have an inbred distrust of the scientific judgment of men who are not themselves in the laboratory. But it has a certain appeal to government officials, who are looking for administrative efficiency, coordination, and research that bears on targeted projects.

The source of all this concern over peer review is an eight-page document from the OMB that, after a précis of the system as it works at NIH and at the National Institute of Mental Health, lists eight "problems with the peer review system." Among them are the following:

- The process is largely reactive to the initiative, interests, or whims of individual researchers and therefore is not readily compatible with targeted or directed research to achieve specific national objectives.
- The participatory process produces a large clientele group that has a personal interest in the continuation of the process and the increase of appropriations at its disposal.
- The system currently operates largely independently of administrative direction for the allocation of research funds.
- Because it uses subjective measures of judgment, and thereby defines "scientific merit or quality" for itself, the system is not subject to objective measures of assessment.

Efforts to avert any potential OMB moves to significantly change, or even abolish, the system have taken different forms. The council of the Institute of Medicine, National Academy of Sciences, at its May meeting, urged institute president John R. Hogness and academy president Philip Handler to seek a meeting with Weinberger and Edwards. At the meeting, which took place on 21 May, they discussed both the question of greater staff review of grants and the matter of greater peer review of contracts in what has been described as "cordial terms."

On Capitol Hill, plans are under way to introduce legislation that would make peer review a mandatory rather than discretionary process. Speaking to a packed auditorium of NIH employees recently, Senator Edward M. Kennedy (D–Mass.) said he plans to introduce such a bill within days.

—BARBARA J. CULLITON

Oceanography: Albatross of Diplomacy Haunts Seafaring Scientists

If present trends in international negotiations preliminary to the 1974 Law of the Sea Conference continue, the United States ocean science establishment, as well as those in the United Kingdom, the Soviet Union, and other advanced nations, could become ensnared in red tape, slowed down or even, in the words of one expert, "killed" in the next few years.

In their fear of rich, technologically elite countries, some developing countries, during preparatory meetings, are seeking limits on ocean research because they want access to any goodies the scientists might discover as they cruise around the globe taking their measurements and samples. The fear is based on the fact that those nations with an oceanographic capability—the United States, the Soviet Union, and the United Kingdom—also have the power to exploit any resources they might discover. The United States is arguing that everyone should be permitted to do research, and make the results available to everyone else.

Two trends in the negotiations threaten the future of ocean research. One is the trend in developing countries to declare all activities within 200 miles of their coastlines subject to regulation by them. The 200-mile band includes portions of the continental shelf that are of great interest to physical and biological marine science, but it can also include oil, gas, and other wealth-producing sunken treasures. On the old axiom that "science-leads-to-knowledge-leads-to-wealth," these governments prefer to keep the scientists —and all potential exploiters such as foreign oil companies—ignorant of what is off their coasts. Fear of economic exploitation, then, is the powerful motive for curbing ocean research. One prominent scientist, citing the restrictions already enforced by Brazil and some other Latin American countries said, "there isn't any science going on off South America anymore."

The second tendency is a growing consensus that some sort of international organization should be established to oversee activities on the high seas, those waters beyond any national jurisdiction. Such a group could be empowered by the 1974 Law of the Sea Conference to claim royalties from seabed mining of manganese nodules (*Science*, 25 May), for example, or manage other resources. The suggestion has been made that it also license ocean research vessels. William Nierenberg, director of the Scripps Institution of Oceanography, fears international licensing may wreck science. "It's not like peer review. Licenses would be made on the basis of political considerations, on which nation should get any resources they might find . . . you would open up a whole Pandora's box."

The United States has adopted the oceanographic community's advocacy of freedom of research, which they define as the right of research vessels to operate anywhere in the world, whether offshore or on the high seas, so long as the findings are nonproprietary commercially and are unclassified in the military sense. Although this position has the blessing of the International Council of Scientific Unions (ICSU), the National Academy of Sciences (NAS), the National Science Foundation (NSF), and other groups, the scientists' lobby remains rather weak and flimsy. Compared to those of interest groups —oil, mining, defense, fisheries and others—who want to keep their particular planks afloat in the overall U.S. position, arguments that the advance of knowledge will be hindered, or that we will know less about plate tectonics, or the history of the planet, carry relatively little weight. Roger Revelle, a long-term fighter in the cause for international ocean research and director of the Harvard Center for Population Studies says, "The scientists don't have any clout. They don't represent any economic or national security interests. They are a weak group politically and haven't been successful in developing a constituency. So their interests are

liable to be sacrificed." Thus, the cause of open scientific research could also be traded off in the internal bargaining among U.S. interests.

