Chapter 1

# Introduction

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*Abstract*. One of the most significant contradictions between the Bible and the prevalent world-view of origins today is the age of the earth. The Bible teaches that the earth is thousands of years old while the current conventional theory of origins says the earth is billions of years old. Many Bible-believing Christians recognize this disparity and are willing to financially support a large-scale research effort to resolve this contradiction. This book is a report of an eight-year project called RATE (**R**adioisotopes and the **A**ge of **T**he **E**arth) designed to resolve the apparent contradiction between the thousands of years taught in Scripture and the billions of years taught by the conventional scientific community. This first chapter gives a summary of the history of the RATE project, tabulates the basic results, comments briefly on the significance of what was found, and offers advice for additional research in the future. The detailed results are reported in the chapters to follow.

## 1. The Birth of RATE

Radioisotopes are radioactive elements which transform into new daughter elements by nuclear decay while radiating energetic particles. Scientists have long assumed that the decay rates are relatively constant and regular. If this were so, then radioisotopes should be relatively trustworthy clocks. They ought to be reliable chronometers with which to assess the age of rocks, and taken together, the whole earth. However, profound problems have been raised showing that the traditional readings of these "clocks" are problematic.

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Does the decay of radioisotopes reliably and validly (truthfully) show the earth to be billions of years old? Or is the evidence more consistent with a Biblical chronology suggesting that the earth was formed less than 10,000 years ago? This book focuses on the explanation of existing quantities of daughter elements derived from radioisotopes. While arguments have been constructed showing that the traditional interpretations of radioisotopic methods of geochronology are flawed, proponents of the Biblical chronology have yet to account for the large quantities of daughter isotopes that must have been formed in a short period of time.

To address the foregoing problems, on July 4, 1997 seven young-earth creation scientists—Steve Austin, John Baumgardner, Gene Chaffin, Don DeYoung, Russ Humphreys, Andrew Snelling, and Larry Vardiman—met in San Diego, California. They reviewed the procedures and assumptions used for radioisotope dating of rocks. They found that the variety of radioisotopic methods are not reliable because of the flawed circular reasoning underlying their development and use.

Empirically, the various radioisotopic methods are known to be excessively unreliable in repeated application, commonly in substantial disagreement with each other in dating the very same rocks, and without a coherent theoretical basis. Furthermore, they are often in disagreement with many non-radioactive chronometers which suggest a young earth. Nevertheless, the fact that large quantities of daughter isotopes are found in the vicinity of parent radioisotopes must be accounted for.

The RATE research initiative born at that meeting in 1997 led to an eight-year project designed to investigate the processes that may have produced the known large quantities of daughter elements in a period of about 10,000 years. The vast disparity between the billions of years estimated from conventional radioisotopic methods and the thousands of years derived from a literal* interpretation of the Bible would hopefully be resolved. Rather than merely showing the logical flaws

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* *To interpret the Bible literally means to read it with a straightforward understanding of the text wherever possible unless there is good evidence for not doing so. This does not rule out the occasional occurrence of poetic or allegorical passages.*

in the conventional assumptions used in dating schemes, the RATE project focused on uncovering the processes that may have led to the observed daughter elements.

The members of the RATE team listed below have been heavily involved throughout the project:

- Dr. Steven A. Austin, Geologist, Institute for Creation Research, California
- Dr. John R. Baumgardner, Geophysicist, Institute for Creation Research, California[1]
- Dr. Steven W. Boyd, Hebraist, The Master's College, California[2]
- Dr. Eugene F. Chaffin, Physicist, Bob Jones University, South Carolina[3]
- Dr. Donald B. DeYoung, Physicist, Grace College and Seminary, Indiana[4]
- Dr. D. Russell Humphreys, Physicist, Institute for Creation Research, California[5]
- Dr. Andrew A. Snelling, Geologist, Institute for Creation Research, California[6]
- Dr. Larry Vardiman, Atmospheric Scientist, Institute for Creation Research, California

Not only was each member of the RATE team trained in different aspects of science, they also had different interests and ideas on how to tackle the relevant problems. Much of the time in the annual meetings was spent in attempting to understand the various member perspectives and in reaching consensus on what experiments to conduct and how to interpret the findings. However, one of the common convictions among the entire team was a high regard for Scripture and its literal interpretation including the acceptance of recent creation and the global Flood, and the trustworthiness of Biblical chronology.

