ing was that a letter was dispatched to Press and Deutch, which said in part:

> . . . the President should announce the establishment of a decisionmaking procedure that is widely seen as credible. Creating a central focus within the federal structure is crucial to establishing a credible procedure. In our opinion, no existing agency outside of the Executive Office of the President, unfortunately, could be the central focus. Creation of a wholly new agency for the purpose of centralizing federal waste management authority probably would lead to intolerably long delays in light of the desirability of moving rapidly to improve programs. Therefore, although we recognize that officials in the Executive Office usually do not have so-called operational responsibilities, we urge consideration of designating the presidential Science Advisor as the senior policymaker and overall coordinator of federal activities on radioactive wastes. No other alternative appeared to be satisfactory to those at the Keystone meeting.

The group, which reiterated the above recommendation in a second letter to Press and Deutch after meeting again in mid-September, also proposed that a science advisory committee on radwaste management be established, with its members drawn from active research scientists from industry, academe, and government who have special training relevant to reprocessing and waste isolation in geologic media. "Our impression is that to date too few active researchers have been involved in the government's programs for management and isolation of radioactive wastes," the Keystone group said.

Indeed, the crux of the credibility gap as the group seems to perceive it is that, after more than two decades of effort, the waste management program carried on by the Atomic Energy Commission and its successor agencies has continued to place primary emphasis on geologic disposal of spent fuel (or high-level wastes from fuel reprocessing) in salt formations in the absence of a scientific consensus that this is the way to go. Much of the problem is attributed to a lack of openness and peer review in technical decisionmaking (although the Keystone group credits Deutch and the IRG with releasing working papers and drafts for review and making "strong efforts . . . to obtain outside advice and assistance"). Besides calling for the creation of the science advisory panel, the group also recommended that a public advisory committee be established to ensure effective two-way communication between the government and the concerned public on radwaste issues.

Deutch Dissents

In an interview with *Science*, Deutch was emphatic in his disagreement with the recommendation that the science adviser take over direction of the radwaste program. "I think that would be unsuitable," he said. "The senior policymaker has got to be the head of the agency that manages the waste program." Although Deutch said he strongly supported keeping the radwaste program under competent scientific peer review, he questioned whether a new science advisory committee is needed inasmuch as panels such as the National Academy of Sciences' Committee on Radioactive Waste Management are available already.

Philip M. Smith, a top assistant to the science adviser, told *Science* that Press, too, feels that to turn over responsibility for radwaste policymaking to the science adviser would be a mistake, both in terms of what is best for radwaste management and of how the science adviser and the Office of Science and Technology Policy can best serve the President.

Moreover, Smith expressed confidence that DOE will prove effective in radwaste policymaking, and that all that is called for are further improvements in program management and a continuation of the recent emphasis on more openness and better peer review. In the latter connection, Smith said that the group's proposal for a scientific advisory committee may have merit.

The Keystone group has asked for a meeting with Press and Deutch and other members of the IRG executive committee in late October. This would be before the IRG submits its final report and recommendations to President Carter, who is expected to issue a major statement on radwaste policy by the end of the year.

The group, which is seeking foundation support for further meetings and conferences, believes that the government should try to identify, by January 1980, candidate sites for radwaste repositories of small to intermediate scale in several different geologic media. These facilities could then be built at the same time to test the suitability of the various media and formations for full-scale repositories.

—LUTHER J. CARTER

New Laetrile Study Leaves Cancer Institute in the Pits

Torn by doubt as to whether an after-the-fact study of Laetrile users really shows cases of improvement, the Decision Network Committee of the National Cancer Institute (NCI) gave on 25 September a half-hearted recommendation that a clinical trial of the controversial drug be conducted by NCI. The committee's vote was 14 in favor of a trial, 11 against.

