

January 2006

POLONIUM RADIOHALOS: COMPETING INTERPRETATIONS OF THE DATA AMONG CREATIONISTS

By Dan Reynolds, PhD

Young earth creation scientists who agree on what the bible teaches about creation may still disagree on the interpretation of natural phenomena. Such is the case with creation scientists Robert Gentry¹ and Andrew Snelling² concerning polonium radiohalos.³ Radiohalos are areas of discoloration found in rocks containing radioactive elements that undergo alpha decay. Alpha decay occurs when a radioactive element emits an energetic alpha particle. An alpha particle consists of two protons and two neutrons; it's the nucleus of a helium atom. Alpha particles are ejected with an energy characteristic of the parent radioactive element. An ejected alpha particle travels away from the parent atom until its kinetic energy is gone. Once at rest, the alpha particle extracts electrons from the surrounding rock thereby discoloring the rock and becoming a helium atom. The alpha particles are emitted randomly in all directions but stop at the same distance from the parent (Figure 1). After enough alpha decays have occurred, a spherical shell of discoloration results. Cross sectional specimens of these discolored areas can be studied with an optical microscope.

The uranium 238 isotope decays ultimately into lead through 14 intermediate elements, 8 of which involve alpha decay (Figure 2). Each of the intermediate alpha emitting elements can form radiohalos, each with its own unique size.

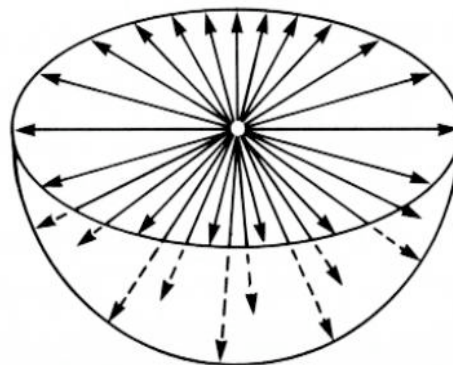
In theory, hydrothermal fluids (hot water) at high temperature transport uranium and its various daughter

¹ Robert Gentry is recognized expert on radiohalos. He wrote a book on the subject entitled *Creation's Tiny Mystery* (Earth Science Associates, 1992). The figures in the article are from his book and are used by permission. The entire book is available online at <http://www.halos.com/book/index.htm>.

² Andrew Snelling is a geologist who studied polonium radiohalos as part of the recent RATE (Radioisotopes and The Age of the Earth) initiative. Results of his work may be found in (a) <http://www.icr.org/pdf/research/ICCRADIOHALOS-AASandMA.pdf>; (b) DeYoung, Don *Thousands Not Billions* (Master Books, 2005), Chapter 5; (c) Snelling, Andrew *Impact 386* (August 2005) – on the web at <http://www.icr.org/index.php?module=articles&action=view&ID=2467>.

³ For an excellent review of radiohalos in general, see *Radioisotopes and the Age of the Earth* (ICR, CRS, 2000), Chapter 8 by Snelling.

Figure 1: Random Paths of Alpha Particles Emitted During Alpha Decay



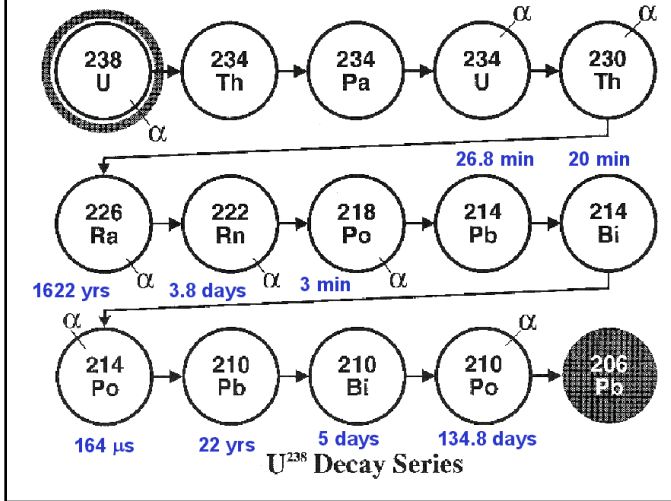
products through rock along mineral cleavage planes and conduits. Occasionally during transport, an element may react with material in the rock and become immobilized. As the transport continues, additional atoms of the same element accumulate at the same location. Eventually enough atoms of a given element (about 10^8 alpha decays required to see a halo⁴) are present at the location to facilitate the eventual formation of a radiohalo. Radiohalos will not persist above 150°C ⁵ and hydrothermal transport ceases below 50°C . Hence radiohalos can only form when the rock is between $50\text{--}150^{\circ}\text{C}$. The rock is in this temperature range for only a few weeks since moving water can carry away heat efficiently. As the accumulated element decays, the radiohalo forms and the decay products accumulate. All alpha emitting decay products will also eventually form radiohalos, each with the same center. The result is a series of concentric shells of discoloration.