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1 *Formerly with Los Alamos National Laboratory*
2 *Joined the project for the last four years*
3 *Board member of the Creation Research Society (CRS)*
4 *Board member of CRS*
5 *Formerly with Sandia National Laboratories and Board member of CRS*
6 *Formerly with Answers in Genesis*

## 2. The Life of RATE

The RATE project was designed to last a total of eight years. The first three years were dedicated to reviewing the literature on radioisotope techniques for dating rocks and proposing what research should be done to develop a better explanation for a young earth. This phase ended with the publishing of the book, **Radioisotopes and the Age of the Earth: A Young-Earth Creationist Research Initiative** [*Vardiman et al.,* 2000] which reported on these two accomplishments. The remaining five years were dedicated to conducting the research proposed in the first phase. The whole project ended with the publishing of this book, **Radioisotopes and the Age of the Earth: Results of a Young-Earth Creationist Research Initiative** [*Vardiman et al.,* 2005]. In addition, a non-technical version of this final book and a video documentary of the project have been prepared by *DeYoung* [2005] and the *Institute for Creation Research* [2005] respectively. These non-technical summaries of results have both been entitled **Thousands not Billions: Challenging an Icon of Evolution**.

When the project was started in 1997 no funds or sponsoring institutions had been identified to support the project. However, the Institute for Creation Research elected to sponsor the first meeting until funding could be obtained. The Creation Research Society joined ICR in soliciting funds and participated in publishing the two main technical reports [*Vardiman et al.,* 2000, 2005]. Answers in Genesis supported Dr. Snelling's participation in the RATE project for his first year on the project, and initially helped distribute fliers and news items to help raise support.

The total cash donations to the RATE project have exceeded $1,000,000 supplemented by about $250,000 in indirect costs paid by ICR. The total expenditure has thus exceeded $1,250,000. Over 400 donors gave gifts of less than $1000. More than fifty contributed $1000 or more, and several individuals gave substantially greater sums. Most of the expenses for the RATE project fell into one of three categories; salaries and overhead for the RATE scientists, charges from laboratories to process and analyze rock samples, and travel, meeting,

and publishing expenses. Some of the laboratory costs ran as high as $2000 per sample. Direct laboratory costs exceeded $250,000. Salaries and overhead costs included expenses in literature searches, field work, meeting attendance, interpretation of results, and writing of articles and reports. Travel expenses included the cost of nine annual meetings of the RATE group, participation in the Fifth International Conference on Creationism, and technical society meetings like the American Geophysical Union where RATE results were reported. A portion of the cost to prepare the non-technical book about the project and all of the cost of the video documentary were paid from RATE funds.

Most of the communication among the RATE project scientists occurred by email. Without this form of communication the geographically widespread research conducted from Australia to the east coast of the United States would not have been possible in the time frame of eight years. It was common practice for one scientist to forward an idea or draft report to one or two of the others, with information copies to the remainder of the group, and have written responses back within twenty-four hours. Many times the email discussion would go back and forth multiple times before agreement was reached on how to proceed with a particular phase of the research. The technical books were also reviewed and edited by email. Electronic files of individual chapters were compressed and transmitted over the Internet. In the final stages of the editing, the files became too large to transmit easily because of the intensive graphics, and had to be recorded on discs and mailed by overnight delivery.

Once each year the entire RATE project group met face to face in San Diego to review the research accomplished and to organize ongoing research. These meetings were highlights of the year because of the creativity and motivation they produced. Each scientist was allotted half an hour to report on his research on a particular topic. These reports typically occurred on the first day of the two-day annual meeting. On the second day, special topics and problem areas were addressed followed by administrative decisions concerning such matters as budgets and reporting schedules. Each annual meeting began with a devotional study and prayer. At the end of each annual meeting an evening of

fellowship at a local restaurant was a well-deserved reward. A written report containing documents presented during the annual meeting was published each year for the exclusive use of the RATE project group. The purpose of these reports was to provide immediate documentation of what had been accomplished during that meeting and a record for posterity.

Special care was taken in publishing the technical reports of the RATE project. A multi-stage process was used in the review. The first draft of each chapter was forwarded to all members of the group to read and comment on at the annual meeting. After the written and verbal review within the RATE group, a second draft of each chapter was peer reviewed by outside technical experts. These experts were not necessarily all young-earth creationists, but most were Christians. The review process was administered by the three editors—Larry Vardiman, Andrew Snelling, and Eugene Chaffin. When the outside reviews were completed the chapters were revised by the authors and resubmitted to the editors for final review. The last step was to review the third draft which was formatted into its final form for the book. The process took almost two years for each technical book.

A key issue identified early in the RATE project needed immediate attention: How much radioisotopic decay had occurred in the history of the earth? If it was a large amount, how could it be explained? Phase one showed that *a large amount of radioactive decay had indeed occurred.* At least four pieces of evidence made this conclusion inescapable. First, a large quantity of Pb, the end product in the U decay chain, was found in close proximity to the radioactive centers still containing residual U. Second, fission tracks, caused by the passage of high-energy fragments emanating from the fission of U atoms gave evidence of a large amount of nuclear decay. Third, radiohalos were formed around primary and secondary radioactive centers where large concentrations of high-energy $\alpha$-particles damaged the surrounding crystal structures leaving spherical shells of discoloration. And, fourth, relatively large concentrations of He were still present in the rocks. This He resulted from emitted $\alpha$-particles having captured two electrons each to become He atoms and coming to rest.

