signs" or for the technological solutions to social problems, occasionally turn to their critics for suggestions or alternatives. Alas, the critics have no technical modifications to offer but focus their challenges upon the presumptions, assumptions, and consequences of the proposed result. The fact that some problems are not amenable to technical solutions, but trying to solve them through technology is characteristic of Western society.

13. Students who complete a fifth year usually receive a "professional master's degree."
14. I am seeking to avoid a tangential discussion of how long it takes to train an engineer, which is an important topic but not especially relevant to my thesis.
15. Reports issued by Committees of the American Society for Engineering Education on "Goals of Engineering Education."
16. D. B. Truman, foreword of (*11*), p. ix.
17. A. N. Whitehead, *Science in the Modern World* (Macmillan, New York, 1960), pp. 282–83.
18. Their commitments are formed by the students' attitudes, the attitudes of their engineering teachers, and by the curriculum.
19. The fact that many engineering schools have to establish (for the faculty advisers and students) lists of courses that are acceptable as liberal electives is incriminating evidence that the role of liberal education is poorly understood.
20. I make these suggestions with some trepidation since I recognize that the appropriateness of any proposal depends upon the intellectual, emotional, and financial environment in which it is evaluated. It should be recognized that there are no actions that will in themselves remedy these problems. Much of the problem is attitudinal, and attitudes are not easily or quickly affected. Finally, while these proposals may appear to be prescriptive, they should be viewed more as classes of actions that might be considered. If engineering faculties are prepared to give these issues the attention they deserve, I have no doubt that many other proposals will evolve.
21. Preparation of this article has been supported in part by National Science Foundation grant GY-8325 to the Cornell University Program on Science, Technology and Society.

NEWS AND COMMENT

Guillain-Barré: Rare Disease Paralyzes Swine Flu Campaign

The troubled influenza immunization campaign—which had previously survived production delays, insurance squabbles, sporadic scientific criticism, and a scare caused by the deaths of three elderly Pittsburgh residents shortly after vaccination—ran into its most serious problem yet as 1976 drew to a close. On 16 December the campaign was temporarily suspended because of reports that some 51 individuals among an estimated 50 million who received flu shots subsequently came down with a poorly understood paralytic disease known as the Guillain-Barré syndrome. (The number of cases reported has since climbed above 200.)

The discovery set off a wave of denunciations of the immunization campaign. The Washington *Post* decreed the program a "fiasco." A columnist for the *New York Times* called it a "sorry debacle." Political cartoonists lampooned the program with glee. And Sidney Wolfe, head of Ralph Nader's Health Research Group, called for the resignation of David Sencer, director of the federal Center for Disease Control (CDC), "the main person responsible for promoting this costly" and "ill-conceived" campaign.

But the reaction to the Guillain-Barré cases may have been premature. At this writing, CDC is still in the midst of an investigation to determine what relation, if any, the Guillain-Barré syndrome has to the vaccination campaign. Some scientists who support the immunization campaign believe that, when all the facts are in, the vaccinations may not be implicated in the syndrome. Others believe that they will be implicated but that the risk to those vaccinated will be too slight to justify abandoning the campaign altogether. The latest figures show, according to Sencer, that the risk of suffering Guillain-Barré disease severe enough to cause permanent injury or death is only 1 in 1 or 2 million vaccinations. That's far less than the threat posed by influenza epidemics, which, in a typical year, kill tens of thousands of people.

The current situation differs markedly from the scare that followed the earlier deaths in Pittsburgh. In that case, federal officials were able to argue that a few deaths among elderly vaccinees around the country was not caused by vaccination but was simply a statistical coincidence—a certain number of old people will die every day whether they get flu shots or not. But the statistics on Guillain-Barré syndrome were not so reassuring. The government's top health advisers noted an ominous bulge in the incidence of the disease, which suggested that there might well be some connection with vaccination.

