comfortable and sometimes corrupt relationship with land developers.

States accepting planning grants under the measure would be ultimately responsible for identifying and controlling both critical areas, such as wetlands or the land around a major airport, and critical uses, such as the development of a new community or the construction of a major oil refinery. In most cases, the state might only review and approve local government decisions, but, even so, many land development activities would be placed under tighter regulation than is now common.

Some years ago, the Rules Committee was a wholly untamed body, which, rather than doing the will of the majority leadership, was an instrument in the deft hands of its chairman, Representative Howard W. ("Judge") Smith of Virginia, an old-style Dixie Democrat of archconservative persuasion. Unwilling to tolerate this situation any longer, Speaker Sam Rayburn decided in early 1961 to gain control of the committee by enlarging it. Rayburn won a showdown vote on the floor, and Judge Smith's Southern Democrat–Republican coalition lost its dominant influence over the committee.

After this disciplining, the committee saw its independence eroded still further in the mid-1960's, when Smith left Congress and was succeeded in the chairmanship by William Colmer, a Mississippian whose mediocrity and lack of flair had never been questioned. In 1973, Colmer too gave up his seat, and, such being the vicissitudes of the seniority system, the aging Dixiecrat was succeeded as chairman by an aging, labor-oriented congressman, Ray Madden. According to a colleague in a position to observe him closely, Madden is forgetful and not up to the job.

Ordinarily, the committee is responsive to the majority leadership, but, when no leadership is asserted, it may behave in a manner at least vaguely reminiscent of the Judge Smith era. In the present instance, Representative Steiger, having failed to persuade the Interior Committee to accept his substitute (which called for hardly more than a program of planning grants), took shrewd advantage of the Rules Committee and the leadership vacuum.

Steiger urged the U.S. Chamber of Commerce to stimulate its constituent groups, companies, and individual members to let Congress know that they opposed the land use bill and to give particular attention to the members of the Rules Committee. Dan Denning, a Chamber of Commerce representative in Washington, says that such an action call was sounded and got a "very, very good" response. The chamber got help from an odd bedfellow when the United Brotherhood of Carpenters and Joiners, a union of 900,000 members and the largest in the building trades, informed Madden, its old friend, of its strong opposition to the bill. Madden was himself among those voting for deferral.

President Nixon's seeming abandonment of meaningful land use legislation followed a conversation with Steiger on the evening of 6 February, when the Arizona congressman and about a dozen other Republican "hard hats" (Steiger's phrase) were guests at the White House. According to Steiger, the President showed real concern at his (Steiger's) characterization of the pending bill as one that would create a bureaucratic mare's nest and lead to an invasion of property rights. An alternative explanation of the President's new attitude, however, is that, faced with the threat of impeachment, he seized this opportunity to curry favor with the Republican right wing.

Representative Morris Udall (D–Ariz.), a senior member of the Interior Committee and sponsor of the land use bill, hopes to get the measure back on track with the help of Speaker Albert, who is said to have been embarrassed and angry at the Rules Committee's behavior. Success in this endeavor may depend, however, on whether some more or less plausible face-saving device can be found to make it easier for several members of the committee to change their votes.

For its part, the Nixon Administration is collaborating with the House Minority Leader in the preparation of substitute legislation. Officials at the Department of the Interior are hopeful that the essential elements of the Udall bill—that is, the provisions for control of critical areas and uses—can be retained. But Steiger frankly admits that he does not want even his own bill to pass the House, for he fears that later, in conference, "we [would] eat the Senate bill." In light of that, together with the fact that there seems no possibility of a genuine compromise between the Udall and Steiger points of view, the new Administration effort gives every appearance of being a charade, conscious or unconscious.

—LUTHER J. CARTER

Herbicides: Academy Finds Damage in Vietnam after a Fight of Its Own

A National Academy of Sciences (NAS) committee looking into the herbicide program in South Vietnam has found that "under present conditions it may take well over 100 years for the mangrove area to be reforested." The committee also reported that a number of Montagnard children may have died after direct exposure to herbicides.

The long awaited report of the Committee on the Effects of Herbicides in Vietnam is expected to strengthen the case of those in Congress and in the arms control community who want to see first uses of herbicides in war banned.* The report was released 28 February after occasioning some of the most bitter internal fights in academy history. Describing the clash, NAS President Philip Handler told *Science*: "This has been the most traumatic incident" involving an academy committee and a review panel set up to oversee it in his term as president.

