

# letters

## Creationism discussion continues

I was pleased to see the report in February (page 53) that the scientific community is beginning to take a public stand against "creation science" (a contradiction in terms). I was much less enthralled by the exchange of letters on the subject in the June issue. It is clear that there is much misunderstanding concerning the nature of both science and religion.

As a physicist who is also interested in religion (I was a member of the Task Team on Science and Theology of the Presbyterian Church, U.S., during 1980-82), I am irritated whenever I find that the spokespersons for religion are anti-intellectual fundamentalists, while often the spokespersons for science are militant atheists. By airing these extreme positions, the ancient science/theology dispute is carried forward, and continued misunderstanding is promoted. Most of the public, who are neither scientists nor theologians, feel that they must choose one or the other model of the universe. The implications for political decisions and the funding of scientific research are obvious.

Religious fundamentalists who demand literal interpretations of biblical scriptures are only rarely found in the mainline religious denominations. One Presbyterian theologian says that whatever the scientific merits of "creation science," it is ridiculous from a theological viewpoint. If one must base one's account of creation on the Old Testament, one has no less than three accounts from among which to choose. Each of these creation myths illustrates particular religious truths (for example, the dignity and worth of human life, or the "goodness" of physical creation), values that are almost universally accepted (or at least given lip service) today, but which were revolutionary in Old Testament times and stood in direct opposition to the predominant Mesopotamian religions of that day. The creation myths in Genesis complement one another in their religious affirmations but differ fairly drastically in such details as the time-ordering in the creation of plants, beasts, humans, and so on.

Joseph Campbell has said that modern culture, unlike any previous culture, lacks a unifying mythology. Perhaps this accounts for our lack of ability to cope with myth. If one is acquainted with the nature of myth (even on an elementary level), one is aware that even the ancient peoples who constructed them did not subscribe to a "literal" interpretation of them. The truth content of myth was considered to be higher, in a moral or religious sense, than merely a description of physical reality. For anyone in the twentieth century to ascribe "literal" reality to these ancient myths is almost too comical in itself to need further ridicule.

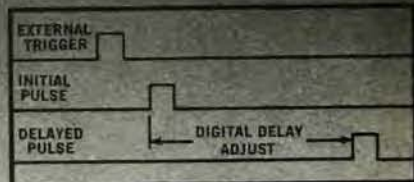
On the other hand, the scientist (or anyone) who dismisses religion because the idea of an omnipotent God is logically inconsistent is guilty of intellectual hypocrisy. Does he or she think that science is free from inconsistencies? Perhaps he or she is not aware of the existence of Russell's paradox or Goedel's Theorem. Actually, aside from obvious methodological differences, science and theology have much in common. Each is an attempt to model reality, founded on unprovable articles of faith. If the existence of a benign supreme being is the fundamental assumption at the heart of religion, certainly the practice of science is founded on the unprovable hypothesis that the universe is rational—that its behavior is subject to human understanding. Through science we construct highly useful models which permit us to understand the universe, in the sense of predicting its behavior. Let us not commit the elementary epistemological mistake of confusing the model with reality. Surely scientists, as well as religious leaders, should possess sufficient maturity to realize that whatever ultimate reality there may be is not directly accessible to mortal humans.

I believe that if the misunderstanding between religion and science becomes an all-out war, the scientists must lose. The potential for anti-intellectual fervor is ever present. Scientists, particularly those interest-

