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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dure to the potential offspring, and the problem of allocation of scarce health care resources. He concluded that the procedures do not pose "unreasonable risk"; as for resources, he predicted that costs would decline as the success rate of the procedure continued to improve and contended that "a strong equity argument can be mounted" for making the service available to all infertile couples "at least in countries where other basic health-care needs have been met."

Walters concluded that in view of the "convincing arguments for the ethical acceptability" of research on in vitro fertilization, the Department of Health and Human Services (HHS) should at least evaluate the desirability of supporting clinical trials. The HHS has been avoiding the subject, although it has been funding studies of in vitro fertilization in rodents, rabbits, cows, and primates.

—Constance Holden

CIA Director Warns Scientists

Admiral Bobby R. Inman, deputy director of the Central Intelligence Agency and past director of the National Security Agency, warned scientists at the AAAS meeting that Congress is ready to move to resolve the conflict between academic freedom and national security in favor of the latter. "I think the tides are moving and they're moving fast toward legislative solutions. There will be pressure for legislation to stop the hemorrhage of the nation's technologies," he said.

Speaking at a symposium on Striking a Balance: Scientific Freedom and National Security, Inman declined to elaborate on his warnings, saying that much of his information is classified. But he stressed that it would be in scientists' own best interests to recognize the mood of Congress and to voluntarily cooperate with the intelligence agencies. Although many scientists fear that by cooperating they will be forfeiting their academic freedom, Inman predicted that far more serious threats to academic freedom could occur if scientists refuse to cooperate. Once it becomes clear that certain publications have harmed national security, Inman said, the situation "could well cause the federal government to overreact."

Admiral Bobby R. Inman

The NSA is particularly concerned about the publication of new results in cryptography which could inadvertently compromise this nation's codes or its abilities to break the codes of other nations. As a result of Inman's suggestion several years ago that academic scientists and the NSA talk about their respective concerns regarding cryptography research, a Public Cryptography Study Group was formed and, last year, recommended that researchers voluntarily submit research papers on cryptography to the NSA for prepublication review. Inman praised that recommendation and said that of the 25 papers that have already been sent to the agency for review, none "has yet raised security concerns."

Some critics of the Public Cryptography Study Group's recommendations have argued that the NSA has not made its case that national security could be endangered by the open publication of certain results in cryptography. "This reasoning," Inman said, "is circular and unreasonable. The specific details of why information must be protected are often even more damaging than the information itself."

Inman questioned the depth of feeling among scientists that they should have absolute freedom to publish. "Scientists' blanket claims of freedom are somewhat disingenuous in light of arrangements made with corporate concerns. There is no problem with holding back research for trade secret reasons. This attitude is based largely on the fact that the federal government rather than corporations is the source of the restrictions. This assumes that corporate interests are at a higher level than national security concerns. I could not disagree more," he said.

In the next few months, Inman said, Congress will be addressing the issue of technology transfer. Of central importance, he remarked, is the fact that "In the build up of Soviet defense capabilities, which has gone on steadily since 1964, the bulk of the technology they used has been acquired from the United States or its closest allies." When Congress looks into this situation, Inman predicts, "It is inescapable that there will be questions of export controls and of whether additional legislation is necessary."

But Inman does not believe that basic research need be suppressed. "I have a personal persuasion that basic research has caused minimal worries for national security. It is the application of that research and studies of how to apply it that cause concern," he said.***—Gina Kolata***

Scientists Honored for Freedom and Responsibility

Four scientists were given the AAAS's first award for Scientific Freedom and Responsibility at the annual meeting this month. A $2000 prize was divided equally among the four.

Morris Baslow, a marine biologist, was honored for publicizing research findings about the possible adverse impact on Hudson River life of power plant operations. For this he was discharged by his employer (*Science*, 14 November 1980, p. 749). Other award winners were Stanford biochemist Paul Berg; Maxine Singer, biochemist at the National Institutes of Health; and Norton Zinder, geneticist at Rockefeller University. The three were cited for their leadership in the recombinant DNA debate. Berg led the group that called for the 1974 moratorium on research; Singer organized the Asilomar conference that led to the formulation of NIH guidelines, and Zinder was a leader in developing gene-splicing techniques as well as in bringing the issues to public attention.***—Constance Holden***