

LITERATURE REVIEWS

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EXAMINING RADIOHALOS

CREATION'S TINY MYSTERY. 1988. R. V. Gentry. 2nd ed. Earth Science Associates, Knoxville, Tennessee. 347 p.

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This book is an account of Robert Gentry's efforts to defend creation, particularly his model of creation. The author has spent many years studying and promoting pleochroic halos [microscopic rings in rocks formed by radioactive decay in the center of the ring] as evidence of instantaneous creation. His hard work and commitment are commendable.

The first edition of *Creation's Tiny Mystery* was published in 1986. The second edition (1988) is essentially the same as the first, but contains additional material concerning exchanges between the author and various individuals who have challenged his interpretation of the data he has collected. The book is published in paperback and contains eleven color plates of radiohalos. For the purpose of discussion, it can be divided into three parts.

The first four chapters of the book are an autobiographic account of how Gentry became involved in the investigation of radiohalos, together with a description of the kind of data he found. The remaining eleven chapters are largely reports of reactions of various individuals to Gentry's interpretation of his data. The last third of the book is an appendix containing a collection from Gentry's published papers and some correspondence relating to his discoveries. After a brief commentary on each of these sections, this review will evaluate Gentry's conclusions in some detail.

The first four chapters, together with the color plates of radiohalos, are the most interesting and useful part of the book. The way in which radiohalos are formed is explained, and the author's view of their significance is outlined. Anyone interested in radiohalos — and in Gentry's views — would benefit from reading these chapters.

The remaining eleven chapters are largely a record of Gentry's efforts to promote his views, along with his concern over their nonacceptance. Several chapters are devoted to the 1981 Arkansas evolution/creation trial, at which Gentry testified in support of creationism. This material is largely of historical interest. Gentry claims that his creationistic beliefs have resulted in discrimination against him; but the reader may be unable to tell whether this discrimination has been due to his philosophical beliefs or to his methods of promoting them. An example is seen in his challenge to the National Academy of Sciences that is reproduced on p 196-198, 322-324 of *Creation's Tiny Mystery*. The president of the Academy is to be commended for his restrained response.

The appendix contains copies of several of Gentry's published papers which present the technical details of his investigation of radiohalos. Most of these papers are in readily available sources, but it will be helpful to some readers to have them so conveniently accessible. The appendix also contains records of some of Gentry's exchanges with various individuals who have questioned his conclusions.

It is regrettable that the author did not expend more effort in organizing and presenting the evidence and the basis for his interpretation of that evidence. Those who are interested in the validity of Gentry's interpretations will find material of substance primarily in the first four chapters, the radiohalo catalogue, and the copies of his published papers. The remainder of the book is more polemic than many readers would wish, and contributes little to an understanding of Gentry's creation model. His model of earth history is partially described, especially on p 184-185 and 280-281. He proposes at least three "singularities" (short periods of time in which God supernaturally intervened in natural processes). These are the *ex nihilo* creation of Earth and the Milky Way galaxy, the fall of man, and the Noachian flood. Between these singularities, Gentry believes, natural laws continued in operation as they do today. During these singularities, the operations of natural law were superseded. In particular, the rates of radioactive decay for uranium and some other kinds of atoms were accelerated; however, the polonium decay rates were not altered.

Gentry's conclusions seem to be based on two propositions which he believes are supported by the evidence from radiohalos. The first of these is his belief that rocks containing halos, especially granites, are rocks that were directly created by God, presumably during the Genesis creation week. Gentry's second proposition is that polonium radiohalos were created in the rocks as evidence that the rocks did not form naturally, but were created. The basis for the first proposition seems to be that when granite is melted and then allowed to cool, it does not reform with the same crystal structure,

but instead cools to form rhyolite. This suggests to Gentry that granite cannot form naturally, but must be the result of supernatural activity. Both propositions will be evaluated in the succeeding paragraphs of this review.

Before proceeding, it should be pointed out that belief in *ex nihilo* creation, the fall of man, and the Noachian flood does not rest on the acceptance or rejection of the thesis presented. If Gentry is wrong in his understanding of the evidence, the validity of biblical creationism is not in jeopardy. Biblical creationism is supported by many other kinds of evidence.

The key to understanding the technical aspects of many problems is the dividing of that problem into as many known parts as possible, thereby isolating the unknown parts for further study. Such a division of the “mystery” of the polonium pleochroic halos results in several known aspects and very few unknown aspects.