The effort to unravel the current situation has been complicated by the fact that relatively little is known about the Guillain-Barré syndrome, which is sometimes referred to by such other names as "French polio," "ascending paralysis," or "acute idiopathic polyneuritis." The victims typically develop symmetric weakness in the limbs, loss of sensation, and diminished reflexes. Most recover with no lasting effects, but some suffer permanent paralysis or respiratory difficulties that lead to death. There are conflicting reports concerning the nature of the disease and its patterns of attack. Virtually the only information about long-term incidence of the disease in this country is derived from a Mayo Clinic study of Guillain-Barré cases in Olmsted County, Minnesota, between 1935 and 1968—a frail base indeed from which to estimate the syndrome's pattern of occurrence in the country as a whole. The cause of the disease remains unknown. A 1966 review of some 1100 cases of Guillain-Barré syndrome reported in the French, English, and American scientific or medical journals indicated that one-third of the cases had no demonstrable cause. Most of the remaining two-thirds occurred after the victim had suffered an infectious disease, but 48 cases occurred after inoculations of various kinds, including one inoculation with influenza vaccine. Whether there was a causal relationship among these events is unknown.

The first cases of Guillain-Barré associated with the current immunization campaign turned up in Minnesota. Under a surveillance system designed to track the side effects of vaccination, CDC received a report on 19 November that four vaccinated individuals in Minnesota had come down with the syndrome. However, Minnesota health authorities investigated the situation and concluded that vaccination was not the cause. Then, about a week later, three cases were reported from Alabama, and soon another was found in New Jersey. These states—and eventually others as well—were asked to conduct active searches for Guillain-Barré cases among the vaccinated and nonvaccinated—chiefly by contacting neurologists or others apt to treat patients with the syndrome. By 13 December, enough preliminary data were in hand for CDC to conduct a conference telephone call with experts from other government agencies and the universities. The verdict was to continue the immunization campaign. "There was a unanimous view that there was not enough evidence to call a halt to the program," recalls one of the partici-

pants, Alexander D. Langmuir, a former CDC epidemiology chief and now a visiting professor at Harvard Medical School. "My gut reaction after an hour's conversation was that it was a coincidental phenomenon and no problem." The next day CDC publicly announced that it was investigating the Guillain-Barré phenomenon, but it stressed that "there was no evidence to link the reported cases to vaccination and that there did not appear to be an increased number of cases of Guillain-Barré syndrome occurring in the country."

Two days later, CDC, after another conference call with the outside experts, reversed itself and recommended that the program be halted pending further investigation of the Guillain-Barré phenomenon. What had happened to change everybody's mind? The most important factor, according to Sencer, was a sharp downward revision in the estimated annual incidence of Guillain-Barré disease in this country under normal circumstances—from 14,000 cases under the initial estimates to only 4,000 cases after the figures were refined. Against that smaller background, the cases of Guillain-Barré disease found in conjunction with the immunization campaign began to look more significant.

Not all of CDC's own staff experts were in favor of halting the whole program. At least two are said to have recommended continuing the program for "high risk" individuals deemed likely to die from flu, namely the elderly and chronically ill. But the majority of CDC's staff preferred to stop all vaccinations pending completion of the investigation of Guillain-Barré cases. According to one participant, the majority was tired of getting hit on the head for the flu campaign and felt that, unless they could prove the campaign was not causing harm, they wanted time out for a breathing spell.

CDC's recommendation for a temporary halt was communicated to Theodore Cooper, assistant secretary for health in the Department of Health, Education, and Welfare (HEW), in a telephone call on 16 December. Although Cooper was technically the official who had authority to continue or to suspend the program, he had little choice once he had received the authoritative recommendation. After briefing HEW Secretary David Mathews and President Ford, he held a late afternoon press conference to announce suspension of the campaign. The tone of the conference suggested an attempt to downplay the significance of the problem. Cooper stressed that "no association" had been found between vaccination and Guillain-Barré cases beyond the statistical suggestion of a possible relationship. And he apologized that some people might find the suspension "premature" or "alarming." But he called the suspension "the most prudent course to take at this time." Suspension, he stressed, "does not mean termination." Neither Cooper, in his oral comments,