According to Vincent Oliverio, chairman of the committee, the unusual toss-up vote showed "much concern" by the committee over the vague results obtained from a retrospective study of 67 Laetrile-using cancer patients. The committee often makes unanimous decisions. Commissioned by NCI last January, the study combed the country for medical records of cancer patients who showed some remission of the disease after taking the controversial apricot pit derivative. Six such patients were found. Debate at the committee hearing raised the specter that some of the positive responses stemmed from incomplete or forged records or that "biological background noise" could explain the improvement of six cancer patients taking Laetrile. The positive recommendation of the committee, however, raises the possibility of a full-fledged clinical trial of Laetrile. The committee's recommendation now goes to Arthur C. Upton, director of NCI, who will make the final decision for or against a clinical trial. Upton hoped that a clear-cut retrospective study would make that decision easier, but, as it turned out, the data are of practically no help at all.

The Network Committee's recommendation comes after 2 years of increasing clamor for a clinical trial. Laws legalizing the use of Laetrile have now been passed in 17 states and are under consideration in several more. Congressional

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hearings on Laetrile conducted by Senator Edward Kennedy (D–Mass.) in July 1977 brought a new flurry of interest. Most recently, a U.S. Court of Appeals in Denver has thrown fuel on the fire by ruling that terminally ill cancer patients can legally receive Laetrile by injection, but by no other route of administration. The Food and Drug Administration (FDA) has appealed the ruling to the Supreme Court. It is now claimed, moreover, that at least 70,000 American cancer patients have taken the apricot pit drug. A midwestern bakery even markets a whole wheat "Laetriloaf." In short, Laetrile mania has been on the rise.

Repeated tests in animals, however, show that Laetrile has no antitumor activity. Clinical responses in humans are undocumented. And some commercial preparations of the substance have been found by NCI to be "chemically subpotent, microbially contaminated, and unfit as pharmaceutical products for human use." It was in this milieu that NCI officials last fall began serious talks about conducting a clinical trial in the hope that it would put the issue to rest once and for all.

Hot debate over the ethics of a clinical trial quickly ensued. Some claimed that since Laetrile appeared to be useless in test animals, its use on cancer patients would in effect be murder by neglect. Others countered that negative tests in lab animals are far from accurate indicators of failure in humans, and that there would be a flood of unsolicited volunteers who would still take Laetrile even with a thorough understanding of the risks. Moreover, the sheer number of people now using Laetrile, they said, would not let it be dismissed as just another quack medicine. Purists maintained that convincing the public at large of Laetrile's worthlessness could never justify ineffective treatments for a few.

Side-stepping the problems of a clinical trial, NCI officials came up with a plan that they hoped would show if Lae-

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OTA Opens the Fall Season with List of Priorities

The Office of Technology Assessment (OTA), in keeping with the farseeing and independent role its leader, Russell Peterson, wishes to establish for it, is seizing some initiative by setting out its own detailed agenda of major topics it wants to explore next year. The agenda was presented on 18 September at a joint meeting of OTA's board and its advisory council.

Peterson said at a press briefing that "OTA has been criticized for taking too many projects from [congressional] committees" that would more appropriately be done by the other information-gathering bodies available to Congress—namely the Congressional Research Service and the General Accounting Office.

The list-making, said Peterson, will be an ongoing exercise and will be revised annually. This year, he said, the staff sent out 4500 letters asking people what they thought OTA's top study priorities should be. They got 1415 responses containing 4293 items. These were boiled down to 286 topics,which, in turn, were reduced to a list of 32 topics.

The priority list contains all the topics one might expect—energy, food, water, and so forth—plus a few that might not be on everybody's front burner—such as "utilization of extraterrestrial space," "prospects for increased longevity," and "technology and mental health." OTA thinks of mental health "technologies" as including various self-actualization schemes abroad in the land, which would seem to be stretching the term.

Peterson said OTA would "fund the projects at the top until we run out of money," although some funds would be reserved for committee requests. Although the OTA staff will be discussing all the projects with congressional committee staffs, Peterson said they did not need a specific request to get moving on them—"concurrence" was good enough. In this way, he indicated, OTA could get away from a "piecemeal approach" and go ahead with long-term studies that cut across the purviews of many committees.

