

Where Is the Science in Creation Science?

Seven scientists gave evidence in support of so-called creation science at the recent creationism trial in Little Rock; the evidence falls short of expectations

The crux of the recent creationism trial in Little Rock, Arkansas (see *Science*, 1 January, p. 33), was whether so-called creation science is in fact science and not merely religious apologetics. The attorney general, Steve Clark, was defending the Arkansas creationism law, Act 590, against the charge that it violated the constitutional separation of church and state through advancing religion, and a very narrow sect of religion, in the public schools. Clark therefore had the opportunity of parading the top echelons of creation scientists before Judge William Overton and the nation's press.

The defendants' pretrial papers listed 16 potential scientific witnesses, a lineup that would surely have stretched Judge Overton's patience had the state tried to offer them all. In the event, seven took the stand, presumably the best of the best.

Morris and Duane Gish, director and associate director of the Institute for Creation Research. "Creation . . . is inaccessible to the scientific method," asserts Morris in his book *Scientific Creationism*. "It is impossible to devise a scientific experiment to describe the creation process, or even to ascertain whether such a process *can* take place. The Creator does not create at the whim of a scientist."

Gish is equally emphatic in his book *Evolution: the Fossils Say No!* "We do not know how the creator created, what processes He used, for *He used processes which are not now operating anywhere in the natural universe*. This is why we refer to creation as special creation. We cannot discover by scientific investigation anything about the creative processes used by the Creator."

In admitting that creation science is

evolutionary theory, to reduce it to a mere model. For this time-wasting line of inquiry the attorney general and his colleagues received a private scolding from Judge Overton because the status of evolutionary theory was not an issue in the case. Creationism was on trial, not evolution.

A key aspect of the defense's overall case was that a two-model approach was valid. In other words, the only possible explanations of the natural biological world are evolution or creation, as defined in Act 590. This dualism was essential to the legal argument, because it would surely be unconstitutional to present only two of many possibilities. But it was also presented as crucial to the scientific case, because any problems with one "model" could be adduced as support for the other. For instance, the current arguments among evolutionary biologists over the mode of evolutionary change—whether it is gradual or jerky—is a source of succor to creationists.

Scientific discussions among creationists often consist of little more than an enthusiastic exercise of poking holes in the work of evolutionary biologists. Indeed, one of the defense's witnesses, W. Scott Morrow, of Wofford College, South Carolina, characterized creation science as "an accumulation of asserted inconsistencies or insufficiencies in the evolutionary model." The body of data generated by the community of creation scientists to test the notion of creation is woefully thin, presumably for the reasons given earlier.

In addition to the pretrial proclamation that creation science is not science, the defense opened its scientific case with a second distinct disadvantage. Five of its witnesses were members of the Creation Research Society, an organization of scientists with higher degrees based in Ann Arbor, Michigan. In order to become a member of the society the applicant must sign a form, affirming subscription to the following statements.

"1. The Bible is the written Word of God, and because we believe it to be inspired thruout, all of its assertions are historically and scientifically true in all the original autographs. To the students

In admitting that creation science is not a science, Gish and his colleagues are quick to point out that, in their opinion, neither is evolutionary theory scientific.

Witnesses for the plaintiffs and the defendants agreed on one point: that science must be explanatory, tentative, and falsifiable (testable). Even before the first scientific witness for the defense took the stand, the attorney general's case was laboring under a distinct disadvantage. Namely, in their pretrial depositions many creation scientists admitted that what they practiced was not scientific. "No," said Harold Coffin, of the Geoscience Research Institute, Loma Linda University, California, "creation science is not testable scientifically." Asked if creation science was a science, Ariel Roth, of the same institute, replied, "If you want to define 'science' as testable, predictable, I would say no."

In burdening themselves with these admissions, Coffin and Roth were merely following the example of creation science's leading intellectual figures, Henry

not a science, Gish and his colleagues are quick to point out that, in their opinion, neither is evolutionary theory scientific. "Stephen Jay Gould states that creationists claim creation is a scientific theory," wrote Gish in a letter to *Discover* magazine (July 1981). "This is a false accusation. Creationists have repeatedly stated that neither creation nor evolution is a scientific theory (and each is equally religious)."