Authorities such as Warren Wooster, of Scripps Institution of Oceanography, say that the scientists' lobby internationally has its failings but points out that it is now better organized than it was a few years ago. Charles Maechling, now special assistant to the director of the NSF, was a participant in constructing the U.S. 1970 draft international treaty, which remains the basic U.S. policy document on oceans issues. Maechling recalls that in 1970 the scientific research freedoms were to be swept in only under a very general clause guaranteeing noninterference for a vaguely defined group of activities in coastal waters. Seeking to raise the profile of the issue, NSF and others got an additional, specific clause dealing with research included.

Since 1970, however, the scientific lobby effort has grown dramatically. The NAS Ocean Affairs Board, which had been practically the only government science group alert to the threat, appointed a special task force to deal with the forthcoming Law of the Sea Conference (members will go to Geneva this July), headed by William Burke of the University of Washington Law School. Last summer ICSU passed, at the urging of the United States delegation, a resolution defining and advocating freedom of ocean research (scientists from developing countries offered, apparently, little comment). Finally, the oceanographic "big shots" became sufficiently alert to the need for public relations that, on 3 April, Paul Fye, Director of the Woods Hole Oceanographic Institution, arranged to have his advanced ocean research vessel *Knorr* moored off a dock in New York, near the United Nations. Delegates to the oceans sessions from all countries, and their families, were invited for guided tours and drinks.

Nonetheless, despite this sophisticated sell, there are those who still think much more must be done. Chaired by Nierenberg, the National Advisory Committee on Oceans and Atmosphere (NACOA) in its report last June roundly chastised the government and some international oceans groups for not having helped the developing countries' own technical and scientific research capabilities; assistance could ease their fears of usurpation.

They transfer this concern of usurpation to research as well, believing that their poor or nonexistent research capabilities put them at a gross disadvantage in obtaining their share of the resources. This could bring major oceanic development to a halt if such fears are translated into conventions restricting research on the open seas.

NACOA rebuked the International Oceanographic Commission for having become "a political forum" instead of a center of international expertise; it reprimanded the Agency for International Development for virtually eliminating technical assistance in oceans and marine science. The State Department's officer for dealing with worldwide oceans research and management, the coordinator of ocean affairs, needed more money and men, NACOA said. Finally, the sea grant program of the National Oceanic and Atmospheric Administration is an ideal candidate for exporting general expertise about ocean resources, NACOA said. The pointed chapter of NACOA's report was the work of Nierenberg and some of the other prominent scientists. If there is a lesson in NACOA's rebukes of myriad government agencies, it is that convincing a handful of key scientists of a problem is a far cry from prodding policy changes from Uncle Sam.

Although the stakes in the fight for freedom of ocean research appear grandiose, at the moment they seem to boil down to the humbler issue of scientific salesmanship. The problems of Nier-

Colleges Sue for Release of Funds

The National Association of State Universities and Land-Grant Colleges (NASULGC), encouraged by the success of several recent anti-impoundment lawsuits, announced on 23 May that it has filed one of its own in the Federal District Court of the District of Columbia.

The purpose of the suit is to gain release of $10 million appropriated by Congress under the Bankhead-Jones Act. The money is for formula-based grants to land-grant institutions for support of instruction and purchase of instructional materials. Loss of the money, says NASULGC, would mean the loss of some 1500 faculty positions and the denial of admission to 20,000 students in the 71 participating institutions. The Administration maintains that the program is marginal as a source of revenue for these schools and is "outdated."

The NASULGC did not dally in arriving at the decision to sue. The organization's associate director Christian K. Arnold had been thinking about it (*Science*, 27 April), and the decision was made at the NASULGC executive committee meeting in early May.

Arnold says NASULGC was encouraged by the success of a half-dozen court cases, one of which resulted in the release of $25 million intended for recruitment of educationally disadvantaged Vietnam veterans.

Ironically, says Arnold, Supreme Court justice William Rehnquist, a Nixon appointee, paved the way for such decisions in a 1969 memorandum in which he said the Administration had no legal means for impounding funds for formula-based programs—the kind the government has no discretionary responsibility in allocating.

Arnold believes a favorable ruling on the Bankhead-Jones appropriation will set a strong precedent in efforts to outlaw presidential impoundments of appropriations for formula-based programs. The government has not appealed any court impoundment decisions, says Arnold, because it is afraid of being further thwarted by stronger and broader rulings from courts of appeal.

