

SCIENCE UNDER ATTACK

The Institute for Creation Research (ICR), the California-based headquarters of Young-Earth Creationists, has made another attack on science, this time prompted by articles that appeared in *Elements*. In an essay entitled "Irrational Naturalism," ICR founder Henry Morris attempts to discredit five authors who contributed to *Elements* #3, a special issue on the geochemical origins of life (Morris 2005).

Employing an often-used Creationist approach, Morris revels in the admission by each author that scientists don't yet know all the details of life's origin. George Cody says, "At present there is no complete theory for the origin of life" (Cody 2005). Joseph V. Smith concurs:

"The chemical steps that led to life on Earth remain a matter of speculation" (Smith 2005). Graham Cairns-Smith notes that "It is humbling to think about [the chemical complexity of] bacteria" (Cairns-Smith 2005), while James Ferris notes the interdependence of DNA and proteins and wonders, "Which came first?" (Ferris 2005). And I provided Morris with what is probably the juiciest sound bite of all: "Scientists are still far from understanding the ancient, intricate processes that led to the origin of life" (Hazen 2005a).

Morris's illogical, but oft-repeated, conclusion is that science has failed and that naturalistic explanations of life's origin are therefore bankrupt, both intellectually and spiritually. He calls our efforts "irrational" and "shameful." Citing select Biblical quotations, Morris concludes that "Only the living God can create life!" For anyone familiar with the ICR critique of science, this is unsurprising rhetoric, but it still comes as a shock when the attack falls so close to home.

By selectively excerpting rondo-like admissions that we scientists don't know it all, Morris tells a truth, but **not** the whole truth. Even a casual reading of the articles in *Elements*, or better yet a more conscientious study of the hundreds of research papers that underlie those brief reviews, reveals that origins research is a vibrant, youthful field. We have a clear outline of life's origin as a sequence of emergent events—the successive emergence of biomolecules, of macromolecules, of self-replicating systems of molecules, and ultimately of molecular natural selection. We now understand how each of these steps adds a degree of complexity to the prebiological system. We have numerous specific examples of these chemical processes, and more details are filled in every week (Hazen 2005b).

Thus, at root, Morris has resorted to the tired old "God in the gaps" argument—that God is to be found in the lacunae of our understand-



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The editors

ing. A central problem with this essentially defeatist argument is that as science keeps learning more and the gaps of our ignorance get smaller, then God's presumed role becomes increasingly trivialized (Miller 1999).

A now-classic example of the failure of this strategy is the evolution of whales. Twenty years ago, Morris and his ICR colleagues trumpeted the "failure of Darwin" to explain the evolution of the whale, which

they claimed could not possibly have descended from a land animal (Gish 1985; Haywood 1985). But over the past two decades, paleontologists have unearthed dozens of intermediate, four-legged whale genera, exactly as predicted (e.g. Gingerich et al 1994; Thewissen et al. 2001). Here, as in other cases, the predictions of Darwinian evolution have been confirmed time and time again.

What I find most sad in this pattern of willful ICR misrepresentation is that it is an effort to reject science—to portray science as the enemy of faith. In fact, from my perspective, nothing could be farther from the truth. Science is a way of comprehending that is based on reproducible observations, experiments, and logical inference about the natural world. As such, science can neither prove nor disprove the occurrence of miracles, the existence of God, or whether the universe is imbued with purpose and meaning. Nevertheless, the discoveries of science—the natural laws that describe the workings of the universe, and the scientific theories that explain how the cosmos evolves—can and do inform many people's beliefs about these important topics. Science may be the enemy of deception and misinformation, but it is not the enemy of faith.

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I found issue 4 of *Elements* very interesting, as I found the other issues. I specially liked the comments by Hochella Jr. and Heaney. They dealt with "hot topics" that surface almost every day here: funding (although we in Argentina are astronomical distances away from the figures that Dr. Hochella quotes) and the competition between different research areas.

I have noticed that there are serious differences between researchers devoted to geochemistry, petrology, mineralogy and related areas (who need "hard" data, often quite costly) and researchers in areas in which they can write wonderful papers using more economical instruments like a binocular microscope and a camera. First, I would like to make it clear that I totally respect other study areas and think that they are very worthy of support. However, if the current trend continues, there will probably be a time in the not-too-distant future when petrologists (or mineralogists) will be relegated because they cannot produce high-quality papers as fast as those in other research areas.