Several sources on the herbicide

* Committee on the Effects of Herbicides in Vietnam, *The Effects of Herbicides in South Vietnam*, Part A, *Summary and Conclusions* (National Academy of Sciences, Washington, D.C., 1974).

committee† and the review panel‡ say that, except for the review process, the final report might have contained little of its central message: that military use of herbicides could have had ill effects on the human population and in fact inflicted long-term damage to South Vietnam's ecology and timber supply. This behind the scenes bickering, then, materially affected the final report.

To be sure, the academy was operating under unusual circumstances in undertaking the herbicide study at all. The study was commissioned in the 1971 military procurement authorization act which ordered the Department of Defense (DOD) to contract with NAS for the work; so both Congress and the DOD were looking over the committee's shoulder. At least some members of the committee and the review panel and officers of the academy, then, wondered how these outside groups—who have their own axes to grind in the larger fight over herbicides —would use the report's results. Also complicating the situation was a procession of prior reports on devastation in Vietnam due to herbicides, by official U.S. Department of Agriculture experts, by a team from the American Association for the Advancement of Science, and by others. Not surprisingly, then, the academy was rumored at the time to be undertaking its task with great reluctance.

The most marked disputes, however, arose not over these external political considerations, but over internal differences involving members of the committee, members of the review panel, and officers of the academy. The "trauma" Handler referred to was over such matters as the composition of the review panel, possession of data, and how to count dead trees.

Apparently some committee members, including the chairman, Anton Lang of Michigan State University, objected to the appointment to the review panel of Matthew S. Meselson, chairman of the Department of Biochemistry and Molecular Biology at Harvard. A former consultant to the Arms Control and Disarmament Agency, Meselson has been credited by some with having persuaded the Nixon Administration to submit the 1925 Geneva Protocol to Congress. As chairman of the herbicide assessment commission of the AAAS, Meselson examined damage in Vietnam and contributed to a preliminary report issued in 1970; since then he and his associate Robert Baughman have identified the potent teratogen dioxin in the Vietnam food supply. Meselson was also, as it turned out, one of the committee's most persistent critics.

Several attempts were made to get Meselson off the review panel. According to several accounts, Lang, in one letter to Handler, argued that Meselson's role with NAS conflicted with his work on the AAAS commission. Handler is reported to have written Lang back defending Meselson and the appointment. Other sources say, however, that Handler on other occasions was more inclined to Lang's view and that Meselson's real defender at the academy was George B. Kistiakowsky, who, as NAS vice president, was in charge of the entire review panel system and who selected Meselson in the first place. At some point at least one of these people threatened to resign—although it could not be determined who—Lang, Meselson, Kistiakowsky, or someone else. Kistiakowsky declined to comment on the controversy; Handler said only: "I heard threats of resignation, I did not take them to be serious."

Meselson's presence on the review panel became important in January 1973, when a committee subgroup, based at the University of Washington in Seattle, began analyzing their first set of aerial photographs of the inland forests of South Vietnam. Ground fighting had prevented the inland forest group from viewing the damage by ground inspection during their field trips to Vietnam. Since ground inspection is the sine qua non of most such forestry work, the group therefore had to invent substitute methods of estimating the damage by examining photographs. James S. Bethel, a member of the committee, his associate Kenneth Turnbull, and a group of their graduate students at the University of Washington did the analyses; they tried to decide how big the forest was before it had been sprayed, how many trees had died, and how many of these trees had been "merchantable" or eligible for commercial cutting.

Previous damage to South Vietnam's merchantable inland forest was estimated in 1970 by Agriculture Department experts after ground inspection; they placed the loss in the neighborhood of 20 million cubic meters of merchantable wood. But Bethel and Turnbull, in early 1973, made a preliminary estimate of only 500,000 cubic meters. Meselson reviewed the data Bethel and Turnbull were using and concluded that their estimate was too low. He and other reviewers disputed the amount of lost wood, the estimate of the original size and composition of the forest, and what standard of "merchantable" timber to use. It was even suggested that the herbicides might act differently depending on whether they fall in small or large drops.

The dispute became so complicated that Handler, in May, hired three independent experts to arbitrate, including Charles E. Olson of the University of Michigan. It was agreed that it would be wise for the independent group not to communicate with the review panel before it went to Seattle to make its own estimate. It reported to Handler that the merchantable timber lost could be estimated at from 500,000 cubic meters to 2 million cubic meters.