The NASULGC move is part of a trend that is gaining momentum. Members of Congress are getting fed up with having their legislative intentions thrown out the window via presidential impoundments. This year's authorization bill for the National Science Foundation, for example, specifically prohibits selective impoundments. And the House and Senate are now considering bills that would put limitations on the President's impoundment powers.—C.H.

enberg, Fye, Burke, Wooster, John Knauss of the University of Rhode Island, and others to persuade the U.S. delegation and the 130-odd member nations of the United Nations that oceanography is worth preserving are not unlike the tedium faced by encyclopedia salesmen. For just as an encyclopedia salesman avoids suspicious looking houses on the block, the science lobby must avoid several pitfalls. The Russians, for example, have a big ocean research program, but will not wholeheartedly support the open research plank in the U.S. position, because they seek to identify with developing countries. The Defense Department also, because it must be able to continue its classified work of snooping and listening in all parts of the ocean, has interests almost directly opposed to those of the scientists. And these are only a few examples.

As to whether the lobby group can successfully navigate these, opinions at the moment are pessimistic. Fye pointed optimistically to last year's cruise along the west coast of Africa by a Woods Hole vessel. "We had the effective participation of all the African nations except one," he said. "The most important concern is for the nations themselves," he added. But Wooster was more gloomy. He pointed to the inertia of some European scientists who are unaffected by the

Physicians Who Falsify Drug Data

Among the many technical problems that entrammel the testing of new drugs, there is a simpler failing that enters in perhaps more often than might be expected—cupidity. Doctors in charge of investigating new drugs turn in fictitious data to the sponsoring drug companies and pocket the fees for studies they never conducted.

How often this happens is hard to say, except that probably only the outstandingly careless get caught. The problem is sufficiently serious that in 1967 the Food and Drug Administration set up a six-man Scientific Investigations Group headed by Frances O. Kelsey, the medical officer who prevented thalidomide from being marketed in the United States. Of the 50 or so physicians investigated by the Kelsey unit and its predecessor, 16 have been found to have supplied false data on drugs to the sponsoring companies and the government.

The erring physicians are usually no more than blacklisted by the FDA from testing further new drugs. Occasionally criminal proceedings are brought. Last month, a Louisiana grand jury indicted an associate professor of medicine at Tulane University, Wallace Rubin, for having submitted false reports on two drugs to two drug companies. FDA officials allege that the two drugs were apparently given to the same patients on the same days, in such a manner as to suggest that either one or both of the reports were fabricated.

Drug testing is a lucrative business. A sophisticated study of two dozen patients for 2 weeks may net an investigator $6500. If the investigator should elect to submit the same data to another sponsor, he will receive $13,000 for his 2 weeks' work. Several clinical investigators are known to gross more than $1 million a year from their testing programs.

Incentives of this order lead some physicians to take shortcuts. Sometimes data are fabricated from start to finish. "When our pharmacologists read reports concerning the negative findings in rat gall bladders and the testes of female animals, we are tempted to believe the investigator is cutting some corners," says Alan B. Lisook, the medical officer with the Scientific Investigations Group.

On one occasion the group's pharmacologist requested an investigator's slides for review and found he was able to assemble them in such a way as to represent serial sections of the liver of a single animal. Similar economy was attained by an investigator who applied to the FDA for permission to conduct clinical trials and was found to have performed all his preclinical work in a single animal—a rabbit, which, according to Lisook, went under the name of Ebenezer.

The Kelsey group has sometimes found paroled inmates and discharged mental patients reported as being treated in situ for weeks after their release. Concerned with the ethics as well as the validity of drug data, the group has uncovered consent forms of senile patients signed "X-(her mark)" and even some forms executed posthumously. On one occasion, the group questioned a set of women patients on their understanding of the consent forms they had signed and found the patients were not fully aware that they were even participating in an experiment.

Instances of outright fraud are less common than failure to keep proper records, excessive delegation of authority, and other administrative failings. The group's general criteria for investigating investigators are if a physician's data are of unique importance to the status of a new drug or if he has conducted an unusually large number of investigations on a wide variety of drugs. When an investigator is delisted, all drug companies who have ever used him are required to provide independent corroboration of his data, if the data are crucial to the standing of a drug.

In most cases of outright fraud, the investigator is deceiving both the sponsoring drug company and the government. Do investigators and drug companies ever collude to deceive the government? "There are companies who are not above hiring investigators who will give them the results they desire," Lisook believes. "This happens, but it is something you cannot prove beyond a reasonable doubt," says FDA attorney Eugene Pfeifer.

The Scientific Investigations Group has recently started a new program in which, instead of checking on individual investigators, they study the records supporting the introduction of new drugs onto the market. At the last count, 25 such studies had been completed, of which no fewer than five, or 20 percent, have uncovered matters sufficiently wrong to require official action, whether a reprimand or the barring of the physician from further investigations. Most of the cases involved failure to keep or provide complete records, rather than demonstrable wrongdoing.