Once the RATE group was certain that a large amount of nuclear decay had actually occurred, the obvious explanation for so much daughter product was accelerated radioactive decay. This hypothesis was reluctantly embraced because conventional wisdom dictates that even under extreme physical conditions like high temperatures and pressures the decay rates typically do not change today by more than a few percent. However, as the evidence began to accumulate during the RATE project it became clear that accelerated nuclear decay was the most promising explanation for the large amount of daughter products. Initially, the concept of accelerated decay was only an hypothesis, but evidence from several different sources resulted in *accelerated decay becoming the primary explanation for the findings of RATE.*

## 3. The Experiments of RATE

Most of the research proposed in the first RATE project book was addressed during the subsequent five-year research phase. It was never anticipated that all the questions raised initially would be definitively answered. However, the advances achieved were greater than anyone expected. The research findings will be described in detail by each principal investigator in the following chapters and will be summarized in the last chapter. Here only a thumbnail sketch of each of the major research topics will be addressed.

Table 1 lists the principal investigator, a description of the experiment, and the main results of the five RATE project experiments originally identified as **High Priority RATE Experiments** in Chapter 1, Table 1 of *Vardiman et al.* [2000, p. 16]. Significant advances were achieved in all five experiments. It should also be noted that the majority of donated funds, consistent with the stated purpose for raising those funds, were expended in conducting these five high-priority experiments.

Table 2 lists the principal investigator, a description of the experiment, and the main results of three additional studies that also achieved significant results. Two of these experiments—Case Studies in Rock Dating and Biblical Word Studies—had been listed in Table 2 of *Vardiman et al.* [2000, p. 17] as **Low Priority RATE Experiments**.

**Table 1.** Results of high priority experiments.

| Experiment | Principal Investigator | Description | Main Results |
|---|---|---|---|
| He Diffusion | D. Russell Humphreys | An experimental measurement of diffusivity of He in zircon from Precambrian granodiorite from the Jemez Caldera, New Mexico, and the development of a two-dimensional theoretical diffusion model of He through zircon and biotite. | *The measured diffusion rate of He in zircon is five orders of magnitude greater than present U-Pb decay produces He.* The measured diffusivity of He in zircon used in the model estimates the age of the zircons and the granodiorite to be 6000±2000 years. |
| Isochron Discordance | Steven A. Austin | A detailed chemical analysis of rock samples from the diabase sill at Bass Rapids, Grand Canyon and the Beartooth amphibolite, Wyoming. Whole-rock and mineral isochron comparisons for four isotope pairs. | Isochrons give four different estimates of age for the same rock sample. Estimated age is greater for α-decay than for β-decay. Conventional radioisotope dating techniques display considerable internal inconsistency. |
| Nuclear Decay Theory | Eugene F. Chaffin | An exploration of theoretical mechanisms which could explain accelerated nuclear decay. | Minor variations in nuclear parameters like potential well width and depth can produce orders of magnitude change in α-decay rates. Beta-decay can be accelerated by different amounts depending on "forbidden modes." |
| Radiohalos | Andrew A. Snelling | A wide geological and geographical collection and survey of U, Th, and Po radiohalos and an explanation of their formation. | Polonium radiohalos formed rapidly under catastrophic conditions. Their formation follows the decay of U and argues for an accelerated decay rate and rapid cooling of granites formed during the Genesis Flood. |
| Fission Tracks | Andrew A. Snelling | A geological collection and analysis of fission tracks in zircons from five selected locations. An interpretation of conditions associated with their formation. | The quantity of fission tracks in most samples is consistent with a large amount of nuclear decay during the period of the Genesis Flood, implying that accelerated decay has occurred. Fewer fission tracks in some samples appears to be due to their erasure during hot conditions associated with accelerated nuclear decay. |