Nuclear Moratorium: Study Claims That Effects Would Be

Alvin Weinberg, an articulate advocate of nuclear power for much of his career, has now challenged industry claims that a nuclear moratorium would wreak economic havoc in the United States. In a new report, Weinberg says that the country could afford to give up nuclear power for 30 years with only modest economic and environmental consequences, because future energy demand will grow much more slowly than had been anticipated. The consequences of a moratorium, he says, would include higher direct costs for electricity estimated to be no more than 1 percent of the yearly gross national product and the need to mine an additional 1 to 3 billion tons of coal per year by the end of the century.

The report's estimates of reduced energy growth will have implications beyond the nuclear arena, since energy demand forecasts are the starting point for broader policy questions. What is most striking about these estimates is the company they keep—the Weinberg projections are essentially identical to the 1974 low-growth scenarios of the Ford Foundation's Energy Policy Project (*Science*, 1 November 1974, p. 426), although arrived at independently and by a different method. The pioneering Ford Foundation's scenarios, especially the so-called "zero energy growth" case, were very controversial at the time and were as pointedly ignored by the government energy policy establishment as they were enthusiastically taken up by the environmentalists. But the tide now seems to have turned. The Weinberg study is evidence that low energy growth forecasts are well on their way to attaining the status of conventional wisdom. The incoming Carter Administration, moreover, appears to be aware of and receptive to such ideas. Weinberg gave Carter a preview of his study's conclusions earlier this year at one of the then-candidate's briefings in Plains, Georgia, and one of the principal members of the Carter energy transition staff is S. David Freeman, the director and principal architect of the Ford Foundation study.

For the nuclear industry, however, the Weinberg study is likely to prove anything but a welcome Christmas present, since it tends to undercut many of the claims made, for example, during the California nuclear referendum campaign of last year. The three-volume report* marks the first major project of the Oak Ridge–based Institute for Energy Analysis since Weinberg assumed its directorship in mid-1975. Weinberg headed the Oak Ridge National Laboratories for many years and later served a stint as energy policy adviser to the Nixon Administration. The report is one of several background studies commissioned by the National Academy of Sciences in connection with its ongoing massive study of nuclear power and alternative energy systems. It also marks Weinberg's re-emergence in a role that he has played from time to time, that of iconoclast-in-residence for the nuclear community.

The report concludes that, under most assumptions about future interest rates and fuel costs, nuclear plants will be a cheaper source of electricity than coal-burning plants. The difference, however, is small enough that the cost of a moratorium on the construction of new nuclear plants from 1980 to 2010 would not represent a major perturbation to the national economy, even though it might total $300 billion to $400 billion by the year 2010. Regionally, for example in New England, the impact might be more severe. But the report asserts that a moratorium would eliminate only about 50,000 jobs in the nuclear industry, most of these only temporarily. Environmentally, it is judged that a U.S. nuclear moratorium would have little effect on worldwide CO_2 levels unless it led to the abandon-

**Economic and Environmental Implications of a U.S. Nuclear Moratorium* (Institute for Energy Analysis, Oak Ridge Associated Universities, Oak Ridge, Tenn., 1976).

nor a press release issued by CDC that same day mentioned that several of the Guillain-Barré victims had died. When an angry reporter who knew of the deaths challenged Cooper on that point, he replied lamely that it had been "an omission on my part."

