tween science and government could be clarified if R & D, which is always discussed in tandem, were unlinked. The Reagan Administration is moving toward separating the two by insisting that the private sector fund a larger share of development costs for civilian applications, Bromley noted. Basic research has traditionally been a public responsibility, but Bromley suspects that basic research could get lost in the funding shuffle. Therefore, he said, "it remains essential that R & D be separated and that basic research be discussed on its own merits as an investment in both the short- and the long-term future of this country."

• This year's AAAS meeting is the last that will be held in midwinter for the foreseeable future. The 1983 Detroit meeting is scheduled for 26 to 31 May, going through the Memorial Day weekend. The three subsequent meetings—to be held in New York, Los Angeles, and Philadelphia—are also scheduled around Memorial Day.

The decision to move to the spring was apparently clinched by last year's meeting in Toronto, which was held during a period of unusual cold when both temperatures and attendance hit uncomfortable lows. But a search for an optimal time for the meeting has been going on for years.

Winter meetings have been customary for AAAS since World War II. Until 1972, the week between Christmas and New Year's was a fixture, but disgruntlement over interruption of the holidays caused a move to later winter dates and then, recently, a compromise on the first week in January.

A prime consideration for schedulers of big meetings is to find a time when downtown hotels have rooms available at favorable rates. Memorial Day weekend is one of the dead spots for the urban hotel trade and seems to fit in well with academic schedules. The AAAS will, therefore, be assembling around Memorial Day at least through 1986.

—JOHN WALSH

Judge's Ruling Hits Hard at Creationism

The anxiously awaited decision in the recent Arkansas trial declares creation science to be religion, not science

No one was surprised that Judge William Overton ruled Arkansas' Balanced Treatment Act to be a violation of the constitutional separation of church and state. The scientific community was confident that creation science would be shown to be religion, not science. And the creationists considered the statute to have been inadequately defended and the case presided over by a biased judge.

There was some surprise, however, at the force of the judge's ruling. Overton could have ruled the law to violate the separation clause of the First Amendment on any one of three basic provisions. In the event he judged the law to contravene all three, and his analysis of each of these points is written in such careful terms that attorney general Steve Clark can have little room for appeal. The scope and power of the decision will have crucial influence in the trial of a similar law later this year in Louisiana, even though the judgment sets no binding precedent in that state.

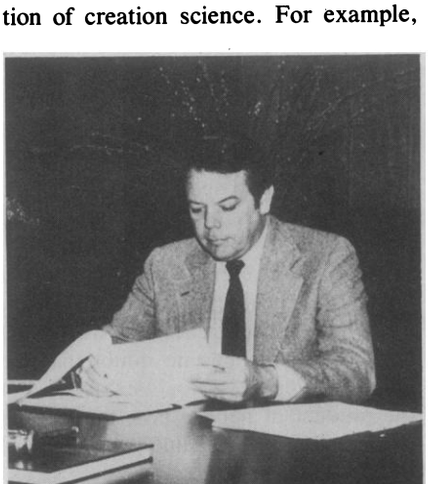
The legal test of the separation clause has been refined over the years, and the most recent formulation derives from a case in 1971, *Lemon* v. *Kurtzman*. For a statute to be constitutional, it must fulfill three provisions: "First, the statute must have a secular legislative purpose; second, its principal or primary purpose must be one that neither advances nor inhibits religion . . . ; finally, the statute must not foster an excessive governmental entanglement with religion." A statute that fails on any of these must be judged unconstitutional.

In evaluating the legislative purpose of the act Overton traced the history of the bill's passage and the motives of those involved. First, he showed that the creationist movement is closely identified with the Fundamentalist view of the origins of the earth and life: "belief in the inerrancy of the Genesis story of creation and of a worldwide flood as fact. . . ." Second, he cited subpoenaed correspondence of the bill's author, Paul Ellwanger of Anderson, South Carolina, to show that the prime motive in promulgating the bill was the promotion of Christianity. And third, he concluded that those involved in finding a sponsor for the bill were motivated by religious concerns, as was the senator who introduced the measure into the state legislature.

"The state failed to produce any evidence which would warrant an inference or conclusion that at any point in the process anyone considered the legitimate educational value of the act," writes Overton. "The only inference which can be drawn from these circumstances is that the Act was passed with the specific purpose by the General Assembly of advancing religion."

During the 9-day trial, the defense argued that the Act should be judged on what it says, not on the motives of those who were responsible for it. Even if this were the case, observed Overton, the Act fails on this count too.

"Both the concepts and wording . . . convey an inescapable religiosity," Overton said in reference to the definition of creation science. For example,



Wide World

Judge William Overton

the phrase, "Sudden creation of the universe, energy, and life from nothing," are "not merely similar to the literal interpretation of Genesis; they are identical and parallel to no other story of creation," Overton concluded.

According to this conclusion, "a major effect of the Act is the advancement of particular religious beliefs." In order

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that a statute be judged unconstitutional on this second prong of the three-pronged test it has to be demonstrated that advancement of religion is the primary effect of the act. In other words, if creation science were judged to be science, then the act would not fall on this test. Overton devotes 13 pages of his 38-page decision to demonstrating that, in his opinion, creation science is not science.