But more photographs came in from DOD flights over the forest and the battle of estimates continued. In November, Meselson met with Olson at the Army Map Center in Virginia to go over films that were apparently identical to those in Seattle. Afterward, Olson, speaking for himself and not the other members of the independent panel, reported that he could believe a responsible estimate of the damaged merchantable timber at from 5 to 10 million cubic meters, and that it could range upward of 16 million cubic meters. Not only were Meselson and the independent group making tree counts: other members of the review panel including Sterling Hendricks of the Agriculture Department and a Vietnamese botanist on the committee, Pham-Hoàng-Hô, made counts; even Saunders Mac

† Members of the committee were: chairman, Anton Lang, Michigan State University; associate chairman, Le-Van-Thoi, National Scientific Research Council of Vietnam; Ewert Aberg, Agricultural College of Sweden; James S. Bethel, University of Washington; Geoffrey E. Blackman, Oxford University; Robert F. Chandler, Jr., AVRDC, Taiwan; William B. Drew, Michigan State University; F. Clarke Fraser, McGill University and Montreal Children's Hospital; John D. Fryer, Agricultural Research Council, U.K.; Frank B. Golley, Jr., University of Georgia; Pham-Hoàng-Hô, University of Saigon; Peter Kunstadter, University of Washington; Alexander H. Leighton, Harvard School of Public Health; Howard T. Odum, University of Florida; Paul W. Richards, University College of North Wales; Fred H. Tschirley, Department of Agricultural; and Paul J. Zinke, University of California, Berkeley.
‡ Members of the academy review panel were: G. Evelyn Hutchinson, Yale University; James F. Crow, University of Wisconsin; Mark Kac, Rockefeller University; Fred Eggan, University of Chicago; Walsh McDermott, Cornell University Medical College; Matthew S. Meselson, Harvard University; Robert H. Burris, University of Wisconsin; Lawrence Bogorad, Harvard University; and Sterling Hendricks, U.S. Department of Agriculture.

Lane, the new NAS vice president who replaced Kistiakowsky who retired last July is described at one point bending over photographs in Seattle, making his own count of dead trees.

The chapter of the NAS herbicide report on inland forest damage was rewritten finally after a meeting in Handler's office at which Handler criticized the philosophy and balance of a draft. It estimated a loss of 1.25 million cubic meters with a possible

Herbicide Study Assesses Effects on Health and Safety

The following are the principal conclusions of the National Academy of Sciences' (NAS) Committee on the Effects of Herbicides in Vietnam. The committee undertook the study of the impact of the defoliation program there at the urging of Senators Gaylord Nelson (D–Wis.) and Thomas McIntyre (D–N.H.). In 1970 Nelson and McIntyre became alarmed about Vietnam herbicide use after an unusual number of birth defects and stillbirths had been reported in babies born in provinces that had been heavily sprayed. Therefore, in the 1971 military authorization act, they ordered the Pentagon to contract with NAS for the study. In 1971, too, the military called a halt to all major spraying of herbicides in Vietnam; the year before, the Environmental Protection Agency (EPA), also alarmed by the Vietnam reports, canceled registration on most similar herbicides. Today, 3 years later, the Congress and the White House have yet to decide whether to include herbicides under the no-first-use ban in the 1925 Geneva Protocol to which 102 other nations are parties. The EPA plans this spring to rule on dioxin, one of the most toxic substances known, which has since been identified as a constituent of many of the herbicides used both here and in Vietnam. Thus, the NAS findings are relevant to future U.S. policy on both military and domestic herbicide use.

Medical effects. The committee found "no conclusive evidence of an association between herbicides and human birth defects" and hence neither confirmed nor denied the original reports. They did, however, find similar symptoms of acute illness that followed herbicide exposure in three separate studies. Coughing, vomiting, skin sores, dizziness, and sometimes death were reported among children of the Montagnard tribespeople, among Vietnamese in a wide-ranging survey of two provinces, and in a community study in the Rung Sat delta area.