For this reason, creationist literature, Act 590, and defendants' counsel, avoid the term "theory" in reference to creation and evolution explanations, because of its implied property of testability, tentativeness, and explanation. Instead the vaguer, less rigorous label "model" is used for both. During cross-examination of the plaintiffs' scientific witnesses, defendants' counsel attempted to undermine the scientific basis of

of nature, this means that the account of origins in Genesis is a factual presentation of simple historical truths.

"2. All basic types of living things, including man, were made by direct creative acts of God during Creation Week as described in Genesis. Whatever biological changes have occurred since Creation have accomplished only changes within the original created kinds.

"3. The great Flood described in Genesis, commonly referred to as the Noachian Deluge, was an historical event, worldwide in its extent and effect.

"4. Finally, we are an organization of Christian men of science, who accept Jesus Christ as our Lord and Savior. The account of the special creation of Adam and Eve as one man and one woman, and their subsequent Fall into sin, is the basis for our belief in the necessity of a Savior for all mankind. Therefore, salvation can come only thru accepting Jesus Christ as Savior."

One after another these five witnesses agreed that the work they did and the conclusions they felt able to draw were inspired by these beliefs.

Roth, who is not a member of the Creation Research Society, was offered by counsel as an expert in invertebrate biology. "The creation model fits the data best because there are serious problems with the evolution model," he said. "How do you get to complex organisms by random events? It is difficult to think this would happen without direction."

Roth discussed his own work, on the growth of coral reefs, during his 70-minute testimony. He suggested that if reefs grew faster than people generally believed they do, then the massive reef structures would not need the millions of years' growth period that is currently supposed. This, he said, would be evidence for a young earth.

His cross-examination was swift:

Q. What is the last sentence of your article on the growth of coral reefs?

A. . . . this does not establish rapid growth of coral development.

Q. The most you can say is that nothing precludes rapid growth, isn't that right?

A. Yes.

Q. Is there any evidence that coral reefs were created in recent times?

A. No.

Q. No further questions.

Frederick Campbell, an assistant attorney general, began Coffin's direct examination with an airing of the witness's belief in Biblical literalism. This, apparently, was an attempt to defuse its potential damaging effect in the hands of cross-examining counsel.

Creation science as defined in Act 590: "Creation science" means the scientific evidences for creation and inferences from those evidences. Creation science includes the scientific evidences and related inferences that indicate:

1. Sudden creation of the universe, energy and life from nothing.

2. The insufficiency of mutation and natural selection in bringing about development of all living kinds from a single organism.

3. Changes only within fixed limits of originally created kinds of plants and animals.

4. Separate ancestry for man and apes.

5. Explanation of the earth's geology by catastrophism, including the occurrence of a worldwide flood.

6. A relatively recent inception of the earth and living kinds.

"I have four positive evidences for creation science," he said. "First, the uniqueness of life. We can't define life and no one has created it in the laboratory. Second, the sudden appearance of complex organisms in the Cambrian period. Third, the absence of connecting forms in the fossil record. And fourth, the inability to cause modern animals to change from one type of organism to another, despite multi-million dollar laboratories."

Coffin enlivened the judge's day by offering some photographs in evidence. He showed pictures of a trilobite and an annelid-type worm, both of which were fossilized in the Burgess Shale, a Cambrian sequence from British Columbia, Canada. "The trilobite is a highly complex organism," he said, "and the worm is as complicated as its modern counterparts. There are no ancestors in earlier rocks. These organisms just appear suddenly."

With two further photographs, one of fossil fish and one of coprolite (fossilized feces), Coffin claimed to have evidence for a worldwide flood. "The fish must have been buried quickly," he explained. "It has its mouth open which shows that it must have been suffocating. It must have been buried alive. Many fish fossils have their mouths open." The coprolite was evidence for a deluge, he suggested, "because you could not imagine feces lying undisturbed long enough on the ground to become fossilized." He did not explain how it was

more likely to have remained intact in the face of massive floodwaters.