**Table 2.** Results of additional significant experiments.

| Experiment | Principal Investigator | Description | Main Results |
|---|---|---|---|
| Case Studies in Rock Dating | Andrew A. Snelling | A collection and chemical analysis of ten rock units from recent time to the early Precambrian. Whole-rock and mineral analyses using four isochron dating methods were applied to the samples. A search for evidence of inheritance and mixing of radioisotopes in the mantle and crust was also conducted. | Marked discordance was found among the isochron estimates of ages. *Alpha-decaying radioisotopes gave older isochron ages than β-decayers, and the greater the atomic weight of the isotope the older the estimated age.* It was concluded that radioisotope methods cannot be relied upon for absolute ages of rocks and that the only explanation for this pattern of discordance is accelerated decay at periods in the past. Contamination of recent crustal rocks by inheritance and mixing has occurred, but accelerated decay is the dominant cause of discordance. |
| Biblical Word Studies | Steven W. Boyd | A statistical study of the difference in verb forms between narrative and poetic passages of the Old Testament. | Preterite, Perfect, Imperfect, and WawPerfect verb forms were found to have significantly different frequency distributions between narrative and poetic passages. These differences are significant at a P-value of less than 0.0001. When applied to the Creation and Flood accounts in Genesis this statistical model indicates that these accounts are narrative and should be interpreted as literal, historical events. |
| Carbon-14 ($^{14}C$) in Coals and Diamonds | John R. Baumgardner | A measurement and analysis of $^{14}C$ in coals and diamonds using accelerator mass spectrometer (AMS) methods. Seventy carbon-rich samples reported in the conventional literature had already been found to contain $^{14}C$. Ten new coal samples from different depths in the geologic record and twelve diamonds from widely divergent geographical locations were collected and measured by RATE for their $^{14}C$ contents. The implications of measurable concentrations of $^{14}C$ in coals and diamonds for a young earth were explored. | This project was added due to new information offered to the RATE project in 2001 by Dr. Paul Giem. The peer-reviewed radiocarbon literature documents scores of examples of $^{14}C/^{12}C$ ratios in the range of 0.1–0.5 percent of the modern $^{14}C/^{12}C$ ratio with uniformitarian ages from 1–500 million years. RATE measurements of coals confirmed these reported concentrations. Measurements in diamonds (which are highly resistant to contamination) found similar $^{14}C$ concentrations. The values correspond to $^{14}C$ ages between 44,000 and 57,000 years using conventional assumptions. A lower, more realistic estimate for biospheric $^{14}C$ prior to a cataclysm which buried all the fossils would yield an estimated age of about 5000 years. This age is consistent with the Biblical account of a global Flood on the planet a few thousand years ago (not billions). |

The third experiment—$^{14}C$ in Coal and Diamonds—was a new experiment conceived during phase two and had not been anticipated in earlier plans. The results of all three of these studies, however, were so significant and surprising that they merit special attention in a separate table.

Table 3 lists six other experiments that were also identified in Table 2 of *Vardiman et al.* [2000, p. 17] as **Low Priority RATE Experiments**. It lists the experiment, a description of the experiment, and a brief discussion. With some exceptions, little progress was made on these experiments. The discussion indicates that some were incorporated partially into the higher-priority experiments and some were not addressed at all. A few of them will be included in recommendations for future work to be found in the summary in the last chapter of this book.

## 4. The Significance of RATE

The geological timescale with its hypothesized billions of years has been regarded by evolutionists as their impregnable stronghold against the Biblical record of Creation. Whenever their other arguments have met with fatal opposition, they have retreated into the claim that billions of years of time could account for primordial conditions on earth accidentally producing life. Whenever they are unable to provide a naturalistic mechanism to account for the transformation of molecules into man by chance, they assert the *fact of evolution*—a drama with an unwritten script supposedly spanning hundreds of millions of years. It is believed by many evolutionists that a great lapse of time can perform "miracles."

The Bible, by contrast, paints a radically different picture of our planet's history. In particular, it describes a time when God catastrophically destroyed the earth and essentially all its air-breathing life. The only consistent way to interpret the geological record in light of this Biblical event is to understand that fossil-bearing rocks are the result of a massive global Flood that occurred only a few thousand years ago and lasted but a year. This Biblical interpretation of the rock

**Table 3.** Results of low priority experiments.

| Experiment | Description | Discussion |
|---|---|---|
| U/Th Halos | A geological and geographical collection and analysis of U and Th radiohalos. | Completed as part of the radiohalos study by Snelling. See the description and discussion of radiohalos in Table 1. |
| Pu in Oklo Reactor | A theoretical study of Pu and other trace elements associated with a natural reactor in a geological formation in Africa. | Considered as part of nuclear decay theory by *Chaffin* [2000]. |
| Allende Meteorite Origin | An exploration of the concentration of radioisotopes in meteorites. Meteorites were not involved in geological processes on the earth but would potentially be affected by accelerated decay of a cosmological nature. | Attention to this subject was postponed because of other more pressing topics. Because of the significance of radioisotopic signatures in meteorites in estimating the age of the universe and the age of the earth as a whole, the study of meteorites should have a high priority in future work. |
| Diffusion of Ar in Biotite | Experimental measurement and analysis of the diffusion rate of Ar in biotite. | It was found that this effort had already been reported in the literature. Because of the significant findings of RATE about He in zircon and biotite, probably little of value could be learned by examining Ar at this time. |
| Origin of Chemical Elements | A theoretical study of the cosmogenic origin of the elements. The purpose was to explore a possible alternative to the nucleogenesis model. | A preliminary approach to this topic was started by an associate. However, the work was suspended after a short period of study due to disagreements with the approach. |
| Cosmology and Nuclear Decay | A theoretical study of the concept of "the stretching of the heavens" stated several times in Scripture with the concept of "a rapid, completed expansion of space". | This effort was suggested by *Humphreys* [2000, pp. 369–374] as a possible explanation for accelerated decay and the associated cooling necessary to explain how large amounts of heat could be removed. |

record implies that the animals and plants preserved as fossils were all contemporaries. This means trilobites, dinosaurs, and man all dwelled on the planet simultaneously, and they perished together in a world-destroying cataclysm.