Peterson expressed confidence that OTA can operate "immune" from political pressures and thereby make itself indispensable as a source of "evenhanded" information. He added in passing that OTA's new system of preparing one-page summaries of all its reports was proving effective in communicating with busy congresspersons. A result of this, he said, was that OTA had gotten many requests from members for reports they had already received but had not paid any attention to.

Another Peterson innovation has been the appointment of three new deputy directors at OTA: Lionel S. (Skip) Johns, staff energy expert, to oversee studies on energy, materials, military matters, and world trade; Joyce C. Lashof, former deputy assistant secretary for health in the Department of Health, Education, and Welfare, to be responsible for human resources studies; and someone (replacing Cornell physicist Raymond Bowers, who dropped out at the last minute) to look after R & D, transportation, telecommunications, oceans, and space.

Recycling, Reuse, Repairs

"At least two-thirds of the material resources that we now waste could be reused without important changes in our life-styles," asserts Denis Hayes of Worldwatch Institute in a report surveying America's squandering of her natural resources.

The report, on "repairs, reuse, and recycling" of products and materials, says that about 70 percent of all metal used—some 3.75 metric tons per capita worldwide—is used once and then discarded. Yet, he says, recycling of materials and the manufacture of more durable products could effect colossal savings while resulting in only minor displacements in the economy.

At present, says Hayes, paper accounts for 90 percent (by weight) of all materials recycled in this country. But in terms of the proportion of energy required to process virgin materials as opposed to recycling them, far greater savings can be made by recycling certain metals and petroleum products. For example, recycling of aluminum or plastics takes only 3 percent as much energy as it takes to refine or manufacture these materials.

Automobiles, as might be expected, supply a model of unintelligent materials use, designed as they are not for durability but for obsolescence. ("The Japanese . . . are aggressive purchasers of scrapped U.S. automobiles, leading to the joke that this year's Buick is next year's Datsun," says Hayes.) As for tires,

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trile had any effect on humans without NCI actually handing out the controversial drug to anyone (*Science*, 21 April). By studying the medical records of cancer victims who believed their tumors had shrunk as a result of Laetrile, the institute hoped to have a kind of "clinical trial in the community." The search for patients began last January. Articles appeared in everything from the *Journal of the American Medical Association* to the *National Enquirer*. Pro-Laetrile groups were contacted, and NCI mailed out 455,000 letters to physicians and health professionals, asking them to be on the lookout for possible patients.

It was a bust. The institute had hoped to find 200 to 300 patients who would release their medical records. But in the end only 93 were pinned down, and of these only 67 cases had sufficient documentation. The 26 rejected cases lacked clear-cut clinical proof, such as biopsies or x-rays, of tumor condition before or during the use of Laetrile. Says Neil M. Ellison, who directed the study for NCI: "This certainly wasn't any overwhelming testimony to the supposedly hundreds of cases out there that responded to Laetrile."

FDA Commissioner Donald Kennedy feels the same way. "It is significant," he told a wire service reporter, "that so few people came forward with case histories of successes from Laetrile therapy in view of the claim that thousands of cancer victims have benefited from the use of this substance."

In spite of claims to the contrary, however, it became clear early in the study that most of the pro-Laetrile groups were not about to cooperate. In California, the National Health Federation (NHF), one of the main groups promoting Laetrile for cancer therapy, last December urged its patients and physicians to boycott the planned study. Clinton R. Miller, executive vice president of the group, said NHF asked its Laetrile users "not to participate" because his group had not been consulted on the design of the study

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he says, only one-fifth of U.S.-produced tires are retreaded. Yet retreads last almost as long as new tires. If all tires were retreaded once, "the demand for synthetic rubber would be cut by about one-third, tire disposal problems would be cut in half, and substantial energy savings would be realized." Jobs lost in making tires would be made up by new jobs in retreading.