Although Cooper had predicted at his 16 December press conference that it would take "every bit of a month" to complete the investigation, just a week and a half later he pressed CDC to convene a meeting of its top advisers to review the data and see if suspension was still warranted. Many CDC staffers considered this a premature effort to reinstate at least part of the program before its momentum was irretrievably lost (and before the lame-duck Ford Administration, which launched the immunization campaign, leaves office). They complained that their investigation was still under way, that data were incomplete, and that they had little time to prepare analyses. Nevertheless, on 29 December, the Advisory Committee on Immunization Practices and other consultants gathered at CDC headquarters in Atlanta to review what data there was. "I think it's a damn shame we've been forced to come to a conclusion before the data are as clean as they might be," grumbled Langmuir. Most of his colleagues apparently agreed. Except for two advisers who wanted to reinstate the program for individuals at high risk, they recommended continuing the suspension until further studies are completed. On 30 December, Cooper announced that he concurred.

The data that troubled the experts suggested—but did not prove—that the vaccinations might somehow be implicated in Guillain-Barré syndrome. As of 25 December, there had been 496 cases of Guillain-Barré disease reported in this country since the start of the immunization campaign on 1 October—with roughly equal numbers occurring among those who had received flu shots and those who had not. There were 11 deaths among the Guillain-Barré victims who had been vaccinated, 8 among those who had not. These totals were not particularly alarming in themselves. But an analysis of the attack rates in ten states where the data were most complete revealed that vaccinated individuals were 7.5 times more likely to develop Guillain-Barré disease than those who had not been vaccinated. That figure was high enough to cause concern.

Some of the scientists who reviewed the data are skeptical that this risk analysis will hold up. They cite a variety of factors that might skew the statistics. It is possible, for example, that the greater number of cases of Guillain-Barré syndrome found among vaccinees may simply reflect better case detection in that group. After all, some health officials note, the vaccinated persons have an incentive to report their illness so as to qualify for insurance payments under the immunization program. And the surveil-

Modest, Foresees Low Growth Rate for Total Energy Demand

ment of nuclear power throughout the world. Emissions of sulfur dioxide and other pollutants from coal-burning plants would be higher than without a moratorium, but would be less than at present—despite vastly increased coal consumption—if it is assumed that present pollution clean-up policies are continued and that many power plants will have scrubbers or other pollution control equipment. Coal mining accidents, however, are estimated to cause about twice as many injuries and deaths as would otherwise be the case. The land required for coal mining would increase substantially.

The principal reason for the modest impact of a nuclear ban as estimated by the report is its conclusion that the demand for additional supplies of energy in the 1980–2010 time period will also be modest. The report projects both a high and a low forecast (Table 1) that are both substantially

Table 1. Projected energy demand in quadrillion Btu's.

Year	Demand	
	Low	High
1975	71.1	71.1
2000	101.1	125.9
2010	118.3	158.8

lower than most previous predictions, and Weinberg says the consensus among those who participated in the study is that "we believe in the lower one more." The report also assumes that the U.S. energy economy will rapidly go electric, from 28 percent of the total energy supply in 1975 to about 50 percent in 2000—an assumption that is likely to be widely challenged. Nonetheless, the projected overall energy growth rate is so low, about 1.5 percent a year for the low-growth case, that a nuclear moratorium would not exert undue pressure on energy supplies. Economic growth for the same period is projected to be about 2.5 or 3.0 percent annually.

Most earlier studies, Weinberg says, used much higher estimates of population growth than those now accepted and assumed impossibly high increases in labor productivity. These studies, he asserts, also neglected to account for the effect of higher energy prices in inducing energy conservation. In essence, Weinberg's message is that the country is not growing as rapidly as it once did, and that even with growth rates for per capita energy consumption comparable to those that have prevailed for the past 35 years, total energy use will simply not rise nearly as rapidly as it has in the past.

All this is sweet music to the ears of those associated with the earlier—and in retrospect, almost prescient—Ford Foundation study. Freeman says that he has been gratified as well by recent favorable comments in industry newsletters that earlier were highly critical of his and his collegues efforts, and he sees the Weinberg study as an indication that what were once radical ideas are now becoming institutionalized. "All of us associated with the [Ford Foundation] study are feeling pretty good," he says. "You can't really expect more mileage for a piece of work than we got," adding that he is especially glad in retrospect that he sent a copy of the study to the governor of each state, including Georgia. Carter is said to have read the study carefully.