The definition of creation science presented in the act has six parts. The first refers to the sudden origin of the universe, energy, and life. "Such a concept is not science because it depends upon a supernatural intervention which is not guided by natural law," Overton writes. "It is not explanatory by reference to natural law, is not testable and is not falsifiable." The decision states that if the "Unifying idea of supernatural creation by God is removed [from this item], the remaining parts [of the definition] explain nothing and are meaningless assertions."

The second part of the definition relates to the "insufficiency of mutation and natural selection in bringing about development of all living kinds from a single organism." This, according to the opinion, "is an incomplete negative generalization directed at the theory of evolution."

Section three refers to "changes only within fixed limits of originally created kinds of plants and animals." This is not science, says Overton, because no one is able to define "kind" and there is no rational explanation of the limits mentioned.

Section four describes "separate ancestry of man and apes." This is "a bald assertion" which "explains nothing and refers to no scientific theory or fact."

Section five refers to "explanation of the earth's geology by catastrophism, including the occurrence of a worldwide flood." Overton has no doubt that the flood mentioned is Noah's: "[it] is not the product of natural law, nor can its occurrence be explained by natural law."

The last section, which claims a "relatively recent inception of the earth and living kinds," is dismissed as having no scientific meaning. "It can only be given meaning by reference to creationist writings which place the age at between 6,000 and 20,000 years because of the genealogy of the Old Testament," states Overton.

Creation science not only does not fit the definition of scientific theory, Overton says, but it also "fails to fit the more

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Goyan Sees Risks in Academic Drug Ventures

"Universities ought to stay the hell out of those enterprises," said Jere Goyan, the former commissioner of the Food and Drug Administration (FDA), speaking of the fad in academia to create quasi-commercial institutions to develop new products using the technology of gene splicing.

Goyan, who headed the FDA in the last days of the Carter Administration, is now dean of the School of Pharmacy at the University of California at San Francisco. He spoke on 6 January at the AAAS meeting on the probable impact of federal regulation on new drugs produced by genetic manipulation.

These drugs will present many of the same regulatory dilemmas that conventional drugs do, Goyan said. But they may present one new problem as well. If the universities become heavily involved in patenting and exploiting this technology, they will forfeit their role as independent advisers.

According to Goyan, academic pharmacologists already tend to identify with the drug industry's point of view. It will be far more difficult to find independent reviewers if universities have a financial stake in drugs proposed for licensing. "We must not forget that universities are bureaucracies, too," Goyan said. It could become difficult for academics to speak frankly about a proposal in which the university has invested its name or its capital. The FDA, which relies on outside expertise in making licensing decisions, may have trouble finding consultants who do not have a conflict of interest, he predicted.

On a separate subject, Goyan said that he was very discouraged by the FDA's recent decision to scrap an experiment intended to help educate the public about drug use. On 22 December, the FDA announced that it would not carry out a pilot project requiring manufacturers of ten high-risk drugs to include leaflets known as patient package inserts (PPI's) along with prescriptions. The leaflets would have provided basic information about the drug's uses, side effects, and limitations. The FDA's original plan was to require PPI's in every drug package. When he was FDA commissioner, Goyan encountered strong opposition to the plan from drug manufacturers, doctors, and pharmacists. As a compromise, he adopted a pilot program that would have required that the PPI's be used only for ten drugs. Among those included were an ulcer drug, an antibiotic, pain-killers such as Darvon, and tranquilizers such as Valium.

In canceling the pilot program, Goyan said, the FDA has surrendered abjectly to pressure from the drug and medical lobbies. He was particularly discouraged by the opposition of his professional peers, the pharmacists. Goyan had hoped that they would side with the consumers in this case, asserting their independence from the drug producers. Goyan expects that the voluntary patient education programs which will be substituted for the PPI program will fade away without having much impact.

—Eliot Marshall

Ethicist Approves Test-Tube Baby Research

A Georgetown University ethicist thinks there is no reason not to go ahead with research on human in vitro fertilization and embryo transfer to the mother's womb.

LeRoy Walters, director of the Center for Bioethics at the Kennedy Institute of Ethics, told a symposium at the AAAS meeting that he did not see any ethical problems with the procedure. First of all, he said that in its clinical application "there is no need for a consensus on the moral status of the early embryo" because no normal fertilized embryos are discarded in either of the two existing approaches that have been used. "The only morally relevant difference between in vivo and in vitro methods is that in the laboratory the clinician can examine each early embryo for abnormal development." He said that a decision not to transfer a grossly abnormal embryo "is not qualitatively different from a decision not to employ extraordinary means to prolong the life of a newborn infant" with serious birth defects.

Walters identified two other primary ethical issues: the risks of the proce-

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general descriptions of 'what scientists think' and 'what scientists do.' " He points out that no reputable scientific journal has published an article espousing creation science as described in the act. "Some of the State's witnesses suggested that the scientific community was 'close-minded' on the subject of creationism and that explained the lack of acceptance of the creation science arguments," writes Overton. "Yet no witness produced a scientific article for which publication had been refused."

