological and geological theory have been utilized in this development.[14]

The construction of a radiometric geologic time scale is based on the assumption that mineral samples may be obtained which contain only results of radioactive transformations that have occurred since the mineral was placed in its present surroundings. Another way to state this assumption is to say that radioactive "clocks" were "set to zero" (the accumulated results of all previous radioactive transformation were removed) when the mineral was either formed or deposited at its present location. According to this assumption the remains of an organism are at least as old as the radiometric age of the mineral that has replaced these remains, of a geologic formation that contains them, or of a geologic formation that overlies or penetrates the formation that contains them. Because it readily led to age interpretations that were consistent with the popular philosophical framework this assumption has not been analyzed as critically as it should have been.

It is not reasonable to expect that naturally occurring physical and chemical processes would isolate radioactive elements and compounds or their stable end-products in absolute chemical purity. Igneous, erosion or solution processes should be expected to transport at least a portion of the daughter products that were initially associated with parent radioactive material at the site of origin. The various radiometric age characteristics at the relocated site should then be expected to reflect to some degree the original radiometric age characteristics, the nature of the transfer process, exposure to heat and fluid circulation since the transfer, and the time since transfer. Only in situations that provide radiometric data for several diverse minerals and radioactive systems can one expect to separate any of these factors from the others.

Reference to significant disagreement between radiometric age data and conventional geologic age classification appears frequently in the professional literature. A recent paper that has received widespread attention lists 22 examples of Tertiary age (65 million years or less on the conventional geologic time table) that have rubidium-strontiurn (Rb-Sr) ages[15] ranging between 70 and 3340 million years.[16] Five continental areas are represented in this collection (Table 1). Each of these examples can be explained best on the basis of varying degrees of inheritance of source area radiometric

TABLE 1

Rubidium-Strontium radiometric ages for selected Tertiary volcanic material. Data taken from Table 1, reference 16.

Location	Association	Apparent Age (million years)
USA	Absaroka volcanic field; andesites	3340 ± 1540
USA	Western Grand Canyon; hawaiites	1300 ± 290
USA	Western Grand Canyon; alkali basalt series	1100 ± 240
USA	Colorado Plateau; basalts	960 ± 240
USA	Snake River plain; King Hill basalts	940 ± 210
Spain	Jumilla, alkalic complex; jumillites	780 ± 390
USA	Snake River plain; Craters of the Moon basalts	620 ± 60
USA	Absaroka volcanic field; shoshonites	470 ± 50
Peru	Arequipa volcanics; andesites, dacites	440 ± 70
Uganda	Napak alkalic complex; nephelinites, ijolites	380 ± 340
Peru	Barroso volcanics; andesites, dacites	310 ± 50
USA	Columbia River group; basalts, andesites, dacites	290 ± 80
USA	Basin and Range; basalts	200 ± 70
USA	Northwest Great Basin; basalts, andesites	190 ± 80
USA	Navajo alkalic province; trachybasalts, lamprophyres	170 ± 110
USA	Leucite Hills; lamproites, orendites	150 ± 80
New Zealand	East arc, North Island; basalts, andesites	110 ± 20
USA	Cascades, Glacier Peak; basalt, andesites	110 ± 90
USA	Cascades, Mt. Lassen; basalts, andesites, dacites	100 ± 50
Uganda	Budeda alkalic complex; ijolite series	80 ± 50
USA	Bearpaw Mountains alkalic complex; syenites, etc.	80 ± 40
Uganda	Torror alkalic complex; phonolites, nephelinites, etc.	70 ± 5

age characteristics for material which has been transported by plutonic or volcanic processes.

Recently deposited sediment on the floor of Ross Sea, Antarctica, has been found to have a 250 million year Rb-Sr age. The two major source areas for this sediment are the Transantarctic Mountains that have a radiometric age between 450 and 475 million years and West Antarctica for which the radiometric age is in the 75-175 million year range. The Ross Sea sediments are easily seen to have radiometric age characteristics that reflect a blend of the radiometric age characteristics of the source areas. Evidence that rubidium is incorporated into these sediments directly from sea water, with resultant lowering of the Rb-Sr age characteristics, adds to the difficulty of interpreting the radiometric age data in terms of relative contribution from the source areas, as well as with respect to time of transport.[17]

An explanation for the agreement between potassium-argon (K-Ar) age[18] and presumed geologic time can be found for at least some samples in the observation that finer-sized components of a mineral formation may have a younger K-Ar age than larger-sized components, with the average K-Ar age of all components fortuitously in agreement with the presumed geologic age.[19] The higher surface-to-volume ratio of the smaller particles evidently favors a higher percentage of argon loss than from the larger particles, with the consequence that the larger particles retain a K-Ar age closer to that of the original source area.