The basic “tiny mystery” of the halos is as follows:

1. There exists in the biotite (mica) of some granites and some pegmatites certain pleochroic halos identified as arising from the radioactive decay of three polonium isotopes.
2. The specific isotopes of polonium are Po-210, Po-214 and Po-218. Gentry’s observations have suggested that these halos are independent of other radioactive elements, i.e., are not derived from the systematic radioactive decay of U-238.
3. The “mystery” is: If these polonium halos are independent of U-238, how did they get into the mica within solid granite when the polonium half-lives may be only 138 days, 3 minutes or 164 millionths of a second?! (Polonium halos are also found in the hydrothermal mineral fluorite, although less frequently than in mica.)

Seven principal questions need to be answered in attempting to understand this “mystery”:

1. How are the halos formed?
2. How are the halos identified as polonium halos?
3. Where are the halos found?
4. How did the halos get into the micas or fluorite?
5. Where did these halos form?
6. Are there other halos present in the micas in addition to those produced by polonium?
7. If the initial independence from a uranium-source assumption is incorrect, what happens to the “mystery”?

On the question of halo formation, Gentry and other scientists are in agreement. Pleochroic halos are the result of crystal lattice damage due to the impact of alpha particles from radioactive decay occurring at the center of the halo.

Halo identification is achieved through the measurement of the halo diameter. The size of the halo and the half-life of the isotope producing it are related. Assuming that the half-life of the parent isotope has remained constant throughout the formation of the halo, the initial energy of the alpha particles that produced the halos can be determined, and hence the parent radioactive isotope identified. In making this identification, Gentry assumes, as do other scientists, a constancy of radioactive decay rate for polonium. However, Gentry also wants to invoke periods of time that "...may have been accompanied by an increased, nonuniform radioactive decay rate" (p 134). If there were periods of nonuniform decay rates, identification of any pleochroic halo from its ring diameter would be questionable at best! All available data indicate that halo ring diameter increases with increase in decay rate. Either the rates remain constant or they do not. Evidence from other sources¹ suggests that the decay rates have remained constant for all radioactive isotopes. Several problems arise when one attempts to invoke increased decay rates while at the same time keeping the halo diameters constant! Such inconsistency cannot be considered as a satisfactory argument.

Questions 3 and 4 are the areas in which there is some of the most open contention between Gentry and other scientists, creationists and non-creationists alike. Throughout *Creation's Tiny Mystery*, Gentry claims that primordial polonium halos are found only in Precambrian granites, pegmatites and possibly some flood rocks. Moreover, Gentry claims that these polonium halos are the "fingerprints of the Creator" and can therefore have no other origin. On the other hand, Gentry recognizes that the polonium halos in coalified wood are of secondary origin, i.e., due to transport into the wood of polonium derived from uranium, rather than arising by instantaneous fiat creation.

A careful examination of some of the geologic settings where polonium halos are found reveals that at least some of the minerals containing the polonium halos are not found in primordial Precambrian granites.^{2,3,4} More will be said about the geologic setting later.

Irrefutable laboratory evidence as to the geochemical processes involved in polonium halo formation is lacking. However, a systematic study of the geologic and geochemical data strongly suggests one or more transport models for the emplacement of polonium halos in biotite, fluorite and other minerals. The polonium or polonium precursors, in the form of aqueous solutions, are transported into the minerals along crystal lattice planes, cracks

and conduits. Gentry's "spectacle halo" (p 218, Plate 9-B) is an excellent example for solution transport along conduits.

One of the best papers addressing transport mechanisms for polonium halos is that of Meier & Hecker.⁵ They suggest that polonium halos are associated with uranium deposits either by hydrothermal processes or supergene (downward enrichment) processes. Without invoking unknown processes, Meier & Hecker — and others — can account for the polonium isotopic pattern and abundances as well as the geochemical and geologic setting in which the polonium halos are found.