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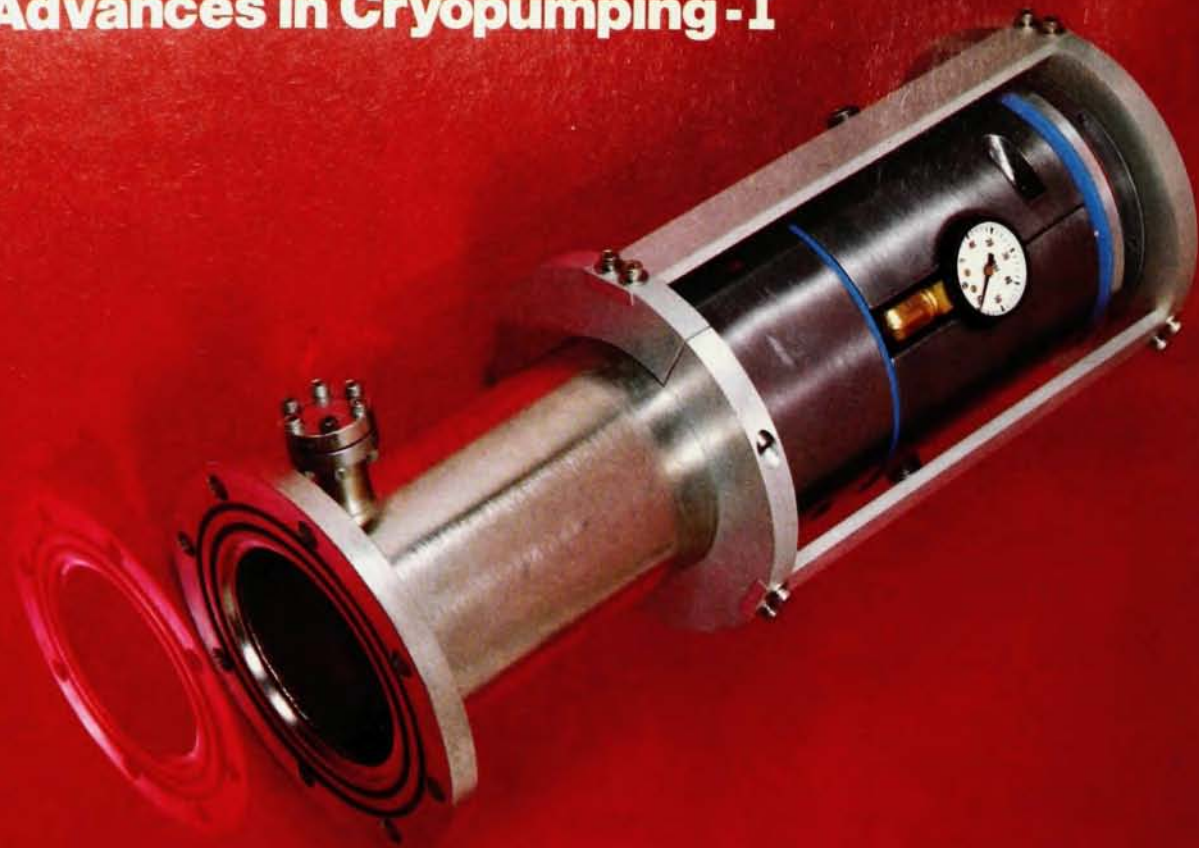


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## letters

ed in religion, must speak up in an attempt to educate the public, not inflame it.

HARRY W. ELLIS

Eckerd College

St. Petersburg, Florida

7/82

If the June letters are any indication, few physicists are aware of my published evidences<sup>1</sup> for Creation, and perhaps even fewer are aware that my published evidences<sup>2</sup> for a young Earth have enormous implications for one of the most pressing technological problems of our generation: site selection for long-term nuclear waste storage.<sup>3</sup> This problem was the *raison d'être* for the April 1978 LSU Symposium on Cosmo- and Geochronology convened by R. G. Kazmann of the Civil Engineering Department. He summarized my presentation at the symposium in the September 1978 issue of *Geotimes* as follows (with minor editing):

His [Gentry's] specialty is the study of minute halos in mica and biotite crystals and, more recently, in coalified wood from uranium-bearing sands in the Colorado Plateau and the Chattanooga Shale. The halos he discussed are created by  $\alpha$ -particles of differing energies emitted by such substances as uranium, thorium, and polonium. He presented microphotographs of an assortment of radiohalos in biotite and fluorite; and then a diagram showing the eight  $\alpha$ -emitters of the uranium decay chain, three of which are polonium isotopes.

The polonium halos, especially those produced by  $Po^{218}$ , are the center of a mystery. The half-life of the isotope is only 3 minutes. Yet the halos have been found in granitic rocks in many parts of the world, including Scandinavia, India, Canada, and the United States. The difficulty arises from the observation that there is no identifiable precursor to the polonium; it appears to be primordial polonium. If so, how did the surrounding rocks crystallize rapidly enough so that there were crystals available ready to be imprinted with radiohalos by  $\alpha$ -particles from  $Po^{218}$ ? This would imply almost instantaneous cooling and crystallization of these granitic minerals—and we know of no mechanism that will remove heat so rapidly; the rocks are supposed to have cooled over millennia, if not tens of millennia.

His studies of halos in coalified wood bear directly on the meeting's topic: geochronology. There

he and his co-workers were able to define the tiny uranium centers and to distinguish the various halos produced by different  $\alpha$ -emitters.