Although creationists have long claimed that the rock formations themselves testify unmistakably to water catastrophism on a global

scale, evolutionists generally have ignored this testimony and countered with their theory of a long lapse of time supposedly justified by their interpretation of the decay of radioisotopes. This supposed bastion of evolutionary thinking is owed largely to the doctrine of uniformitarianism passed down from one generation of geologists to the next since the time of Charles Lyell in the early nineteenth century. Uniformitarianism assumed that the vast amount of geological change recorded in the rocks must be the product of slow and uniform processes operating over an immense span of time. This theory rejects a global cataclysm of the type described in the Bible and in other ancient texts as impossible and therefore nonhistorical.

With the discovery of radioactivity about a hundred years ago, evolutionists deeply committed to the uniformitarian outlook believed they finally had irrefutable proof of the immense antiquity of the earth. In particular, they discovered the very slow nuclear decay rates of elements like U while observing considerable amounts of the daughter products from such decay. They interpreted these discoveries as vindicating both uniformitarianism and evolution, which led to the domination of these beliefs in academic circles around the world throughout the twentieth century.

Even when creationists point out that radioisotope dating of rocks is built on three basic assumptions which often cannot be justified, evolutionists would retreat into the stronghold of their prior assumption that the earth has been around for billions of years. This defense rested ultimately on radioisotope dating.

Radioisotope dating techniques are based on three assumptions:

- The rate of radioisotopic decay has always been constant.
- The isotopic abundances in a specimen have not been altered by processes other than radioactive decay. (When evidence suggests this has not been true for a given sample, the results are commonly discarded.)
- The amount of daughter isotopes when the rock was first formed are believed to be small, often negligible, or the original isotopic composition can be determined. (So-called “isochron” methods attempt to date rocks that contain significant initial levels of daughter isotopes.)

However, the RATE project has convincingly shown that the first and most fundamental of these assumptions is invalid, namely that the rate of radioisotopic decay has not always been constant. This conclusion was reached from several independent lines of evidence showing that nuclear decay has been accelerated during brief episodes of earth's history. Furthermore, this increase in decay rate was not a small amount, but was on the order of a billion or more times greater than the rates observed today.

Such change in decay rate obviously calls into question all radioisotope dating methods. The calculation of the age of a rock based on the present-day rate of decay of a radioisotope from the amounts of daughter element is clearly invalid if the rate of decay has been different in the past. Almost certainly the agent that caused a change in decay rate of a single radioisotope affected them all. However, our studies suggest the acceleration has not been uniform for all elements, but was greater for different categories of nuclear decay and also greater for elements with greater atomic weights. This variable change in decay rate appears to be the explanation for isochrons of different parent/daughter isotope pairs *giving divergent ages for the same rock or mineral.*

One line of evidence strongly supporting accelerated decay is associated with two clocks involving the decay of U in zircon crystals in granite. The age of granite calculated from the rate at which He diffuses from imbedded zircons gives an age which is *orders of magnitude less than the millions to billions of years calculated from U decaying to Pb.* The rate of diffusion appears not to have been affected by whatever accelerated the nuclear decay. Consequently, the age of the earth from the diffusion "clock" is on the order of thousands of years, not millions or billions, in agreement with the young age of the earth derived from the genealogies in the Bible. Billions of years thought necessary for evolution to occur never happened. Without these eons of time available, evolution becomes unthinkable. The consistent time frame between the calculations of He diffusion in granite and the Biblical chronology support the Bible's statements of earth history and Creation.

## 5. The Administration of RATE

The RATE project made breakthroughs not only in the physics of radioisotope dating but also in the way creationist research is administered and funded. The total cost exceeded $1,250,000 and was provided by over 400 donors. The effort was purposely organized as a closed-ended, eight-year project in order for the donors to be able to evaluate the goals, progress, and results in a business-like manner. Many research projects, whether they are sponsored by government or private sources, rarely have clearly specified goals or sensibly bounded time frames for their achievement. Most are open-ended and not subject to sufficient review by the persons paying the bills. Although, funding for most research comes from the government, foundations, or other sources that have built-in procedures for previewing and periodic review to decide if funding should be continued, reports are often published in technical journals and read only by experts in the field. The general public may not even be aware that the research is being conducted on a particular subject or what the results mean when the project is over.

The approach to funding and reporting by the RATE project was significantly different. First, the RATE team recognized that few, if any, normal sources of funding for scientific research were likely to support this effort. There is such a bias against creationist thinking that government agencies and most foundations are not viable sources. Most large private foundations which might have been potential sponsors for this project did not have the technical expertise to evaluate the scientific details of the proposed work. So, the RATE team concluded that most funding would likely come from individuals and small foundations. The project would therefore need to be planned and described in a way that the informed public could comprehend the general concepts, the methods to be applied, and the importance of the potential findings.