The specifics of a Carter energy policy are clearly still some way off, although Freeman is optimistic about the direction things are going. "It looks like we're going to have a real show here," he says. But it seems obvious that low energy growth projections will have a substantial effect on the framework within which new energy policies will be formed—if only to reduce the pressure for hasty commitments.—ALLEN L. HAMMOND

Science Advisory Groups Gearing Up

When Jimmy Carter moves into the White House, he will find most of the new executive science advisory apparatus in place and performing according to its legislative mandate. The only thing missing will be the science adviser.

The new President's Committee on Science and Technology, which is to conduct a 2-year study of federal R & D, held its first substantive meeting last month under the direction of its chairman, Simon Ramo.

Also meeting for the first time was the newly created panel of local government officials, called the Intergovernmental Science, Engineering, and Technology Advisory Panel.* This group, chaired by soon-to-be ex-science adviser H. Guyford Stever and attended by members of the Federal Coordinating Council on Science and Technology, wants to figure out ways to better match federal R & D with the needs of local, state, and regional bodies.

The 16-member panel (which contains two Georgians) is composed of representatives from across the political spectrum, from urban and rural areas, and from all levels of government. It has two ex officio members—the science adviser and the head of the National Science Foundation (Richard C. Atkinson is acting director).

Discussions at the meeting were friendly and relaxed, but panel members lost no time in communicating their problems. Among these are: inadequate access to up-to-date information on research and new technologies; federal policies and regulations that stifle local innovation and flexibility; a dearth of research on and assessment of social programs; and the failure of the government to include local officials in the roots of policy-making on domestic R & D.

Two subgroups were organized, one on technology transfer, the other on institutional barriers to technology flow (such as outdated civil service practices). The full group plans to meet in Washington four times a year, with the next meeting set for February.

The Ramo group devoted most of its 16 December meeting to discussions of which way federal R & D, particularly energy, ought to be reorganized. In the morning, Representative Mike McCormack (D–Wash.) made a pitch for his baby, a mammoth new Department of Science, Technology, Energy, and Materials. In the afternoon the panelists heard retiring Representative Charles Mosher's (R–Ohio) critique of science on Capitol Hill, which he said suffered from the "fragmented, antiquated, divisive, overlapping" committee structure. "No effort to enhance the efficiency of the Executive Branch will be successful without corresponding changes on the Hill," he said.

Mosher also delivered an eloquent warning about the "profound, persistent strain of know-nothingism" that runs through a significant portion of the populace. The anti-intellectuals, he said, were getting more sophisticated and more activist—"I think they're on the march." He thought Congress would be seeing more activity comparable to the 2-year-long "concentrated attack" on the National Science Foundation.

In addition to Ramo, members of the committee are William O. Baker of Bell Laboratories (vice chairman); Indiana governor Otis R. Bowen; W. Glen Campbell of Stanford University's Hoover Institution; former science adviser Edward E. David of Gould, Inc.; Elizabeth H. Leduc of Brown University; Fritz J. Russ of Systems Research Laboratories, Inc.; Charles P. Slichter of the University of Illinois; Charles H. Townes of the University of California at Berkeley; W. Bradford Wiley of John Wiley and Sons, Inc.; and Caspar Weinberger of Bechtel Corp.—C.H.

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*The members are: governors George Busbee of Georgia (appointed vice chairman of the panel), Hugh Carey of New York, Julian Carroll of Kentucky, and Richard Lamm of Colorado; mayors Kenneth Gibson of Newark, Margaret Hance of Phoenix, Charles Horn of Kettering, Ohio, William Hudnut of Indianapolis, and Ted Tedesco, San Jose city manager; state representatives Thomas Anderson of Michigan, Genevieve Atwood of Utah, and Thomas Jensen of Tennessee; county officials Stan Cowle of Hennepin County, Minnesota, and Francis Francois of Prince Georges County, Maryland; North Carolina state budget director Kenneth Howard; and Charles Howell, executive director of the Middle Georgia Planning and Development Commission.

lance system is geared to detect problems among the vaccinated—a thrust which may not have been offset by subsequent efforts to detect cases among the rest of the population.