However, since the deposits from which the coalified wood was obtained are considered to be of Triassic and Jurassic age ( $> 2 \times 10^8$  years), the ratio between  $U^{238}$  and  $Pb^{208}$  should be low. Instead, some such halos have been found with uranium-lead ratios ranging from about 2200 to over 64 000. If isotope ratios are to be used as a basis for geologic dating, then presently accepted ages may be too high by a factor of greater than 100 000, admitting the possibility that the ages of the formation are to be measured in millennia. Thus ages of the entire stratigraphic column may contain epochs less than .001% the duration of those now accepted and found in the literature.

Kazmann's own conclusion was: "...that cosmochronology and geochronology are far from reliable in yielding ages...that many engineering structures or designs based on such considerations...would be questionable if not downright hazardous...[and] that intense effort in the area of geologic dating would be needed before engineers could develop designs that would be safe for the required periods."

Since that symposium I have not only easily rebutted<sup>4</sup> the two criticisms<sup>5,6</sup> of my results, but moreover have proposed an experimental test which in theory could falsify my view that the Precambrian granites are primordial rocks, or rocks that were created during the initial creation event. That test is the laboratory synthesis of a hand-size piece of granite or biotite.<sup>4</sup> Apparently I have found strong evidence for creation because there has been no response to this challenge in three years. Further, my evidence for a young Earth has just been reinforced by studies of Pb retention in zircons taken from deep granite cores at 313 °C.<sup>3</sup> Diffusion calculations show that 50-micron zircons should experience 1% Pb loss in  $3 \times 10^8$  years at 313 °C. Since no Pb loss was detected, this value is an approximate upper limit to the age of these Precambrian granites. Evidence for an even lower upper limit has been submitted for publication.<sup>7</sup>

In this respect I find it interesting that scientists who claim that creation science is undermining science education in America<sup>8</sup> generally fail to mention my results or their implications for nuclear-waste storage. If I have indeed uncovered factual scientific evidence that conventional geological or radio-

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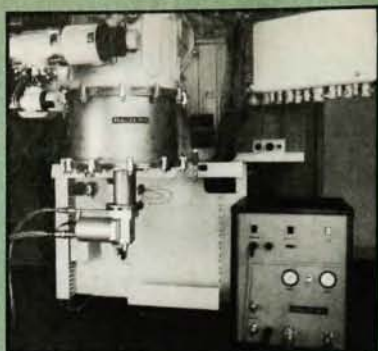
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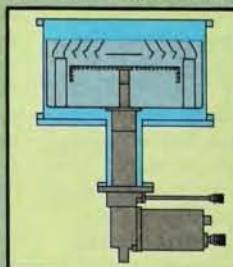


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## letters

metric age dating techniques are in error, this has enormous implications for nuclear-waste containment. That is, if the salt domes in Louisiana and Mississippi are really only several thousand years old instead of the hundreds of thousands or millions of years estimated by current uniformitarian concepts, then these sites, which have been judged safe repositories of nuclear wastes on the basis of these long-age estimates, just might in reality be the poorest type of repository for nuclear-waste storage. Thus to plan nuclear waste containment in salt domes without further investigation could lead to problems of unknown proportions several decades from now.

### References

1. R. V. Gentry, *Science* **160**, 1228 (1968); *Science* **173**, 727 (1971); *Science* **184**, 62 (1974); *Annual Rev. Nuc. Sci.* **23**, 347 (1973); R. V. Gentry, *et al.*, *Nature* **244**, 282 (1973); *Nature* **252**, 564 (1974); *Nature* **274**, 457 (1978).
2. R. V. Gentry, *et al.*, *Science* **194**, 315 (1976).
3. R. V. Gentry, *et al.*, *Science* **216**, 296 (1982). See also *Sci. News* **121**, 296 (1982).
4. R. V. Gentry, *EOS* **60**, 474 (1979); *EOS* **61**, 514 (1980). See also *Sci. News* **121**, 44 (1982).
5. P. E. Damon, *EOS* **60**, 474 (1979).
6. Derek York, *EOS* **61**, 514 (1980).
7. R. V. Gentry, *et al.*, Submitted for publication.
8. R. Sinclair, *Sci. News* **119**, 67 (1981).

ROBERT V. GENTRY  
Columbia Union College  
Takoma Park, Maryland

8/82

In connection with the recent debate in these columns on the creation-evolution controversy, I would like you to print, for the benefit of all readers, the following excerpt from the Rig Veda, an ancient Hindu religious text. As translated by A. L. Basham, it reads: But, after all, who knows, and who can say whence it all came, and how creation happened? The gods themselves are later than creation, so who knows truly whence it has arisen?