A second difference was that technical evaluations of the scientific proposals and reports of the results would need to be made from within the creationist scientific community. It is desirable that at the end of the project summaries of the major findings should be reported in conventional journals and news releases, but in the early stages at

least, proposals and reports would need to be made within creationist venues. The battle to report in conventional circles would be so difficult initially that it would detract from other more important efforts to complete the research. Unfortunately, the number of experts who have the knowledge to evaluate the technical details of radioisotopes and nuclear decay is so limited that adequate evaluation is difficult to achieve in any venue. Nonetheless, it was a recognized priority. Without adequate review and evaluation by independent experts, confidence in the proposals and results would be jeopardized. On the other hand, utilizing experts from outside the creationist community would almost certainly incorporate sufficient bias to jeopardize the integrity of the whole RATE project. Scientists with little sympathy to a literal view of Scripture often completely reject creationist work, regardless of its quality, or stubbornly deny that favored assumptions should be open to scrutiny.

Because of the decision to obtain most of the technical reviews and to report the initial results within the creationist community, there have been some concerns expressed about the appropriateness of reporting preliminary research results to the general community in order to raise funds before publishing them. It is common practice in scientific circles to strongly limit public releases of scientific results until the technical reports have had a peer review in one or more of the conventional scientific journals. A number of scientific societies have codes of conduct which include strong statements insisting on such practices. For example, the National Academy of Sciences, the American Geophysical Union, the Geological Society of America, the American Physical Society, the American Chemical Society, the American Mathematical Society, and the American Association for the Advancement of Science, among others, have such standards incorporating strong commitments to independent peer reviews. However, because of the difficulty in publishing creationist research in conventional journals and because of the desirability of making information available for public scrutiny, the RATE project team chose to release critical findings after publishing them in peer-reviewed creationist journals and conferences.

In fact, the RATE project may have been the first creationist research

project to generate detailed guidelines for the conduct and ethics of research. Of course, the ethics for creationists should be even higher than the conventional scientific community, but it would be helpful if these guidelines were developed and disseminated explicitly for those who may wish to conduct and report creationist research. To this end, Dr. Henry Morris Jr., founder and President Emeritus of the Institute for Creation Research, has drafted a white paper which attempts to fill this need. It may be found in the Appendix to this chapter entitled, *Peer Evaluation in Scientific Research and Creationism*. We anticipate that his white paper will also be published in one or more of the creationist research journals in the near future.

A third difference was that the RATE project was designed to last eight years. Unlike most funded research, this project had a determined stopping point. It was understood that not all the questions raised initially would be fully answered during the project. But, by specifying a fixed length of time for the project, the donors could more easily assess how much progress was being made and could decide if their investment had been worthwhile. Specified reports at the end of the proposal phase and the research phase would provide the necessary information for evaluation. In addition, the researchers would also have fixed deadlines for the completion of subprojects. Questions not answered during the eight years of the project would need to be addressed in follow-on research. Funding and reporting of the follow-on research would need to be conducted subsequently and separately from the RATE project.

A final difference was that although the RATE project was intended to be conducted according to the highest standards of scientific quality and integrity and reported to the technical community, it was also intended to be comprehensible to the larger community from which the funding came. Unfortunately, an attitude has arisen among many scientists that science is so technical that most of the public are not prepared to understand it and explanations should not be attempted. Many technical journals seem to accept as a matter of course that no effort is needed or justified to explain research objectives, methods, and results in language comprehensible by the general public. This elitism may have developed because funding for science has primarily become

a function of government agencies. Scientists are no longer responsible for justifying their sometimes esoteric work to the public at large, but, rather, to a committee of their peers or to faceless administrators. The attitude has become so prevalent that any scientist who attempts to express his excitement for science in a popular format is criticized by his peers as degrading the dignity of science. Carl Sagan was a premiere example of this. Although he was widely praised by the public for having an unusual gift of explaining science in simple terms, his peers generally held him in low esteem for his attempts to communicate scientific ideas at a popular level.

The RATE project could not get funding and also ignore its public, even if such an attitude had developed. It was highly dependent upon its donors and purposely chose to communicate with them throughout the project. Unless the non-technical supporters understood what was planned and what was accomplished, the scientists would not have been able to obtain the funds necessary to complete the experiments. The RATE scientists sincerely believed it was part of their responsibility to clearly inform the supporters what their funds had purchased. The initial proposals were written in a form that a technically literate public could grasp. Also, scientific concepts and world-views dramatically affect the lay public. The RATE scientists attempted to communicate as clearly as possible to them. The concepts and objectives were clearly spelled out. Throughout the project timely non-technical reports were published reporting on new results and plans. And at the end of the project, not only was this final technical report published, but a lay version of the technical report and a video documentary of the RATE project geared to the non-technical public at large were produced. Each scientist also has the responsibility of continuing to interpret and publish his results in peer journals and at appropriate conferences. However, it may be several years before all the results of RATE are fully reported.