The NAS committee turned up three new leads which could provide an answer to the question of human health effects of herbicide spraying. Gerald C. Hickey of Cornell, an anthropologist consultant to the committee, found the Montagnards who said that they had been directly exposed to herbicides and that at least 38 children had died as a result. Second, unusually complete medical records for stillborn and defective babies were found in the Barsky Unit of the Cho Ray Hospital in Saigon. A member of the NAS group, F. Clarke Fraser of McGill University and Montreal Children's Hospital, is studying these. Third, 45 to 50 Vietnamese military technicians who had handled herbicides in the spray program for many years were identified. The report of the committee urges these leads to be followed up promptly.

Mangrove forests. South Vietnam's coastal mangrove forests "suffered greater damage than any other type of vegetation," says the report. Of the total mangroves, 36 percent (260,000 acres) was sprayed once or more; and, even where they were sprayed only once, they were destroyed. In the Rung Sat, a delta area south of Saigon, the mangroves are not recovering spontaneously; recovery will take at least 100 years. The committee urges consideration of a massive program of artificial regeneration which could restore the forest in 20 years.

Inland forests. These were by far the most heavily sprayed areas of South Vietnam: a total of 2.67 million acres were sprayed at least once. The report concludes that 1.25 million cubic meters of merchantable timber was lost as a result, with the range of possible loss being from 0.5 to 2 million cubic meters. The calculation was a compromise figure—the result of great internal controversy among committee and review panel members.

Bamboo. A preliminary report of the American Association for the Advancement of Science's herbicide commission in 1970 warned that a massive invasion of defoliated areas with "worthless" bamboo was a threat to South Vietnam's valuable timber stocks. The NAS committee partially confirmed this warning. It found that there had been large patches of bamboo in the hardwood forests prior to spraying, and that bamboo was increasing only in areas that had been already cleared for some other reason.

Crop destruction. The NAS committee found that more cropland had been sprayed with herbicides than the 260,000 acres claimed in official military records. Additional crops were sprayed in the course of regular defoliation missions, when farms lay in the path of flight, and that other crops were sprayed as a result of wind drift from regular herbicide missions. After a farmer's crop had been sprayed, only one growing season was lost.

Soils. The committee confirmed previous findings that toxic residues of herbicides barely persist beyond 1 year. Even though spraying kills vegetation, it does not have a "lasting detrimental effect" on plant nutrients in soil.

Dioxin. The committee did no experimental work of its own on dioxin (known chemically as 2,3,7,8-tetrachlorodibenzo-para-dioxin) which appears as a manufacturing impurity and is a proven teratogen in mice and rats. But it "strongly" recommended more work on possible effects on man, as well as repeated sampling of the Vietnamese food chain, where low levels of dioxin have already been found.

Social effects. The herbicide program was partially responsible for turning Vietnamese opinion against the United States during the war. Urban dwellers came to view it as "an emotionally charged symbol . . . for many . . . distresses, especially those for which Americans are blamed," and this view is likely to eventually prevail throughout the country.—D.S.

range of 500,000 (the original estimate) to 2 million (the independent panel's upper estimate). Meselson still says the estimate is too low and plans his own study, pointing out that this is a scientific question, after all, on which everyone ought to be able eventually to agree. In the final document, a tropical forest expert on the committee, Paul Richards, and Hô wrote separate letters dissociating themselves from the inland forest chapter and saying they thought the estimate was too low. Whatever larger lesson—if any—there is in this tale of the inland forests, at least it is clear that a batch of scientists analyzing a batch of facts are capable of high emotion. As one Seattle forester told *Science*: "Just because I was a dove on the Vietnam war doesn't mean I am going to invent dead trees to solve my emotional problems."

Although this dispute colors all accounts of the rest of the committee's work, its other activities generated controversy, too, and affected the final report in significant ways. For example, after several noted anthropologists refused to work for the committee because of its DOD funding (the American Anthropological Association having recently been the arena for a fight over military funding of anthropologists in Thailand). Lang succeeded in getting DOD to change the terms of the contract to protect privacy of information and the identity of "all respondents" in the study. At least one anthropologist who joined the committee, Peter Kunstadter of the University of Washington, did so only after nonmilitary funds were found to support him.