Some neurologists put little faith in any of the numbers because of wide variations in the criteria used by various doctors to diagnose Guillain-Barré disease. "I think until you have some hard-nosed criteria these data don't really mean very much," commented Dale McFarlin, chief of the neuro-immunology branch of the National Institute of Neurological and Communicative Disorders and Stroke, at the 29 December meeting. But there was no agreement as to how refinement of the numbers might affect the risk estimate. Most scientists at the meeting suggested that the risk estimate would fall but at least one suggested it might rise.

Probably the most troubling data, in the eyes of many of the decision-makers, was an analysis of the time interval between vaccination and onset of Guillain-Barré disease. That analysis revealed relatively few cases in the week immediately after vaccination, a cluster of cases in the second and third weeks after vaccination, and relatively few cases thereafter. Some experts felt the cluster of cases might be a response to the vaccination—otherwise one would expect the cases to be more randomly distributed. Reuel A. Stallones, dean of public health at the University of Texas in Houston, found the conclusion "inescapable" that "something happened on the day of vaccination that is important." Sencer told *Science* that he shares that opinion. But other experts suggest that even these statistics might be skewed. Thus, the lack of cases in the week after vaccination might reflect the possibility that people on the verge of developing Guillain-Barré symptoms feel too sick to get vaccinated. And the decline of cases after the third week might be due to the short life of the immunization campaign—large numbers of people have not even been observed that long.

Many experts queried by *Science* seem to have a gut feeling that the investigation, when complete, will reveal at least a low order of statistical association between Guillain-Barré syndrome and vaccination. Some theorize that the shots may turn out to play a triggering role in causing or accelerating the onset of disease in susceptible individuals. But others speculate that the difference in attack rates among the vaccinated and unvaccinated may reflect differences in the composition of those two groups—the vaccinated population may contain a

higher proportion of individuals who are, for perhaps still unknown reasons, prone to come down with Guillain-Barré disease. That latter theory may prove difficult to explore.

The extent of Guillain-Barré cases among the vaccinated caught federal health officials by surprise. Before launching the immunization campaign, they had conducted the largest clinical trials in the history of vaccination drives—ultimately involving some 7000 individuals—and had seen no reason to expect much in the way of side effects beyond transient fevers and sore arms. They had also conducted a survey of the medical literature since the early 1950's and found only about a dozen reports of neurologic disorders in temporal association with influenza vaccination. According to Sencer, nothing prepared him for the extent of Guillain-Barré syndrome that has now been found. That should serve as a sobering reminder that mass vaccination campaigns aimed at tens or hundreds of millions of people may cause side effects that can't be detected in clinical trials of a few thousand individuals. Some observers suspect that previous vaccination efforts—aimed at other diseases as well as influenza—may have caused cases of Guillain-Barré syndrome that were simply not detected.

The decision to suspend the campaign was made easier by the absence of significant influenza activity anywhere in the country. No one is quite certain what to make of the fact that very few cases of influenza, either swine flu or other strains, have been detected this winter. (Those "flu" cases that keep felling one's friends and family are apparently not bona fide cases but "flu-like" ailments.) Some experts believe that, as each week passes with no appreciable flu, the chances of an epidemic diminish. Others predict that an epidemic—probably of swine flu—will break out in the coming months. But critics predict that the vaccine won't work. "We were told we had a safe and effective influenza virus vaccine," says J. Anthony Morris, a former federal vaccine scientist. "We now know that it isn't safe. And if a swine influenza epidemic occurs, we will then learn that it is not effective."