Several techniques have been developed to examine radiohalos. Alpha decay during transport results in alpha recoil tracks which can be seen under a microscope after

⁴ Reference 1, Appendix, Gentry 1968.

⁵ Reference 2b, p. 86.

Figure 2: The Uranium 238 Decay Chain. The half lives of some elements are shown.



treatment of a cross sectional rock specimen with acid. Even one recoil track can be detected. Uranium undergoes nuclear fission as well as alpha decay. Fission tracks can be detected by the same techniques as alpha recoil tracks. If uranium moves through rock, fossil fission tracks would reveal the path of movement. Mass spectrometric techniques allow for analysis of centers of radiohalos. Hence the decay products of the radioactive elements responsible for the halo can be determined. Photographic emulsions and neutron bombardment have been used to determine if the center of radiohalos still contain any radioactivity.

There are three isotopes of polonium (Po) in the decay chain of uranium²³⁸. These are Po^{218} , Po^{214} , and Po^{210} , with half lives of 3 minutes, 164 microseconds, and 138 days, respectively. The amazing fact is that there are radiohalos in Precambrian granite ("basement" rocks of the earth's crust) that are attributable exclusively to these polonium isotopes without evidence of radiohalos from precursor elements, that is, the polonium appeared to be parentless or orphan. Many of the polonium radiohalos are isolated from any nearby uranium radiohalos which could theoretically be sources of the polonium or its precursors. In addition, no evidence of alpha recoil tracks, uranium fission tracks, or conduits leading up to these polonium radiohalos are observed. The precursor of polonium 218 is the alpha emitter radon 222, a gas with a half-life of 3.8 days. If radon had been the precursor of the polonium, there should have been evidence of its alpha recoil tracks, but none was found. The type of lead expected from polonium alone was detected ruling out the presence of uranium at the radiocenters. No evidence of extant radioactivity was found; the radioactivity responsible for the radiohalos was now *extinct*, thereby adding additional evidence that the ha-

los were not derived from uranium. The challenge is how to explain how these radiohalos, by all evidence formed exclusively from polonium, came to be. Saying that they came from transport of uranium decay products has the difficulty of explaining why there are no alpha recoil or fissions tracks in the vicinity of the halos. How could such short lived elements have been transported through rock without leaving evidence of the transport? Temperatures which would facilitate transport yet allow the halos to persist are short lived due to rapid cooling. Moreover, parentless polonium radiohalos were found in fluorite, a mineral lacking cleavage plains and conduits making the transport hypothesis extremely unlikely. The possibility that the polonium might have come from an as yet unknown decay chain (not uranium) was also excluded experimentally and theoretically. The data suggested rapid (in minutes) cooling and crystallization of the granites containing the polonium radiohalos. If they had cooled slowly, the heat would have erased the halos. Hence Gentry concluded that the only explanation for the parentless polonium radiohalos was sudden creation of the rocks and polonium by God. By this reasoning, since the polonium was not ultimately derived from uranium but from God's creative power in an instant, the time from nucleosynthesis⁶ to the formation of the earth's crust collapsed from billions of years to at most a few minutes. The polonium radiohalos were seen as fingerprints of God's creative work.

Snelling, familiar with Gentry's work and conclusions, nevertheless conducted field research to determine if there was any evidence for a natural mechanism for the formation of parentless polonium radiohalos. Several metamorphic rock formations containing parentless polonium radiohalos were found. Snelling concluded that the radiohalos in these formations had been derived from uranium and not fiat creation, reasoning metamorphic rock was formed during the Flood and not during creation week. Gentry has long held that polonium halos found in metamorphic rock formations would probably be from rock created during creation week which was relocated but otherwise unaltered. In light of the evidence discovered by the RATE (Radiometric Dating and the Age of the Earth) project for episodes of accelerated radioactive decay in the past (e.g. retention of helium in zircons), Snelling speculates that polonium radiohalos found in metamorphic rock formed during the Flood and an episode of accelerated decay. The accelerated nuclear decay is suggested by the maturity of associated uranium radiohalos (evidence for halos from several decay products in the decay chain) and the number of uranium fission tracks, both consistent with large

⁶ Nucleosynthesis is the process of element formation by nuclear fusion taking place in stars. Conventional geology and astronomy say that all the elements of the earth were made this way over billions of years of stellar evolution through multiple generations of stars.

amounts of radioactive decay. Presumably, accelerated nuclear decay would have provided a rich source of polonium and its precursors. Geochemical changes in the rock often releases water as a by-product. This hot water would then act as a hydrothermal fluid transporting polonium and its precursors through cleavage planes and conduits to sites where polonium could accumulate and eventually form parentless radiohalos. While Snelling says most polonium radiohalos are usually associated with nearby uranium, Gentry has observed polonium halos well removed from nearby uranium and apparently isolated from any obvious cleavage planes, crystal defects, or conduits. In addition, Snelling did not look for alpha recoil tracks, evidence that would have strongly supported his case. Gentry has long said if anyone would ever synthesize a hand sized piece of granite containing just one polonium 218 radiohalo, he would consider his explanation of an instantaneous formation of the earth's crust as falsified. Interestingly, when granite is melted and allowed to cool, it forms rhyolite, a rock with a very different texture and mineral composition.