The FDA is not unkind to those it catches fudging data. Last month's indictment is only the second that has ever been brought. And four of the 16 investigators barred from testing new drugs have been allowed back on the list.—N.W.

whole thing and are staying out of the fight, and to the awkward situation that scientists from developing nations, who are often paid by their governments, are in. "I'm afraid we're going to lose the whole bit. We haven't really been able to convince the developing countries that they will benefit from the research." A veteran international observer is also pessimistic: "Scientists . . . like Revelle and Fye . . . are well received wherever they go. But they don't understand that the legal adviser to the foreign ministry of the Cameroons can make one speech in the United Nations and wipe out that goodwill."

In one sense, then, the scientists' reaction to what appears to be a world wide jeopardy to future ocean research boils down to a fundamental problem of science and scientists. Thus, when the heat is on and grave matters of state hang in the balance, and the scientist is called in to explain what he can do to help, he really cannot promise anything. He can't promise that he will make his, or any other country any richer, nor can he revolutionize its system of military defenses. Backed to the wall, all he can say is that more research will lead to more knowledge and that it is a good thing. Nothing more. Philip Handler, President of NAS, who has become active in the fight to preserve ocean research freedoms, took exactly that line in a speech to probably his most sensitive forum, the United Nations Seabeds Committee, which deals with ocean research, last March. Addressing the delegates, many of whose governments feel uneasy about having American scientific ships moving in their waters, Handler said: "Some of the information of marine science may eventually become of some economic significance," such as the distribution of mineral ores and the occurrence of earthquakes and volcanoes. But it was "up to others" to decide on the economic consequences. "The primary purpose of the marine geologist . . . is better understanding of the recent geological history of the earth." Regulation, he warned, could result in "stifling of scientific creativity," and the danger of "second class research." Ultimately, he warned, through pursuing "short term goals" in science, "we may lose the unique scholar driven by his own curiosity. . . . I submit that mankind cannot afford such a loss."

The delegates from Latin America, Asia and Africa who heard this may be pardoned if they regarded it as a modern equivalent of the white man's burden.

—DEBORAH SHAPLEY

Land Use Control: Rockefeller Task Force Calls for Boldness

At a conference on 24 May, a task force on land use and urban growth sponsored by the Rockefeller Brothers Fund presented what the chairman of the Council on Environmental Quality, Russell E. Train, described as a "seminal report."* Although many reports so described are soon forgotten, Train is not the only knowledgeable observer who believes that public interest in land use problems is now such that any good ideas offered about this complex issue may fall on fallow ground.

In congressional testimony 2 years earlier, Train had observed that, of the various problems bearing upon environmental deterioration, the "single most important . . . remain[ing] substantially unaddressed as a matter of national policy" was that of land use. What Train meant was this: During the 1960's the federal and state governments had finally begun to respond in a serious way to the problems of air and water pollution, but, with few significant exceptions, this was not true of the equally troublesome and vastly more complex matter of preventing abuse of land and encouraging enlightened land development practices.

Even land use questions of obvious regional, statewide, and sometimes national consequence were being treated as largely a responsibility of local government. Furthermore, many of the problems of air and water pollution to which the federal and state governments were addressing themselves could not be overcome in the absence of national and state land use policies. Note, for instance, the effect freeway construction can have on urban air quality.

It was 2 years ago that the Nixon Administration first presented its proposed national land use policy legislation. This was a measure to have the states establish programs of state and local regulation aimed chiefly at preventing misuse of areas of "critical state concern" (such as important wetlands), ensuring the proper placement of major facilities (such as airports or highway interchanges) and compatible use of the surrounding land, and ensuring that facilities needed within a region (such as low-income housing) are not excluded by discriminatory local zoning.

Legislation embodying the objectives of the Administration bill ultimately was reported out of the Senate Interior Committee, but no floor action followed until last fall when the Senate passed a bill from which meaningful sanctions against states that fail to establish land use control programs had been stricken. On 22 May, the Interior Committee ordered reported a new land use bill, generally similar to last year's but stronger in certain particulars, as in its provision for control of large-scale recreational homesite subdivisions. A land use bill is also undergoing committee "mark up" in the House, and there is a good chance that some kind of land use policy bill will be enacted during this session of Congress. A number of states have enacted land use control laws over the last 2 years.

One significant thing about the task force report is that it calls for abandonment of the deeply ingrained idea that private ownership of land necessarily carries with it a "right" to develop that land. Conservatives in Congress and elsewhere are sure to find a recommendation of this kind to have a dis-

* Entitled *The Use of Land: A Citizens' Policy Guide to Urban Growth*, the report is to be published in June [(Crowell, New York), 384 pp.; hardcover, $10; paperback, $3.95].