When all creation had its origin, he, whether he fashioned it or whether he did not, he, who surveys it all from the highest heaven, he knows—or maybe even he does not know.

Nobody really knows exactly how old the Rig Veda is. It has been estimated to be at least 5000 years old. But the above hymns appear as true today as they were then. They do great credit to the thinkers of that lost era. The tremendous advances made since then in science, technology and other fields

of human thought have not altered the basic truth of these statements from the Rig Veda.

T. RAYA HALEMANE  
State University College  
Fredonia, New York

7/82

After reading a spate of virulently anti-creationist articles and letters in your publication, I decided that something less virulent and more thoughtful should be said.

As we might all easily agree, it isn't very scientific to make assumptions dogmatically and then accept only evidence in favor of these assumptions. It is the practice of this precept that separates the unbelievers from the believers, sheep from goats, and so forth. Most of us, history says, will test as goats. Therefore, a word of caution: How much do we actually know (other than that it has something to do with someone's religion) about this set of ideas we are calling "creationism"? I shall confess that I know next to nothing. Will any of the noisemakers out there also confess?

I do know what we do not know about creation: almost everything. Science, like religion, is not a physical thing itself, but a non-material set of ideas. It is an ideology and is not exempt from the scrutiny to which we subject other ideologies. Science, if it is to progress, must be fed the fuel of inspired thinking—brainstorming, if you will. Religion has generally been the repository of things we felt must be true, in some sense knew were true because we existed ourselves, but which we could not demonstrate rationally or understand. Sometimes the inspiration that sparks great scientific progress has been religious. Other times a dogmatically held religious concept has stifled the development of the very inspiration that it may have been meant to provide. The point is that we have never been very good judges of this and, as scientists living in an age that has history books telling of both atheistic Nazis who purported to worship science, and Spanish Inquisitors, who purported to be doing God's will, that we be a bit more humble and lower our voices.

We have several things to gain by lowering our voices. One is the possibility that paying attention to some radically different ideas, however wacky, may suggest to us an insight into science that we do not expect. For instance, we do not have a thoroughly rational, tested hypothesis about the origin of our species. Indeed, we haven't even been able to agree upon a biological classification system for primates. Somewhere buried in the creationist arguments may be the right

continued on page 103



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question, one that we have been ignoring because it wasn't proper to consider it! The second thing we have to gain is our decency and humanity. I have myself sat in class after class in the sciences and humanities in which any idea remotely religious was belittled, attacked, and shouted down in the most unscientific and emotionally cruel way. I have seen young students raised according to fundamentalist doctrine treated like loathsome alley cats, emotionally torn apart, and I never thought that this sort of treatment was any better than the treatment that religious prelates, who held authority, gave Galileo. Why scream about the inhumanity of nuclear war if you are also willing to force people of fundamentalist faiths to attend public schools in which their most cherished beliefs will be systematically held up to ridicule and the young children with it? These people are mostly too poor for private schools to be an alternative. The state tries to prevent them from teaching their children at home rather than sending them to school. What choices do they have? Would you call it freedom? Do you call it fair?

Is it really a terrible thing for a textbook to mention that, aside from the Darwin theory of evolution, there have existed other ideas, many of them religious in nature? Would that not open the mind of students rather than close them to scientific possibilities? Wouldn't it make the fundamentalist student feel a little more welcome and better equip him to take an unbiased view of evolution?

Well now, I've asked a lot of questions and I do not know the answers. I would far prefer to hear physicists discussing such questions than loudly attacking straw men and expressing a Chicken Little attitude that the educational sky is falling because a few creationists want to be heard.

J. WILLITS LANE  
Tallahassee, Florida

8/82

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Neither your statements on creationism (February, pages 53 and 120) nor readers' responses (June, page 84) give any practical advice on how to cope with the creationist challenge.

A large part of the problem is that few people really know what "scientific creationism" is all about. Most creationists are biblical creationists only, and know nothing whatever about the scientific claims of "scientific creationism." I suspect that significant numbers of scientists and science teachers do not know, either.