We believe that God called the scientists of the RATE project for such a time as this. We pray that the LORD will honor the results of this effort and that whatever valid findings we have discovered will permeate the scientific community and our society. We believe a false confidence in radioisotope dating has been a key factor in undermining confidence in

the Bible and faith in God in our society. We pray this work will lead to a new reformation—to the glory of God!

## 6. The Future of RATE

Although the RATE project has accomplished much in the field of radioisotope dating to show radioisotope data indeed support a young-earth creationist perspective, there are many remaining questions to be clarified and explored. A number of remaining problems are discussed in the final chapter of this book. No doubt some readers will ask, as we have: If the RATE project is ending in 2005, how will these questions be addressed?

The Institute for Creation Research (ICR) has decided to expand its research efforts into a larger domain. Not only has the RATE project identified several questions about radioisotope decay which need further work, but while it was underway several ICR scientists have also pursued other research themes. Geology, paleoclimatology, geophysics, biology, and molecular biology are long-standing topics of interest to the faculty at ICR. The RATE project has shown in a practical way how these efforts can be funded and developed. Because of the scientific and administrative success of the RATE project, ICR has been encouraged to develop a much larger multi-disciplinary research program. It is believed that if strategic research projects are identified and defined, the supporters of ICR will once again recognize their value and commit necessary funding. It is evident that much can be accomplished by following this model in other disciplines.

In December of 2004 a new Research Council was convened at ICR to discuss just such a plan. The intent was to develop procedures for identifying significant research, to raise more funds, perform research, review results, and report findings. Follow-on to the RATE project research would be included as part of this multi-disciplinary program. In addition, some of the research could be conducted as thesis topics by students in the ICR Graduate School. It is recognized that obtaining funds for multiple projects of the magnitude of the RATE project may be a considerable challenge, but there are other projects comparable in

significance to the RATE project which have the potential for major advances in defending the Biblical account of earth history.

## 7. Additional Resources

The following chapters in this book are highly technical in nature, and it may be difficult for some to follow the text because of the nomenclature. An extensive glossary was included in the first RATE book by *Vardiman et al.* [2000] to assist the non-specialist in defining terms. The reader is encouraged to acquire a copy of the first book to accompany this final report. A non-technical book has been written by *DeYoung* [2005] and a video documentary has been produced by the *Institute for Creation Research* [2005] which discuss the RATE project and its results without all the technical nomenclature and details.

## 8. Acknowledgments

I wish to express my appreciation to all the donors who made the RATE project possible with their gifts. Thanks to over a dozen reviewers who provided detailed comments and suggestions on the drafts of this introductory chapter and the summary chapter, and to over two dozen experts in various fields who helped review the technical chapters. As much as I would like to honor all these reviewers by listing their names, the editors are following standard peer review protocol by keeping the reviewers' identities confidential.

And I wish to thank the LORD for blessing the RATE project team with the insights He gave us and the privilege of doing this research. When the RATE project was started in 1997 we adopted the following statement of David to Goliath as our project inspiration. It expresses how we felt when facing this gigantic problem initially, our dependence on God for insights and funding, and the hope we had for His help. I would like to quote that passage again at the end of this project to remind us how God has provided. As David faced Goliath in the valley of Elah he said to the Philistine:

*"Thou comest to me with a sword, and with a spear, and with a shield: but I come to thee in the name of the LORD of hosts, the God of the armies of Israel, whom thou hast defied. This day will the LORD deliver thee into mine hand; and I will smite thee, and take thine head from thee; and I will give the carcasses of the host of the Philistines this day unto the fowls of the air, and to the wild beasts of the earth; that all the earth may know that there is a God in Israel. And all this assembly shall know that the LORD saveth not with sword and spear: for the battle is the LORD's, and he will give you into our hands."*
1 Samuel 17:45–47

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## Appendix: Peer Evaluation in Scientific Research and Creationism

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It is normally recommended that activities involving scientific research, especially the publication of the results of that research, include what is known as "peer review" prior to publication. This is generally true in the case of the secular academic and industrial research communities, but has not always been the practice in Christian communities. This paper, therefore, will attempt to suggest guidelines for the peer review process in connection with research carried out and/or published by Bible-believing Christian scientists and organizations, in particular those committed to literal creationism.

It is obviously important that scientific research by Christians be carried out carefully, then analyzed and interpreted judiciously before publishing. Christians and others who are not scientists should be able to have confidence in its accuracy and reliability. A good peer review process is very important for this assurance.

Christian men and women of science should follow even a higher standard in this connection than their secular colleagues, in the sense that they are ultimately required to give an account of their stewardship (of talent, time and opportunity, as well as money) to God Himself:

*"Wherefore putting away lying, speak every man truth with his neighbor."*

Ephesians 4:25.