An oil well in southwestern Louisiana that was drilled into formations which have a conventional geologic age in the 5-25 million year range (Miocene) furnished from the 5190 foot level shale that has a K-Ar age of 164 million years (m.y.) for particles less than ½ micron in diameter, 312 m.y. for ½-2 micron particles, 358 m.y. for 2-10 micron particles, and 372 m.y. for particles greater than 10 microns in diameter. The corresponding whole-rock K-Ar is 254 m.y. The radiometric ages for the sediments in which this well was drilled reflect the radiometric age characteristics of the source areas drained by the Missouri and Ohio river systems, not the time of placement.[20]

The validity of the geologic time scale is brought into question also by radiohalos, which are regions of radiation damage surrounding a microscopic inclusion of radioactive material. Coalified wood from Triassic and Jurassic sediments (225-135 m.y. conventional geologic age) has been found that contains radiohalos.[22] If one assumes an *in situ* decay in the inclusion centers of these halos, the lead-206/uranium-238 ratios present may be expressed in terms of uranium-lead ages[21] ranging between 236 thousand and 2.9 million years. There is no presently available experimental evidence which could exclude the possibility that essentially all the lead-206 in these halo centers was introduced (either directly or as parent polonium-210 or lead-210) together with the uranium, and thus did not accumulate from uranium since the inclusion was formed. There is evidence that the lead isotope ratios in these inclusions are related to the source area(s) from which the uranium was transported during the production of uranium-rich sediments in which coalified wood radiohalos are found, hence invalidating a real-time interpretation of the calculated ages given above.

The original radiometric age characteristics of source material can reflect the primordial characteristics of this material, radioactive transformation since primordial creation, and also exposure to heat, chemical activity and nuclear radiation prior to relocation. Confidence that for many available mineral samples the radioactive transformation effects can be isolated from these other factors is the basis on which a 4.56 billion year solidification age[23] has been established for the Solar System. Individuals whose convictions concerning the interpretation of inspired testimony do not allow so great an age for inorganic material may classify the radiometric features from which this conclusion is derived as primordial characteristics that were introduced in a relatively recent creation.[24]

The popular concept that radiometric ages of geologic formations relate directly to their real-time age obtains much support from the observation that volcanic sequences, and volcanic-derived sedimentary sequences, usually exhibit a pattern of increasing radiometric age with depth. It is obvious that the upper material in a given undisturbed sequence was emplaced later than the underlying material. But the radiometric age differences between them does not necessarily represent the real-time emplacement interval. It has been established that the radiometric age profile of a volcanic sequence may be the consequence of: 1) chemical and isotope zonation in the magma chamber that furnished volcanic material, 2) circumstances that were progressively more favorable to resetting a particular radiometric clock (degassing of radiogenic argon, e.g.) as eruptions proceeded, and 3) crustal material incorporated by the magma as it moved upward.[25] There is evidence that fission tracks in crustal material may survive transport by volcanic activity;[25a] however, this is not the case with fission tracks in volcanic glass formed at the time of eruption.

In accord with these considerations the lowest material in a volcanic sequence represents the upper portion of the associated magma chamber and may have erupted in a more viscous, lower temperature state than did material that erupted later and is placed higher up in the sequence. Crustal material that was broken loose and carried along with the first magma that reached the surface could have experienced less annealing (erasure) of previously developed fission tracks than crustal material that was incorporated during later stages of the eruption sequence. Gaseous and other lighter components would likely be enriched in the upper portion of a magma chamber as a result of gravitational differentiation. Thus there are two factors that could contribute to a diminishing content of radiogenic argon as an eruption sequence proceeds — lower argon content of the lower portion of the magma chamber and increased degassing of the material that reached the surface at a higher temperature in the latter stages of the eruption sequence.

The book of Genesis references two episodes of crustal deformation and reorganization on planet Earth that are outside the range of prediction or explanation based on the normal day-by-day and year-by-year operation of geophysical processes — the original appearance of continents on the third day of Creation week, and the global destruction and reformation described in chapters 6-8. The radiometric age characteristics of many rocks and mineral specimens that are now accessible would be expected to have been altered in each of these episodes. This alteration compounds the difficulties in making historically correct interpretations of radiometric age data.

Although a fully satisfactory explanation of all radiometric age data undoubtedly awaits more information than is presently available, it is the hope of the author that the information brought together and the suggestions made in this paper will assist in the development of a basic understanding that is consistent with both radiometric data and the chronological stipulations in the Bible.

ENDNOTES

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4. Jaki, p 1-3.
5. Ibid., p 33-34.
6. a) Comte de Buffon. 1778. Des Epoques de la Nature. See: Otis E. Fellows OE, Milliken SF, editors. 1972. Buffon. NY: Twayne Publishers, p 75; b) Haber FC. 1959. Fossils and the idea of a process of time in natural history. In: Glass B, et al., editors. Forerunners of Darwin: 1745-1859. Baltimore: Johns Hopkins Press, p 236.
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13. Brown RH. 1976. The potency of prevailing concepts. Origins 3:3-5.
14. Harland, p 29-262. {Geological Time Scale Symposium, Sydney, Australia, August 1976, AAPG Studies in Geology No. 6, 1978. Tulsa, OK: American Association of Petroleum Geologists — added 10/19/99} .
15. Rubidium-strontium age is the amount of time that would be required for the rubidium in a mineral to generate the associated amount of the strontium isotope 87 that is in excess of the amount of this isotope found in corresponding mineral which does not contain rubidium.

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18. Potassium-argon age is the amount of time that would be required for the potassium in a mineral to generate the associated amount of argon isotope 40 that is in excess of the amount of this isotope found in corresponding mineral which does not contain potassium.
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