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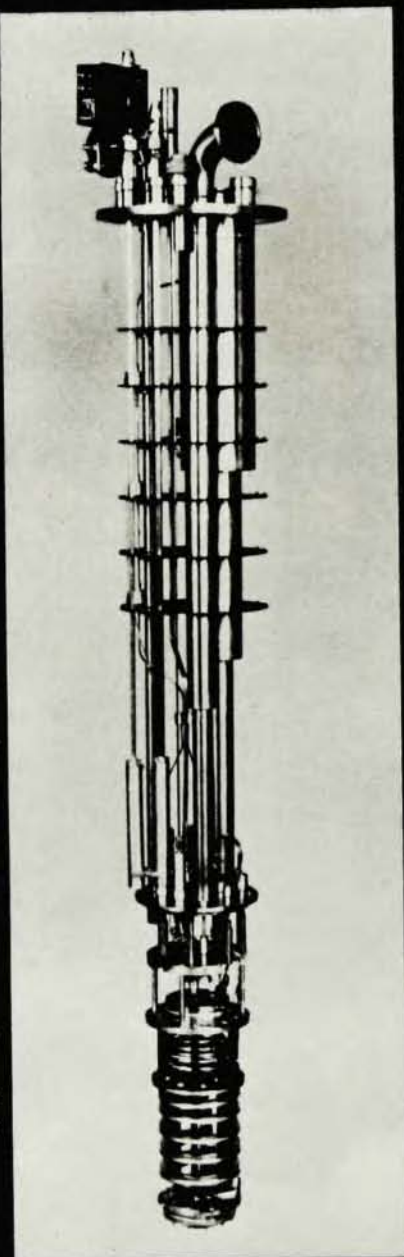
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## letters

ism are as follows:

- The age of the Earth is no more than about 10 000 years.
- The Earth has undergone very little change since creation, except for the Flood and perhaps a few other catastrophes.
- Life forms have changed little since the creation except for minor hereditary changes.

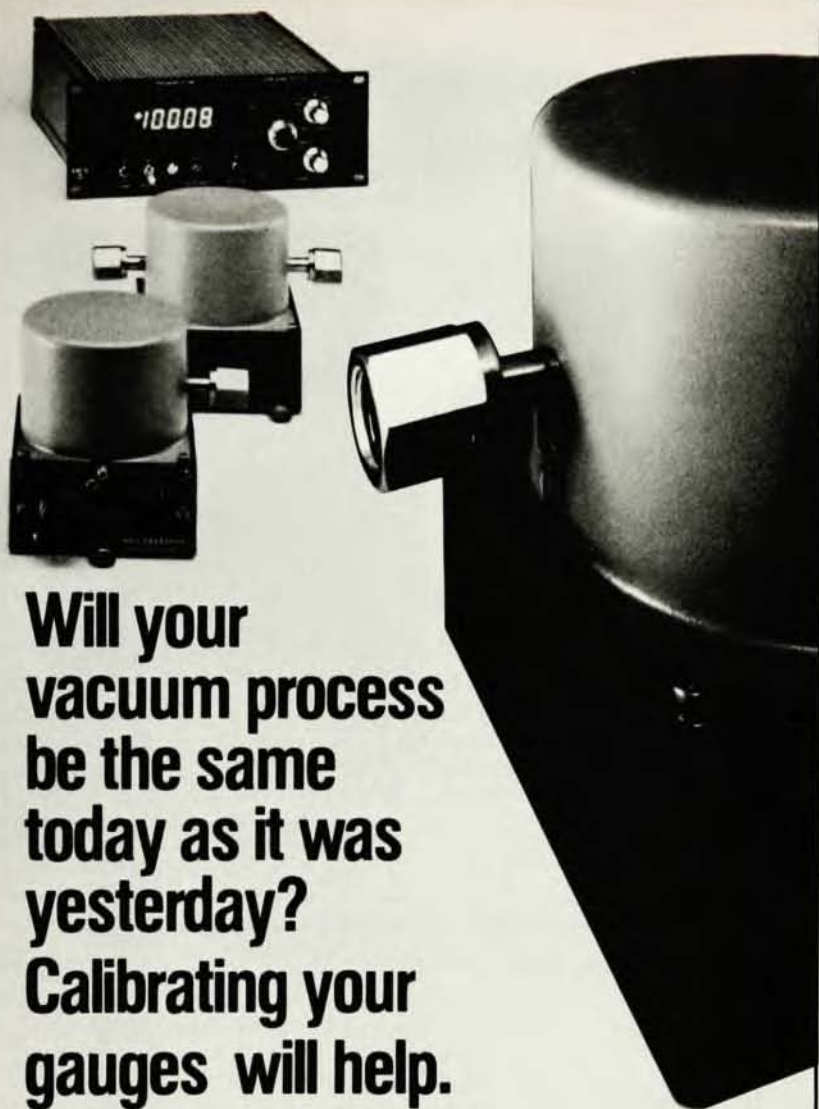
Those of us with broad scientific training know that the evidence does not support those claims, but we are not going to convince many by merely arguing that those claims are nonsense. We can win that argument only by thoroughly teaching the facts and especially the processes of science in an unbiased, non-emotional atmosphere.