"*…whatsoever ye do, do all to the glory of God."*

1 Corinthians 10:31.

They must, therefore, be scrupulously honest in reporting the results of their research. If certain data points or trends are omitted—or, for some reason, added by interpolation—this must also be reported, with justifying reasons carefully explained.

When an interpretation is applied to the data, perhaps intended to support a Biblical or philosophical position, this may be legitimate and good, provided only that the context clearly acknowledges that it is only

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the writer's interpretation, allowing the reader the option of agreeing or disagreeing.

At the same time, such a process is never infallible and may be difficult to achieve, especially when underlying spiritual motivations could be affecting either the researchers or reviewers or both.

Concerns about the peer-review process commonly in use by secular scientists have been raised not only by Christian creationists but also by non-Christian evolutionists in connection with *their* research. Both of these groups have deplored the clear influence of non-scientific bias in many reviewers. Reviewers should therefore be selected, if possible, who will not allow their personal beliefs to influence their scientific evaluation of the research.

Some may question the above discussion as being too self-serving. However, Christians—especially those who are called "young-earth creationists" (we prefer the term "literal creationist" or, even better, simply "Biblical creationist," since our interpretations are primarily Bible-based) have found by experience that it is almost impossible to get a fair evaluation from scientists whose interpretations are essentially naturalistic and uniformitarian in science.[1] Different premises inevitably lead to conflicting interpretations.

It is also significant that our cautions with respect to the peer-review process are shared by many who are not creationists at all. This includes, for example, such eminent evolutionists as Dr. Lynn Margulis, an honored biologist, Dr. Frank Tipler, world-class specialist in relativistic physics and quantum mechanics, and up-and-coming young British physicist João Magueijo. All of these have written bitter complaints about the peer-review process as it commonly works in secular science,[2] tending to prevent publication of any book or article or funding of any proposal which does not adhere to current majority opinion. One could also mention world-famous astronomer Halton Arp and many others.

Thus, although peer review can be invaluable in limiting the harmful

1. This fact has been discussed and documented by numerous creationist scientists. One brief example is a three-page article entitled "Willingly Ignorant" in the ICR newsletter *Acts & Facts* for December 2003.
2. Ibid. Their complaints are quoted in the *Acts and Facts* article, with documentation.

influences of fallacious research, it can also be of deadly influence in screening out valuable discoveries and silencing truth. Reviewers must be selected judiciously!

Another important factor, largely unique to scientific research in young-earth creationism, is that funding is not available from sources accessible to naturalistic scientists (governments, large foundations, industrial coalitions, etc.). Funds must be sought largely from Christian individuals, who are naturally concerned with the possible Biblical and/or moral implications of the proposed research. That means that the purpose and value must be convincingly explained in the proposal, otherwise these funds (usually not large in the first place) will be channeled into more obvious spiritually oriented causes.

Pure research for the sake of pure research may motivate secular scientists and their funding sources, but Christians are expected by God to be careful stewards of their financial resources and thus will require persuasive Biblical reasons for using them to support scientific research. That constraint, therefore, must also be understood by any peer reviewer.

All of the above considerations have made it next to impossible to get reports of creationist research—not to mention creationist reinterpretations of evolutionary naturalistic research—published in secular scientific journals or funded by any source other than Christian individuals. Creationists are often berated for not publishing in such journals, but failure to get creationist research accepted for publication is not necessarily because of their allegedly poor science.

The fact is that many creationist scientists already have extensive publication records based on their research done on strictly secular topics with secular goals. This is certainly true of most of the scientists associated with the Creation Research Society, Answers in Genesis, the Institute for Creation Research, and other such organizations. But scientific studies that may support young-earth creationism (or even just intelligent design) are widely deemed in the secular world to be unworthy even of discussion. Creationists thus often have been forced to establish their own publications and draw peer reviewers from their own ranks (which thankfully have been growing).

## Selecting the Peer Reviewers

In view of the above discussion, any "young earth" or "intelligent design" scientific research proposal or publication should, whenever possible, be evaluated and critiqued by at least two or more peer reviewers, chosen in accordance with the following criteria.

- The reviewer should be qualified by both education and experience to give an accurate and knowledgeable evaluation of the proposed or reported research and its treatment in the submitted paper.
- The reviewer should be willing and able to do a fair and impartial evaluation within the available and stated time constraints.
- Whenever possible, the reviewer should be in agreement with—or at least not antagonistic to—the Biblical viewpoint of the researcher, especially if the research is potentially relevant to that perspective.
- A negatively inclined reviewer should be selected only if he or she agrees to limit the critique to scientific questions. It will be understood that interpretations may clash, but that should not be a consideration in the review, unless clearly so stated in the review request.

Finally, if no reviewers can be found satisfying the above criteria, the creationist may, if he believes his work truly should be published, go ahead and publish it with an appropriate note informing readers of the situation.