Coffin's only direct research consists of floating horsetails, a primitive herbaceous plant, in large tanks of water. He wants to test the idea that coal deposits were formed when huge quantities of plant material were swept up in floodwaters and later deposited in one place. "This is a reasonable alternative to the current idea that they were formed over a long period of time by the accumulation of plants growing in swamps," he said. There is evidence of tree trunks oriented vertically in or between coal deposits, Coffin pointed out. "My experiments show that when the horsetails in the tank become water-logged they gradually sink and many are oriented vertically. This is consistent with the flood model," he said.

Cross-examination focused initially on Coffin's scientific credibility.

Q. You have had only two articles in standard scientific journals since getting your Ph.D. in 1955, haven't you?

A. That's correct.

Bruce Ennis, one of the plaintiff's counsel, then turned to the source of Coffin's inspiration.

Q. The Burgess Shale is said to be 500 million years old, but you think it is only 5000 years old, don't you?

A. Yes.

Q. You say that because of information from the scriptures, don't you?

A. Correct.

Q. If you didn't have the Bible you could believe the age of the earth to be many millions of years, couldn't you?

A. Yes, without the Bible.

Q. Creation science is not falsifiable, is it?

A. No, it is in the same category as evolution science.

Q. No further questions.

Wayne Friar is a zoologist at The King's College, Briarcliff Manor, New York, and a member of the Creation Research Society. Although he said his main interest was in biochemical taxonomy of reptiles he devoted most of his testimony to reading from three books on evolution, published in 1929, 1930, and 1953, in which the authors expressed some misgivings about some aspects of evolutionary theory. The only evidence of his own he presented was the observation that the difference in size of red blood cells between various amphibians, reptiles, and mammals does not appear to support a phylogenetic tree as envisioned by evolutionary biologists.

Ennis cross-examined once again, and immediately established that not only had Friar signed the statement of the

Creation Research Society but also signed a similar statement as a condition of employment at The King's College. He also made Friar admit that a considerable amount had happened in the world of biology since 1929 and 1930 and even since 1953 that impinged on evolutionary theory. The books that Friar had referred to were therefore irrelevant.

During his testimony Friar had propounded his "limited change model." In other words, a small degree of evolutionary change is possible, but this is within the limits of "the originally created kinds." ("Kinds," incidentally, is a term that appears in Genesis, in creationist literature, and in Act 590 but not in the scientific literature.) Ennis therefore directed part of his cross-examination to the question of kinds.

Q. How many originally created kinds were there?

A. Let's say 10,000 plus or minus a few thousand.

Q. Some creationists believe kinds to be synonymous with species, some with genera, some with family and some with order, don't they?

A. (Friar began a long dissembling answer which Ennis cut short by repeating the question.)

A. The scientists with whom I am working . . . well. . . . It tends more toward the family. But it may go to order in some cases.

Q. You have been studying turtles for many years, haven't you?

A. Yes.

Q. Is a turtle an originally created kind?

A. I'm working on that.

Q. Are all turtles within the same created kind?

A. That's what I'm working on.

Friar was not alone among the witnesses in being unable to define "kind" or to say how their organisms of study might fit into the concept.

Ennis brought the cross-examination to an end by asking Friar to read a passage from his book *The Case for Creation*. The passage contained the assertion of a separate ancestry for man and apes, based solely on the scriptures.

Q. You believe that the choice between evolution and creation is a matter of faith, don't you?

A. There's certainly an element of faith in it.

Q. Do you recall in your deposition my asking you the following question and your giving the following answer?

Q. You believe the choice between evolution and creation is a matter of faith, don't you?

A. Basically, yes.

Q. No further questions.

Margaret Helder, a botanist from Canada and vice president of the Creation Research Society, followed Friar to the stand. She described evidence on the nuclear structure and biochemical characteristics of green algae which, she suggested, conflicted with the commonly held notion that these organisms were the ancestors of higher plants. In cross-examination Garry Crawford established that Helder had finished professional teaching in 1974, had published one paper in noncreationist literature since 1971, and that she was totally alone in her ideas. He also asked her to recall stating in her deposition that there was no scientific evidence for special creation. She did.