Our colleagues in the life and Earth sciences will have to deal with the second and third claims, but we who teach physics are in an ideal position to debunk the first claim. We should do so only after thoroughly teaching relevant material, such as radioactivity. After students have done some half-life experiments and plotted enough decay curves to understand how exponential decay works, the question of the age of the Earth can be brought up. I like to present the problem in this way: "Some people believe the Earth is only 10 000 years old, while others claim it is 4.5 billion. What is the shortest half-life an element could have and still exist in the Earth after those periods?" Since any radioactive nuclide which is not a decay product will virtually disappear in 10 half-lives, the answers are about 1000 years and 0.5 billion years, respectively. Then I send them to the *Handbook of Chemistry and Physics* with instructions to tabulate all of the nuclides with half-lives longer than 1000 years.

The results consistently and overwhelmingly refute the notion of a young Earth. If students already know about alpha and beta decay, they can tabulate the natural abundance of the decay products of those long-lived nuclides which are not found in the Earth. Students who make these surveys after gaining a working knowledge of radioactivity are not likely to give much credence to the creationists' young Earth claim. They will quickly see why creationists "do not trust radioactivity" as a means of establishing the age of the Earth, although many creationists trust nuclear science in the contexts of national defense and the electric utility industry.

It is to be hoped that colleagues in the life and Earth sciences can come up with similar teaching strategies to counter the creationists' challenges to their fields.

It is not enough, however, merely to



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## letters

debunk unacceptable ideas. We must teach science more effectively in all areas. If we really believe that science is what scientists do, we must teach science by letting students do some real science. We must set aside or even throw away encyclopedic textbooks and let them make observations, devise "laws," invent and test models.

Physics is the very best medium for teaching how the scientific process works. Many profound concepts can be taught to even very young children with simple equipment, provided we ask the right questions. Arons and Rogers and others have given us some ideas on how to do it, and we must do it if we are to convince anyone that science is a pleasurable as well as useful intellectual activity.

It is not enough, however, merely to improve the quality of high-school and college physics courses. People in physics must find ways to improve the teaching of science at all levels of education right down to and including kindergarten.

### Reference

1. Henry Morris and Duane Gish, *The Institute for Creation Research*, 2716 Madison Ave, San Diego, CA 92116, have written many books and pamphlets on the subject.

JOHN E. BEACH  
Fairless High School  
Navarre, Ohio

7/82

... even more revealing of the dogmatic nature of the special creationists is the implicit assumption shared by the letters of both Russell Humphreys and the Doanes (Letters, June); that is, that evidence *against* evolution is evidence *for* special creation. This assumption is patently false. It ignores the great variety of other creation models which contend for popular acceptance such as abiogenesis, panspermia (recently promulgated by Sir Fred Hoyle and Chandra Wickramasinghe), cyclical evolution and the near infinite variety of religious cosmologies of the Hindus, American Indians, and so on...

But why *should* scientists, engineers, and all academics worry about a "scientific" creationist movement? Put simply, there are special-interest groups who do not understand how legitimate science progresses, who philosophically disagree with evolution, and who wish to neutralize it in our nation's science classrooms. Thus, we have comments such as Charles Chaffey's: "Something is clearly wrong when scientists will not obey a law enacted by the majority of the people, and go to court to try to escape from having to." (June, page 88). Yes, Mr. Chaffey, the something

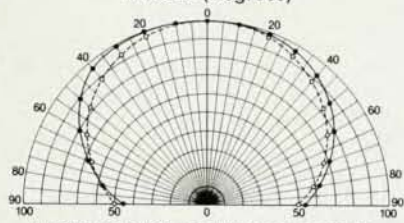


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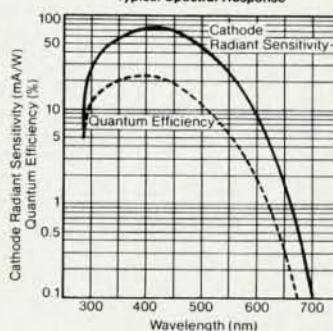
LIGHT ACCEPTABILITY OF R1391X