The work on medical effects of herbicides is also important since much of the public outrage about herbicides in Vietnam, and DOD's halt of most herbicide spraying there in 1971, followed reports of an unusual number of birth defects and stillbirths in hospitals in provinces that had been heavily sprayed. Because of heavy ground fighting the committee could not get into Tay Ninh province, where these reports originated, and the group decided not to make its own epidemiological survey elsewhere. A member of the review panel, who asked not to be named, explained that the original chapter on biological effects implied that since the committee hadn't found definitive human health effects, they didn't exist. The reviewers, he said, are in part responsible for changing the report's emphasis in this regard. In fact, it recommends that the reports of Montagnard children's deaths, of dioxin in the Vietnamese food chain, and of human effects of dioxin be followed up.

It should be noted in conclusion that the report itself reflects the troubled process which produced it. Handler says the report is a better product for having undergone the "difficult" and "sometimes regrettable" process of review; it is the best single document today, he says, of what is known about herbicide effects. Meselson reflected the comments of some others when, in a statement, he termed it "quite informative" with the exception of the inland forest timber estimate and the lack of new data on stillbirths and birth defects. Other evaluations reflected that of another review panel member, "It is all made of loose ends and it says so itself." Thus having been handed a potential political time bomb in the form of the herbicide assignment, the academy exploded alright—but not over the sorts of issues one might have expected. Perhaps someday, after the Vietnam war has receded still further in the public memory, and the issue of herbicide effects has lost the fascination of being topical, these questions will be answered.

—DEBORAH SHAPLEY

APPOINTMENTS

Frank L. Hereford, Jr., professor of physics, University of Virginia, to president of the university. . . . **Paul Meier**, professor of statistics and theoretical biology, University of Chicago, to chairman, statistics department at the university. . . . **David J. Cox**, associate professor of chemistry, University of Texas, Austin, to chairman, biochemistry department, Kansas State University, Manhattan. . . . **Victor Gilinsky**, formerly assistant director for policy and program review, Atomic Energy Commission, to head, physical sciences department, Rand Corporation. . . . **Harry C. Davies**, acting dean, College of Arts and Sciences, Adelphi University, appointed dean of the college. . . . **Gene E. Martin**, professor of geography, University of Oregon, to dean, School of Behavioral and Social Sciences, California State University, Chico. . . . **Eugene H. Kopp**, dean, School of Engineering, California State University, Los Angeles, to vice president for academic affairs, West Coast University. . . . **Jonathan C. Messerli**, dean, School of Education, Hofstra University, to dean, School of Education, Fordham University. . . . **Benjamin Rosner**, university dean of teacher education, City University of New York, to dean, College of Education, Temple University. . . . **Helen M. Ranney**, professor of medicine, State University of New York, Buffalo, to chairman, medicine department, University of California, San Diego. . . . **Helen P. Gouldner**, professor of sociology, Washington University, to chairman, sociology department, University of Delaware. . . . **Warren J. Baker**, professor of civil engineering, University of Detroit, to dean, College of Engineering at the university. . . . **Donald E. Rathbone**, chairman, electrical engineering department, University of Idaho, to dean, College of Engineering, Kansas State University. . . . **Robert A. Corrigan**, associate professor of English, University of Iowa, to dean, College of Arts and Sciences, University of Missouri–Rolla. . . . **Gerald R. Stairs**, chairman, forestry department, University of Wisconsin, to dean, College of Agriculture, University of Arizona. . . . **Leslie S. Jacobson**, professor of biology, Long Island University, to dean, Graduate School at the university. . . . **Louis A. Luzzi**, professor of pharmacy, University of Georgia, to dean, School of Pharmacy, West Virginia University. . . . **Fritz E. Dohse**, chairman, engineering sciences department, Louisiana State University, to dean, School of Engineering at the university. . . . **Neal A. Vanselow**, chairman, postgraduate medicine and health professions education, University of Michigan, to dean, College of Medicine, University of Arizona. . . . **Merl C. Hokenstad, Jr.**, director, School of Social Work, Western Michigan University, to dean, School of Applied Social Sciences, Case Western Reserve University. . . . **Ira M. Rosenthal**, director of pediatrics, Cook County Hospital, to head, pediatrics department, Abraham Lincoln School of Medicine, University of Illinois. . . . **Wallace Arthur**, professor of physics, Fairleigh Dickinson University, to dean, College of Science and Engineering at the university. . . . **Leonard L. Ross**, professor of anatomy, Cornell University Medical College, to chairman, anatomy department, Medical College of Pennsylvania. . . . **Patrick L. Parker**, former acting director, Marine Science Institute, University of Texas, to director of the institute.