Another way to gain striking savings with minimal disruption would be to make all beverage containers returnable, asserts Hayes. According to the Environmental Protection Agency, that would reduce roadside bottle and can litter by more than half and save 1/2 million tons of aluminum, 1.5 million tons of steel, and 5.2 million tons of glass annually, as well as the equivalent of 45.6 million barrels of oil. It would also produce a net gain of 80,000 jobs.

Hayes mentions some of the economic incentives that have been proposed to encourage recycling, such as government price supports for recycled materials; equalized transport rates for such materials so that they can compete with transport of raw ores; and replacement of the oil depletion allowance with its opposite—a severance tax for the extraction of virgin materials. He also suggests that mandatory deposits such as those for beverage containers could be extended to all kinds of things. In Sweden, for example, a person makes a deposit on a new car, refundable when the car is returned to a certified scrap yard.

Hayes does not discuss the powerful political obstacles to such changes—or why, if the changes are so desirable, the obstacles have not been overcome. He seems rather to place his hopes in public education and the trend, discernible in some of the more affluent sectors of society, toward replacing conspicuous consumption with "conspicuous frugality."

New Group Designed to Draw Scientists to Animal Cause

Several people prominent in the animal welfare movement, catalyzed by Jeremy Stone of the Federation of American Scientists (FAS), have decided that the time is ripe for the formation of a Scientists' Center for Animal Welfare.

The center will be a nonprofit educational group focusing on three basic areas: wildlife management, factory farming, and the use of animals in research.

President of the board is physiologist F. Barbara Orlans, a longtime animal welfare activist who is executive secretary for the National Heart, Lung, and Blood Advisory Council at the National Institutes of Health. Vice-president is Michael Fox, director of the Humane Society's Institute for the Study of Animal Problems (*Science*, 7 July).

The group has just gotten incorporated and is now looking for money and staff and for three scientists to put on its board. Stone explains that so far very few scientists have been actively involved in animal welfare concerns. He believes the center will serve as a needed balance to the National Society for Medical Research (NSMR), which was established in 1946 as a bastion against antivivisectionists, who want all animal experimentation banned.

Stone says he started worrying about whales and caribou after a trip to Alaska in the summer of 1977. He subsequently devoted an issue of the FAS newsletter to animal rights, calling on scientists to take a leading role in the movement. He now sees the formation of the new center as "a moral necessity."

Animal rights, says Stone, is "a tremendous closet subject" that people are afraid to get involved with because once they start empathizing with animals there does not seem to be anywhere to draw the line. He said his parents refused to read the special newsletter issue because they were afraid they would stop eating meat.

The formation of the new center has stirred a surprising amount of animosity over at the NSMR. Executive director Thurman Grafton, a veterinarian, says it is "duplicatory, competitive and overlapping" with existing groups and that existing regulations in all areas are sufficient to ensure proper treatment of animals. Asked if they took into account the new awareness of animals' social and behavioral needs, Grafton countered, "Nobody has tried to legislate happiness."

Nonetheless, the formation of the center is a clear sign that treatment of animals is increasingly being seen as involving scientific and philosophical as well as humane issues. Says Orlans, "Many people were brought up with the idea that if you believe in animal welfare you are some sort of nut or anti-vivisectionist." But if it is scientists who are taking up the cause, how can they possibly be nuts?

—Constance Holden

Photo by Eric Poggenpohl

Arthur C. Upton

and because "a retrospective study is not the way to go. It is not scientific." Instead he called for a clinical trial.

At least three other pro-Laetrile groups also boycotted the study: the Cancer Control Society, the International Association of Cancer Victims and Friends, and the Richardson Clinic of Albany, California. The complaints from these groups ranged from "poor protocol" to the fear of harassment by federal and local authorities if the names of physicians and patients using Laetrile were made public.

The only known pro-Laetrile group to pitch in was the Committee for Freedom of Choice in Cancer Therapy, claimed to be the largest pro-Laetrile organization in the country with about 60,000 active and inactive members, 3000 of them being physicians. Its chairman, Robert W. Bradford, was the sole pro-Laetrile voice on the NCI "protocol review panel" that formulated the case-review study. "We didn't like the way they were going about it," he says. "We didn't like their selective process. But we felt that if anything at all positive came out of it, however slight, at least we'd have our foot in the door."