— measured ——— calculated

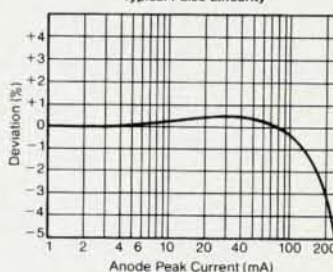
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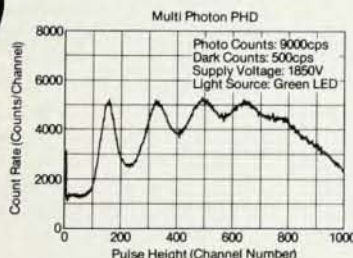
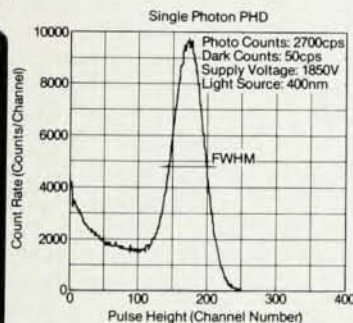
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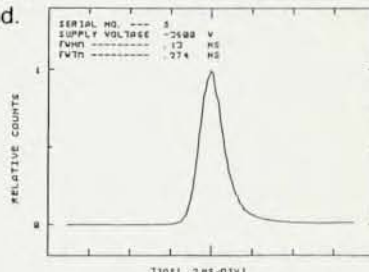


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## letters

that's clearly wrong is that science does *not* test its hypotheses and theories by popular vote. When governments intervene into the contents of science, its effects may range from the ludicrous (legislating that pi equals 3), to the counterproductive (the USSR's previous adherence to Lysenkoism) and to the tragic (the Aryan physics and biology of the Nazis).

And when should such a movement be erupting? At the very time our technical education should be at its best and is instead at its worst. The next century will require a technically competent and literate populace for our country to survive in any reasonable form. It has been noted many times previously how poorly our children are educated as compared to the Japanese, the Russians and so on. To allow a pseudoscience such as creationism to enter the biology classroom is only one more dilution in our anemic secondary education. Once we allow unfalsified theories into the limited domain of scientific inquiry, we invite the entire collage of astrology, flat-earthism, pyramidology, and so on.

All observers should note that if it weren't for the book of Genesis, and the fundamental religious groups behind such laws as Arkansas' Act 590, there would be no "scientific" creationist movement. It is a transparent attempt to inject a particular religious orthodoxy into our schools. I therefore invite the "scientific" creationists who philosophically disagree with biological evolution to teach their point of view in the churches where it belongs and where science does *not* seek equal time.

KEVIN G. SMITH

Houston, Texas

8/82

I would like to get in my two cents worth on the creationist/evolutionist debate. As far as I can tell this is nothing more than a continuation of the efforts of certain factions within Christianity to impose their dogma by the systematic extermination of all opposition. We are, of course, all familiar with the inquisition and the persecution of such pioneering scientists as Bruno and Galileo. What is not well known, however, is some of the history of the early church which indicates that far from being the guardian of learning through the Dark Ages, the church was one of the major causes of their darkness. In the course of preparing a television program on the history of mathematics I came across the following revealing bit of information:

Though the Christian leaders adopted many Greek and Oriental myths and customs... they opposed pagan learning and ridiculed

mathematics, astronomy, and physical science; Christians were forbidden to contaminate themselves with Greek learning. Despite cruel persecution by the Romans, Christianity spread and became so powerful that the emperor Constantine (272-337) was obliged to adopt it as the official religion of the Roman Empire. The Christians were now able to effect even greater destruction of Greek culture... Pagans were attacked and murdered throughout the empire. The fate of Hypatia, an Alexandrian mathematician of note... symbolizes the end of the era. Because she refused to abandon the Greek religion, Christian fanatics seized her in the streets of Alexandria and tore her to pieces.

Greek books were burned by the thousands. In the year that (the Emperor) Theodosius banned the pagan religions, the Christians destroyed the temple of Serapis, which still housed the only extensive collection of Greek works. It is estimated that 300 000 manuscripts were destroyed. Many other works written on parchment were expunged by the Christians so that they could use the parchment for their own writings. In 529 the Eastern Roman emperor Justinian closed all the Greek schools of philosophy, including Plato's Academy."