Several things contribute to this situation for researchers in mineralogy, petrology and geochemistry:

- different funding needs depending on the type of study. With some exceptions, no serious journal in our discipline accepts papers that are not based on a number of chemical analyses, from "common" whole rock data to more sophisticated techniques like ion microprobe.
- some sort of "fashion trends" in study areas. Nowadays, almost anything related to global climate change and dinosaurs (just to quote two examples) makes much more noise and is accepted much more easily for publication than the discovery of a new pluton, however interesting it may be.
- there is a constant pressure to publish papers in indexed journals, and to evaluate production based solely on that criterion.

While this has certainly led to higher quality papers and is a healthy practice, not all journals are equally strict when it comes to standards used to accept a paper.

This situation has gone quite far and, if criteria continue to be the same irrespective of the study area, it is likely that the number of researchers in more costly and not-very-popular fields will diminish and they (we) will lose even more representation. Time will tell.

Have you heard similar comments from other researchers in other countries?

**Fernando Colombo**, Cordoba, Argentina

The following two letters were in the queue to be published in the September issue but had to be postponed due to lack of space.

I would like to join the gang in praising the Editors and sponsoring societies for producing a magazine worthy of the great contributions of geochemistry and mineralogy to science and society! The June 2005 issue is no exception, with a number of fascinating articles summarizing hypotheses and research approaches regarding the origin and evolution of life on the early Earth. Since there has been a great deal of interest expressed in using the material in this journal for teaching purposes, I feel compelled to make one derogatory comment.

All articles in this issue make heavy use of qualifying phrases and adverbs (e.g. might have, must have, most likely, possibly, etc.) to emphasize the highly speculative nature of this avenue of research at the present time. The sole exception is the title chosen for the overall issue and its lead article, "Genesis: Rocks, Minerals, and the Geochemical Origin of Life." Perhaps it was accidental that the title of the first chapter of the Bible, considered a sacred and divinely inspired text by Jews, Christians and Muslims worldwide, was chosen, but it gives the impression of drawing a line in the sand between science and religion over this hot-button issue. Furthermore, there is no avoiding the finality of the first line of the lead article, "Life arose on the young Earth as a natural chemical process."

This flat statement of fact is itself contradicted throughout the issue and most particularly in the last paragraph of the same article: "Scientists are still far from understanding the ancient, intricate processes that led to the origin of life." I see no reason to promote conflict between science and religion. Both of these great philosophical endeavors benefit from the application of logical reasoning and critical questioning of all presumptions, and both have much to contribute to the evolution of a just and sustainable society.

**David J. Wesolowski**, Kingston, Tennessee, USA

I very much enjoyed reading your review of Howard Evans' contribution to the mineral sciences. His studies of the crystal chemistry of various metal complexes were equally important and were the area of chemistry that he considered the most important to his scientific career. I would like to make one correction to your review, that of the discussion of the Hauptman-Karle Nobel Prize.



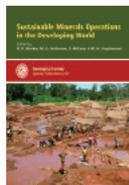
In the 1950s the USGS crystal-chemistry group was headed by Charles Christ, and included Howard Evans, Joan Clark, Mary Mrose, Dan Appleman, and myself... In the early 1950s, Karle and

Herb Hauptman were completing the mathematical analysis of the "phase problem" but had no immediate way of proving that the equations could lead to a structural solution of a light atom compound. At this same time Charlie Christ and Joan Clark were trying to solve the structure of the borate colemanite, and it was proposed that the Hauptman-Karle equations be used to solve the colemanite structure. Joan Clark spent months using hand calculations to solve the H-K inequalities (no big computers then). The preliminary structural solution was given as an abstract at the 1954 GSA meeting—the first use of the H-K method. Joan Clark is the real hero of this very important contribution to crystal-chemical science.

**Malcolm Ross**, Washington, USA



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### Geological Society Special Publication 250: Sustainable Minerals Operations in the Developing World

*Edited by B. R. Marker, M. G. Petterson, F. McEvoy and M. H. Stephenson*

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