Next to the witness stand was Donald Chittick, a physical chemist from Oregon and a member of the Creation Science Research Society. He covered a wide range of topics in his testimony, including chemical evidence that coal formed rapidly, geophysical evidence that radiometric dating was invalid, geological evidence for a worldwide flood, and physical chemical evidence that the world is only 10,000 years old.

This last point was based on the assertion that as most radioactive decay involves the release of helium (Chittick presumably meant alpha particles), there ought to be far more helium in the atmosphere than in fact there is, if the world is as old as geologists contend. Chittick apparently did not take into account that most atmospheric helium is lost into space because it is so light a gas. His calculation that the amount of helium in the atmosphere shows the earth to be 10,000 years old is therefore invalid.

Crawford did not touch on this point in cross-examination. Instead he immediately established Chittick's lack of credentials in radiometric dating.

Q. You have had no formal course in radiometric dating for 20 years, have you?

A. Not since then.

Q. You have never published an article on radiometric dating, have you?

A. Yes.

Q. You have had only one article in a refereed journal since 1960, isn't that correct?

A. Correct.

Crawford then turned to part of Chittick's direct testimony in which he had referred to scientific papers on radiometric dating that had appeared to be dogged with terrible difficulties.

Q. In fact, the article you referred to was examining the suitability of certain minerals for dating techniques. The au-

Magazine of the People

Short exchange between counsel for the defense and defense witness Harold Coffin of the Geosciences Research Institute, Loma Linda University, California, at the recent creationism trial in Little Rock:

Q. You've had papers published in scientific journals, haven't you?

A. Yes, I have.

Q. Give me an example.

A. *Science* magazine.

Q. That's a kind of *Readers Digest* of science, isn't it?

A. You could say that.

—Roger Lewin

Smithsonian Cuts Up Anthropological Film Unit

A lengthy bureaucratic struggle at the Smithsonian Institution has resulted in a splitting up of its youthful National Human Studies Film Center, an action that many fear will severely hamper the center's filmmaking activities.

The film center was set up 7 years ago by anthropologist E. Richard Sorenson. Sorenson, in a break from traditional anthropology, has pioneered in the use of film as a scientific tool for examining in detail the behavioral patterns of vanishing Third World cultures. The center has also operated an archive which collects and catalogs old as well as new anthropological films. The center, with about seven full-time employees including four filmmakers, has suffered inadequate funding for most of its existence, but Congress has raised the level in the past few years in response to pleas from anthropologist Margaret Mead, who died in 1978. The fiscal 1981 appropriation was \$477,000.

The center is now being divided up, with the archives being turned over to the new Museum of Man, situated in the Museum of Natural History. Two-thirds of the film center's budget is now to go to the archives, leaving the filming unit with the remaining one-third. It will be left with four employees including Sorenson and two filmmakers trained by him, a Tibetan and an Elithian from the Caroline Islands.

thors were not simply applying the techniques so as to date the rocks, were they?

A. Yes, that's right.

Cross-examination ended with Crawford reading a passage from Henry Morris's *Scientific Creationism*:

Q. "...If the Bible is the true word of God, and if Jesus Christ is the omnipotent Creator, then the world was created in six natural days. . . ." Do you agree or disagree with this statement?

A. —long pause—

I agree.

By now the trial was reaching its end, but two witnesses remained, Chandra Wickramasinghe and Robert Gentry, who on the face of it appeared to bear greater academic credentials than their predecessors.

Wickramasinghe, an Indian mathema-

tician, together with the calculation that the probability of the chance assembly of genes for some 2000 enzymes characteristic of life was one in $10^{40,000}$, forced Hoyle and Wickramasinghe to conclude that life must therefore be the product of a Creator.