If no epidemic occurs soon, the immunization campaign is apt to be over for all practical purposes no matter what the Guillain-Barré investigation reveals. The program was running out of steam anyway and this latest controversy is not apt to energize an apathetic public to get shots. Many health leaders fear that the troubles of the influenza campaign may cause a public backlash against other vaccination programs, many of which are already lagging. But office wits at CDC see a silver lining in their cloud of troubles. They joke that abandonment of the influenza campaign will free them to devote full energies to their next major project—a massive drive to immunize all Americans against Guillain-Barré syndrome.—PHILIP M. BOFFEY

Adverse Drug Reactions: Monitoring Needed of Drugs on Market

"We simply don't know how different kinds of doctors use different categories of drugs; we don't know the true incidence of adverse reactions nor do we appreciate the very real benefits of appropriate drug usage," Senator Edward M. Kennedy (D–Mass.) declared recently while announcing the formation of a Joint Commission on Prescription Drug Use* which is supposed to find a solution to the problem. "Millions of dollars, public and private, are spent to assure that a product is safe and effective for a specific purpose *before it is marketed*," Kennedy observed, but "once marketed, a physician may use a drug in any dosage, for any purpose—whether or not that purpose has been scientifically evaluated."

Although the idea for it was Kennedy's, this commission is a nongovernmental body with most of its money coming from the very people who make the drugs that sometimes cause adverse reactions—the drug industry via the Pharmaceutical Manufacturers Association (PMA). To preclude charges that the commission is stacked steps were taken to minimize the industry's role in selecting members and to ensure that PMA cannot withdraw its support if commission decisions seem to be going against it. As a result most observers are satisfied that the commission begins with neither a strong pro- nor anti-industry bias.

Drug laws in this country are predicated on the assumption that, if regulations governing premarket clearance are sufficiently stringent, then all drugs that make it to the marketplace automatically will be safe and effective as promised. Unfortunately, that assumption simply is not valid. In fact, there is abundant evidence to support the observation that, once a drug enters widespread use, it is likely that unanticipated side effects or unexpected benefits will be observed. Kenneth L. Melmon, who was chosen chairman of the commission at its first meeting on 30 November, notes, "No system in the world will reveal all activities of biological importance of a drug pre-marketing."

Melmon, a clinical pharmacologist at the University of California Medical School in San Francisco, has long favored the development of a system to monitor drugs in general usage—a so-called phase IV study. In an interview with *Science*, he cited a few examples of drugs with unanticipated toxicity or efficacy that might have been detected reasonably soon after marketing had there been a workable program of drug surveillance.

*The members of the Joint Commission on Prescription Drug Use, and the organizations that nominated them, are:

American Academy of Family Physicians: John F. Derryberry, Chairman, Public Relations Committee, AAFP, and Phillip D. Cleveland, Commission on Health Care Services, AAFP

American Medical Association: F. Gilbert McMahon, Tulane University School of Medicine, and Daniel Freedman, University of Chicago

American Society for Pharmacology and Experimental Therapeutics: Daniel L. Azarnoff, University of Kansas Medical Center, and Kenneth L. Melmon, University of California, San Francisco

American Society for Clinical Pharmacology and Therapeutics: Edward A. Carr, Jr., State University of New York, Buffalo, and Marcus M. Reidenberg, Cornell University Medical School

American Hospital Association: William E. Hassan, Jr., Peter Bent Brigham Hospital, and Robert N. Heyssel, Johns Hopkins Hospital

Phamaceutical Manufacturers Association: Foster B. Whitlock, Johnson & Johnson, and Monroe Trout, Winthrop Laboratories

American Pharmaceutical Association: William R. Bacon, President, APhA Academy of Pharmacy Practice (1972–73) and practicing pharmacist, and Harold H. Wolf, University of Utah College of Pharmacy

American Society of Hospital Pharmacists: R. David Anderson, Waynesboro University Hospital, Virginia

Public Members: Marcia Greenberger, Attorney, Center for Law and Social Policy, Washington, D.C., Patricia King, Georgetown University Law Center, and Anthony Robbins, Colorado Department of Public Health.