By Bradford's standards, the door has now been thrown wide open. A panel of 12 NCI cancer specialists judged the 67 cases, and to avoid charges of an anti-Laetrile bias, an equal number of conventional cancer cases were mixed in. Results appeared in the 7 September issue of the *New England Journal of Medicine*. One case was judged twice, since the patient took Laetrile on two separate occasions. Of the 68 Laetrile cases, the panel threw out 11 that had "insufficient data" and 35 others that were "non-evaluable" (because, for instance, anticancer drugs had been given along with Laetrile). This left 22 cases to be judged—out of the 93 that had originally been sent to NCI. Seven of the 22 showed progressive disease. Nine showed stable disease. Two cases showed complete disappearance of all cancer and four showed shrinkage of tumors by 50 percent or more. Says Bradford: "I'm very happy with the report. You've got a couple of clear-cut cases of remission. Here for the first time we have the National Cancer Institute coming out and saying, hey, we've really got to look at this stuff."

To the researchers, however, no clear conclusions can be drawn from the study. Normal variability or spontaneous remissions could account for the recoveries, they say. And since the study looked only at positive responses, a balanced view is not yet available. "In fact," says Ellison, "although we only asked for cases of a positive response, we received replies from 220 physicians who claimed to know more than 1000 patients who showed no beneficial response to Laetrile."

Another ambiguity, and an unavoidable weakness of any after-the-fact study, is that improvement by other factors cannot be ruled out. Patients treated with Laetrile almost always use it as part of a program of "metabolic therapy," including a vegetarian diet, supplementary vitamins and enzymes, and chelated minerals, some of which may, according to the report's authors, "be regarded as immune stimulants." The report also said that improvement could be brought on by "the unmeasurable ingredient of hope."

The solution? Shelve the whole thing or attempt a clinical trial. If it achieved nothing else, at least the retrospective study seems to have weakened some of the ethical objections to a clinical trial. Last November John C. Fletcher, assistant for bioethics at the NCI Clinical Center, coauthored a letter to the *New England Journal of Medicine* that said a clinical trial of Laetrile would come as a "devastating blow" to the established canons of medical ethics. Now he is not so sure. "There are," he says, "some scientific problems with the retrospective study, but there is also a small signal there that needs to be heard. I am now more open to the possibility of a clinical trial. We have to take this evidence seriously."

Even though NCI's Decision Network Committee has made its toss-up recommendation, the ultimate decision rests with Arthur C. Upton, director of the institute. His decision, expected within 1 week, does not have to follow the Network Committee's recommendation. And even if a decision to test Laetrile is made by Upton, NCI still needs an Investigational New Drug (IND) permit from the FDA. Commissioner Donald Kennedy is said to not think kindly about the idea.

It is no small irony that in the midst of making the long-put-off decision, NCI director Upton will be rubbing shoulders with some militant pro-Laetrile company. The Committee for Freedom of Choice in Cancer Therapy, of Los Altos, California, is holding its "First International Conference on Laetrile, Metabolic Therapy, and Cancer" at the Bethesda, Maryland, Holiday Inn, just a couple of blocks down from NCI headquarters. They expect 125 physicians, pharmacists, and nurses to attend. Says Vincent Oliverio, chairman of NCI's Decision Network Committee: "I thought this whole thing was dying down. But here they are, camped right on our front doorstep."—WILLIAM J. BROAD

Erratum: Due to a printer's error, the word "nitrite" was altered to "nitrate" in two instances in the article, "Ever so cautiously, the FDA moves toward a ban on nitrites," (8 September, p. 887). The lead sentence should read, "The hazard to animals and man of eating excessive amounts of nitrates and nitrites. . . ." The first sentence in the fourth paragraph should read, "These circumstances . . . the existent but unquantified hazard of adding nitrites to food." Nitrites—not nitrates—are deliberately added to foods.