In other words, the early church enlisted the aid of the state to destroy all opposing beliefs, and all forms of learning which might lead people to question Christian dogma. This seems strikingly parallel to the attempts of modern creationists to enlist the courts in their efforts to eliminate the teaching of evolution. And note: I say eliminate because I, at least, have no doubt that should the creationists be successful in gaining equal time their next step will be to attempt to have the teaching of such sciences as evolution outlawed. Historical Christianity (as distinct from Gnostic Christianity, which the early church also destroyed) can only flourish where there is ignorance. It does not do, for example, to have scholars point out that the myth of Christ is simply a reworked version of the myths of Osiris and Dionysus; or that according to the best empirical estimates the Earth is approximately 4.5 billion years old.

One is tempted to speculate on the reason behind the creationists efforts. Certainly they are committed to their religion; the question is why they cannot relax, enjoy life, and allow others the freedom of their beliefs. If they want their children to learn creation instead of evolution, there are fundamentalist Christian schools avail-





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## letters

able. As far as I can tell, the answer involves the nature of historical Christian dogma and the personality types attracted to it. Historical Christianity is a religion based on guilt, the fear of external damnation, and the idea of vicarious atonement. In psychological terms the terror of sexual guilt centered around the Oedipus complex becomes associated with the external damnation of the soul. This fear and terror is covered by belief in historical Christian dogma which promises absolution via the sacrifice of Jesus. A person possessed by such a belief system (and possession here may be taken in the sense of demonic) will attack anything which tends to throw doubt on his belief. The historical Christian is not able to relax and enjoy life, and to allow others the freedom of different beliefs undermines the rigidity of dogma. As I see it, this is what we dealing with in the creationist/evolutionist debate.

BURTON H. VOORHEES  
Athabasca University  
Edmonton, Alberta, Canada

### Reference

1. M. Kline, *Mathematical Thought from Ancient to Modern Times*. Oxford University Press, New York, 1972.

This is in answer to G. F. Albrecht's scathing attack (July, page 15) on those who cannot accept the theory of evolution as the origin of life. As a Christian, I can accept any method of creation, including evolution, because God can create through any method that He wishes. As a scientist, I cannot accept a theory that proposes, without any experimental verification, that life arose by chance, violating the laws of thermodynamics and the law of probability. Experimental verification of any theory must be provided.

The theory of evolution is a catalog theory in that all evidence is based upon observation, cataloging those observations, then developing a theory to explain the items in the catalog. There is no experimental evidence of one species evolving into a new one by chance; all changes that occur are variations of a theme within a species. A theory that life was created also agrees with the data in the catalog and does not violate physical laws which have been demonstrated to be true.

I am not defending those who call themselves creationists, as many of their positions are non-biblical and serve only to distract from God's plea to us to walk in His way; however, I am a scientist and will oppose vigorously any effort by Albrecht or others to impose their religious position (blind accep-

tance of a theory which has not been experimentally verified) through the use of the scientific organizations to which I belong and pay dues.

There is one aspect of the almost hysterical insistence by the evolutionists that their theory be accepted as fact that greatly concerns me. If evolution is occurring, that implies that some humans are more highly evolved than others. Who are those more highly evolved? How would they arrange society to handle those who are not as highly evolved? Who decides the state of evolution of each individual? A repeat of the historical answers to these questions makes me shudder. I pray that the "reason" that Albrecht wishes to prevail doesn't.

ROBERT L. DUNNING  
Petroleum Sciences, Inc  
Spokane, Washington

8/82

This letter is apropos of the APS stand on creationism and Lincoln Wolfenstein's letter in April (page 95) stating that advocacy of creationism is part of a "well orchestrated anti-intellectual campaign, . . . resembling those of Hitler and Stalin."

As a physicist, my training has not equipped me to decide on the correctness of the theory of evolution. However, in your May issue there was an article reporting evidence which confirms the idea that a large meteorite hitting the Earth caused a major wave of biological extinctions. Recently a book by Francis Crick, a winner of the Nobel Prize in biology for the discovery of the double-helix structure of DNA, proposed that life on Earth originated from a space ship, visiting from somewhere in outer space. There do then appear to be a large number of people, qualifying as "intellectuals," who deviate from the standard (synthetic) theory of evolution which, as I understand it, states that life arose spontaneously in some kind of primeval organic soup and developed into its present form by continuous selection of advantageous mutations. Further I believe that Wolfenstein's characterization of the Bible as "mythical" and his denigration of President Reagan's economic program do not belong in PHYSICS TODAY, which is a journal of physics.

ALVIN RADKOWSKY  
Tel-Aviv University  
Tel-Aviv, Israel

8/82

## Telescope misrepresented

I am writing about an error in the figure caption on page 56 of the June issue.

The fine-error sensor, or star-tracker, of the International Ultraviolet Explorer (IUE) is only sensitive in