The question as to when the pleochroic halos formed in the rocks — or more basic yet, when did the rocks that contain the pleochroic halos form? — evokes open confrontation between the position that Gentry adopts and the views held by the majority of the scientific community. In *Creation's Tiny Mystery*, Gentry repeatedly states (p 25, 36, 65, 66, 98, 117, 153, 184) that the Precambrian granites represent the primordial creation rocks. Part of the reason for this statement is the presence of pleochroic halos found in them. However, Wakefield⁶ and Wilkerson⁷ challenge this interpretation, pointing out that the localities where the pleochroic halos are found represent secondary rocks, specifically dikes of granite and even calcite veins that intrude older rocks; hence, they are at least secondary in origin. Wise,⁸ who has reviewed the literature on the localities where pleochroic halos have been reported, indicates that a majority (15 out of 22) appear to come from veins or dikes (pegmatites), and hence represent secondary and not primary rocks.

Without entering into the argument as to the absolute age of the rocks (either primary or secondary), it would be safe to state that the majority of halo-containing minerals are younger than the host rock and therefore do not represent primordial material.

The presence of non-polonium pleochroic halos found near polonium halos in biotite, fluorite or other minerals weakens Gentry's case even further. This is especially true when Gentry must invoke a nonuniform increased radioactive decay rate to account for the presence of U-238, Th-232 and Sm-146 halos, while leaving untouched the polonium decay rates! Gentry must invoke a nonuniform rate increase for some of the halos, because at present the half-lives of these other halo-producing isotopes are on the order of hundreds of millions to thousands of millions of years!

If Gentry's independence assumption (polonium halos formed from polonium which was not produced by the radioactive parent U-238) is found to be incorrect, or even found to be strongly questionable, his whole contention that pleochroic halos are evidence of *ex nihilo* creation becomes suspect. The fact that the polonium isotopes involved in halo formation in

the rocks are only those which are daughter products of systematic uranium and thorium decay forces one to suspect immediately that they are derived from uranium rather than a special creation. There are 19 other polonium isotopes, not derived from uranium and thorium, and literally hundreds of *independent*, non-polonium halo-producing isotopes that could give stronger evidence for instantaneous creation of the granite or other rocks.

No review would be complete without addressing Gentry's challenge to evolution. In *Creation's Tiny Mystery*, the author states that he will consider his thesis ("evidence for creation", p 72) essentially falsified if a single hand-sized specimen of granite is synthesized in the laboratory (p 65, 72, 98, 117, 120, 123, 128, 129ff, 183, 191, 194). Probably the author derived this challenge from his belief that the pleochroic halos found in granite represent "God's fingerprints" and thus instantaneous creation. There are several problems with this falsification-of-creation test.

1. The ability to synthesize granite in the laboratory may have little to do with creation. The argument is basically a *non sequitur*. Whether we can or cannot synthesize certain rocks or minerals in the laboratory seems to reflect mainly the sophistication of our laboratory procedures. One could likewise say that the synthesis of a one-kilogram (2.2 pound) diamond would disprove creation. But such an argument would not be taken seriously.
2. We can now synthesize many substances that could not be produced artificially in the past. This fact should evoke caution regarding risking belief in creation on whether or not a hand-sized specimen of granite can be synthesized. In the past we were unable to synthesize diamonds or opals, but we can now. Over a century ago, some individuals believed that organic compounds could only be created by God, but many thousands of them have been synthesized since then! In addition, all the basic minerals found in granite have already been synthesized in the laboratory.^{9,10,11,12} It seems risky to pose a challenge to evolution on the basis of whether or not a hand-sized piece of granite is synthesized, since none of us can predict the future developments of science.
3. It appears that in a number of instances, granite has formed as the result of natural processes. This seems to be the case when granite penetrates (in the form of veins or dikes) older rocks, some of which contain fossils. Obviously the granite was formed after the intruded rocks. Granite filling cracks in fossil-bearing rocks suggests a natural formation of granite rather than evidence for creation. Even more convincing for a naturalistic origin of

granite is the discovery *within* granite of shells of a number of fossil species of brachiopods.¹³ One could hardly argue that God would place fossils in granite He was creating.

Creation's Tiny Mystery represents an interesting approach at a synthesis of science and the Bible; however, the argumentation presented has some serious problems. These include:

1. The inconsistent use of radioactive disintegration rates;
2. The fact that polonium halos appear to be derived from uranium;
3. The evidence for the origin of polonium halos by aqueous transport; and
4. The fact that polonium halos are found in secondary rocks.

Because of these and other problems, readers of *Creation's Tiny Mystery* should be cautious in accepting its argumentation and claims of evidence for *ex nihilo* creation.

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