The decision refers to creationist literature, specifically to Henry Morris's and Duane Gish's, which states baldly the nonscientific nature of creation science (usually in the context of saying that neither is evolutionary theory science). These writings admit the supernatural element of a creation explanation of origins. "A theory that is by its own terms dogmatic, absolutist and never subject to revision," concludes Overton, "is not a scientific theory."

Because the teaching of creation science would advance religion, and because it is in fact not science, the Balanced Treatment Act fails on the second of the three First Amendment tests.

> "The application and content of First Amendment principles are not determined by public opinion polls or by a majority vote."

The third test concerns entanglement of the state in religion. "Involvement of the State in screening texts for impermissible religious references will require State officials to make delicate religious judgments," writes Overton. "The need to monitor classroom discussion in order to uphold the Act's prohibition against religious instruction will necessarily involve administration in questions concerning religion." The act therefore fails on the third test.

When the American Civil Liberties Union (ACLU) filed suit on behalf of 23 plaintiffs on 27 May 1981, it challenged the Balanced Treatment law on three grounds: separation of church and state; academic freedom; and vagueness. As he upheld the complaint on the first ground, Overton said he had no need to make legal conclusions on the other two. He did indicate, however, that implementation of the act would produce serious educational problems.

The judge's decision picks for comment two points made by the defendants. The first concerns the assertion that evolution too is a religion, and therefore should be balanced by creationism. The second refers to the recently demonstrated wish of a majority of people that creationism be taught in public schools alongside evolution.

The attorney general had argued that as evolution was considered by some to be religious, then students' free exercise rights were being violated, a situation that could be redressed by the concurrent teaching of creation science. The argument derives from an article by leading creationist lawyer, Wendell Bird, published in *The Yale Law Journal* in 1978. Overton describes the article, which is the foundation of much of the creationists' legal claims, as "a student note" which has "no legal merit."

In his testimony for the defense, Larry Parker had said that "the public school's curriculum should reflect the subjects the public wants taught in schools." He went on to cite the opinion polls that indicate that 75 percent of the public think both creation science and evolution should be taught in schools. "The application and content of First Amendment principles are not determined by public opinion polls or by a majority vote," writes Overton. "Whether the proponents of Act 590 constitute the majority or minority is quite irrelevant under a constitutional system of government."

Overton closed his decision by stating that "No group, no matter how large or small, may use the organs of government, of which the public schools are the most conspicuous and influential, to foist its religious beliefs on others."

The attorney general now has until 4 February in which to appeal. Throughout, he has insisted he would appeal if he lost, as did the ACLU. His decision, however, rests on political rather than legal merits. Given the defense he mustered at the trial, and the tightness of the decision against him, the chances of overturning Overton's ruling in a higher court are slim. Clark's recent announcement that he will run for a third term as attorney general is more decisive. Will he do better to try valiantly once more to uphold the honor of the state, or advise that enough of the state's tax money has been spent on an indefensible law that some see as bringing ridicule to Arkansas? He will probably not appeal.

Overton's decision is legally binding only in Arkansas, though it could become the law of the land if it were appealed and upheld in both the circuit courts of appeal and the Supreme Court. Nevertheless, according to Jack Novik, one of the ACLU lawyers in the Arkansas case, the opinion is so cogently argued against the Arkansas statute that its effects will be far reaching. "You cannot modify the language of this law to make the teaching of creationism legally acceptable in science class," he says. "The judge ruled that creation science as revealed by its literature is not science. This is not a semantic issue."

The next creationism law to go before the courts is Louisiana's, some time in the summer. The definition of creation science in this law is much less specific than in Arkansas', simply stating that "Creation science means the scientific evidences for creation and inferences from those scientific evidences." Novik's suggestion that no matter what the wording is, creation science cannot be interpreted as science will therefore be put to the test in a Louisiana court. He will be leading the ACLU's case there.

On the other side will be Wendell Bird, general counsel of the Institute for Creation Research (ICR). "The Arkansas decision," he says, "is constitutionally erroneous and factually inaccurate." Bird is confident that "stronger evidence will be presented to a Louisiana judge" and that the law there will be upheld.

Meanwhile, many leading creationists admit that the Arkansas decision has a somewhat dampening effect on their cause, but all insist that it will stir members and sympathizers to even greater action. "A lot of people are indignant about the unfairness of the decision," says Morris, director of ICR. Although Ellwanger is determined not to be deflected from his efforts to have creationism bills introduced into many more legislatures, Luther Sunderland, an independent creationist, implies that a change in tactics is required.

"Teachers are naturally suspicious of being told what they must teach," says Sunderland. "It would be better if school libraries were required to have a selection of creation science books, so that teachers could see that there is nothing to fear." Like Morris and Gish, Sunderland believes the most effective way of getting creationism into the schools is through action at the local school board level. Such an approach would be far more difficult for the ACLU, or any other national body, to combat.

—ROGER LEWIN