It may be possible that there are two mechanisms for formation of parentless polonium radiohalos, one involving God's direct intervention at creation of the earth's crust, and the other involving some transport mechanism. Whatever subsequent research reveals, these fine Christian men and scientists have shown their dedication to God and His Word while doing excellent scientific research. They show how Christians can differ over scientific theories while remaining true to God's Word. ❧

TASC IN 2006

TASC was founded to help strengthen the faith of believers by finding scientific evidences which support the Biblical account of creation. Starting from the scriptures alone, based on the leading of the Holy Spirit, affirming the inerrancy of scripture, and by the application of sound hermeneutical principles, TASC has long held to the young earth creation viewpoint. We affirm that God created the universe and did so *recently*. We believe the scriptures speak plainly on this issue and that progressive creationism, the gap theory, theistic evolution, the framework hypothesis, and many other attempts to combine secular scientific theories with scripture miss the mark. We believe that these compromise positions ultimately weaken the believer's faith and are perceived by skeptics as transparent attempts to modify what the scriptures so plainly teach. The young earth creation position is foundational to an understanding of original sin and Christ's atonement. We also believe that the facts of science, when understood in the light of scripture, dovetail with the young earth view. While the scientific evidences and theories which support the young earth model may change (as do all scientific theories), the bib-

lical basis for the young earth position is strong and unchanging, and it is upon this sure foundation that TASC rests its case.

Over the years TASC has shared the creation message through presentations at local schools and churches, a monthly newsletter, our monthly meetings, panel discussions, TV appearances, invited speakers, book sales, our website, and newspaper editorials. As we enter a new year, TASC plans to continue its mission. Our desire it to expand our outreach and we need your help. We need your input to plan our activities for 2006. We would like to know how TASC may serve you personally, in your church, or in your school. Please come to our monthly meeting (second Thursday of each month at Providence Baptist Church at 7:30 PM) and tell us what we can do for you. I also invite you to contact me personally, Dan Reynolds, TASC's new chairman, at 518-1842 (home) or by e-mail at dwr51055@aol.com. You can also visit our website at www.tasc-creationscience.org. We would appreciate your prayers as we plan for the new year.

TASC's board of directors is staffed with dedicated Christians, many with advanced degrees in diverse fields such as geology, computer science, education, engineering, botany, pathology, and chemistry. These men are professional scientists, teachers, researchers, and professors at local universities. Several have published in the scientific and professional literature. Did you know that TASC's board already has several prepared talks on various subjects dealing with creation/evolution, astronomy/cosmology, radiometric dating, geology, theology, intelligent design, and other topics (check out our website for more details)? Perhaps you need a series of creation lessons for your Sunday school class, small group, or home school. Maybe you are struggling with the creation/evolution issue and would like to speak with someone one-on-one. Please call, write, or visit us in person or on the web and let us know how we can help.

MARK STEPHENS STEPS DOWN

Many thanks are due to outgoing TASC chairman, Mark Stephens, for his excellent service over the past five years. Mark is known for his enthusiasm, courage, and gentle and uplifting leadership. Mark is an encourager and has blessed all of us these past few years. During his tenure, Mark wrote several newsletter articles, presented at TASC meetings, presented at several churches, appeared on television several times, wrote letters in support of the teaching of creation in public schools, and recruited new board members. Mark plans to continue serving on the TASC board while he steps up his involvement with evangelism at his home church. Again, a heart felt thanks goes out to Mark for all he has done.

COMING EVENTS

Thursday, January 12, 7:30 P.M., Providence Baptist Church, 6339 Glenwood Ave., Raleigh

Dan Reynolds will discuss what TASC believes, its mission, and its plans for 2006. Please come out and let us know how TASC can serve you this year. Dan will also discuss the biblical basis for the young earth creation

position and the evidence for rapid granite formation involving polonium radiohalos.

Thursday, February 9, 7:30 P.M., Providence Baptist Church, 6339 Glenwood Ave., Raleigh

Philip Johnson. Topic to be announced.

TASC

TRIANGLE ASSOCIATION for the SCIENCE of CREATION
P.O. BOX 12051
RESEARCH TRIANGLE PARK, NC 27709-2051

CHANGE SERVICE REQUESTED

NONPROFIT ORG
U.S. POSTAGE
PAID
APEX, NC
PERMIT NO. 68