The Creator, said Wickramasinghe, dispersed microorganisms throughout interstellar space, whereupon they were able to seed planets such as Earth once they had been caught up in the tails of comets. Not only was life seeded in this way, but the only possibility of major evolutionary jumps occurring, he contended, was if new genes rained down on earthly organisms and became incorporated in their genomes. How could genes for great music and great art evolve naturally? he challenged. Impossible. They must have come from space.

tional Laboratory, and a member of the Creation Research Society. He has for years been working on polonium "halos" in granite. These halos are formed through the damage to the rock's crystal structure during radioactive decay of the heavy element. The point about the radioisotope he has been dealing with is that it has a very short half-life, about 3 minutes. It is formed in one of two ways: either in the primordial Big Bang, or as a decay product in the uranium series. Polonium halos are therefore typically found in association with uranium halos, as concentric rings.

Gentry claimed he has found polonium halos in isolation, which means that the polonium must be primordial, which further means that the granite in which it is located must have formed and cooled within minutes, not the millions of years envisaged by contemporary geologists. This, said Gentry, is evidence that the universe was created instantaneously. Related data from coalified wood taken from geological strata said to be millions of years separate in time show, he contended, that all the coal was formed instantaneously. Hence, this is evidence for a worldwide flood, he said.

In 10 minutes of cross-examination Ennis showed that the principal motive for Gentry's work was his literal reading of the Bible—in particular, Genesis. Ennis also established that Gentry had shown poor judgment in using a certain technique in looking for primordial superheavy elements.

Q. You referred to the grant rejection letter of 11 July 1977. Isn't it fair to say that one reason the request was turned down was because the panel felt you were to be faulted for using a technique that was known to give false results?

A. Yes.

Q. And this was not the only time you had to retract results, was it?

A. No.

Q. Did you not invent new alpha activity to explain unusual results and later admit you erred in so doing?

A. Yes.

Ennis closed his cross-examination by asking Gentry if other people working in the field thought that conventional explanations would be found for the anomalous results he had. Gentry said "yes."

The combined testimony of the creationists' scientific witnesses was, it has been acknowledged, not impressive. Anyone who was hoping for a body of science to stand in equal force against conventional evolutionary biology, and the background of geology, chemistry and physics, would have been disappointed.—ROGER LEWIN

Anyone who was hoping for a body of science to stand in equal force against conventional evolutionary biology . . . would have been disappointed.

tician working at the University College of Wales, Cardiff, had been flown in by the attorney general's office to be the star witness. David Williams, deputy attorney general, led the direct examination, and it immediately became obvious that the witness was reading his answers from notes. David Klasfald, one of the counsel for the plaintiffs, leapt to his feet to lodge an objection with the judge. Before Overton had time to rule, Wickramasinghe protested that he never lectured without notes, that he had lectured all over the world during his career, and that he refused to lecture on a technical subject without notes. Overton, in the laconic manner that had marked his handling of the case, waved the witness to continue in any way he pleased. Wickramasinghe did so, delivering a 3-hour lecture on the impossibility of the spontaneous origin of life from nonlife and on the existence of microorganisms and genes in interstellar space.

He and British astronomer Sir Fred Hoyle had come to their extraordinary conclusions after discovering that the absorption spectrum of interstellar dust coincided with that of the gut bacterium *Escherichia coli*. Wickramasinghe also cited a German scientist who claims to have found fossilized microorganisms in fragments of the Murchison meteorite (this has yet to be confirmed in the scientific community). These observa-

Wickramasinghe, who is not a biologist, was extremely dismissive of the brain power of biologists who believe in the power of evolution "to upgrade a bacterium into a man." He was also dismissive of Klasfald's cross-examination. "The cross-examination is at such a low level of questioning," he snapped at the plaintiff's attorney.

Klasfald could have asked Wickramasinghe why he thought it was necessary for the spontaneous origin of life to involve the self assembly of 2000 genes all at the same time in the same place rather than a stepwise aggregating phenomenon, but he didn't. Instead he asked the witness to read a passage from his latest book, *Evolution from Space*, with Fred Hoyle. In the passage, the authors state that it is possible that insects are in fact smarter than humans but are being careful not to let on.

Cross-examination closed with the witness undermining the case of the team who paid his air fare to Little Rock.

Q. Could any rational scientist believe that the earth's geology can be explained by a single catastrophe?

A. No.

Q. Could any rational scientist believe that the earth is less than one million years old?

A. No.

Last on the stand was Robert Gentry, a guest scientist at the Oak Ridge Na-