gave a mixed and quite critical review.

Most commenters agreed with his scheme for ranking biological evidence for carcinogenicity according to definitions used by the International Agency for Research on Cancer (IARC). Evidence would be called sufficient, limited, or inadequate. Compounds in the last category would not be controlled as carcinogens; those in the first, would be. Those in the middle might or might not be controlled, and, if they were, with less urgency than those in the first category. This middle group would include chemicals that have been judged carcinogenic based on (i) a single study, single strain, or single species of laboratory animal, (ii) weakly structured experiments, such as those with few individuals, or (iii) an increase in tumors that often occur spontaneously, such as lung and liver tumors in mice. Permethrin, for example, would probably fall in the middle category.

Most commenters disagreed with Albert's second proposal, which was to rank carcinogens according to their apparent genotoxicity. Chemicals thought not to affect the cell's genetic mechanism directly, in this proposal, would be regulated by a "conventional toxicological" approach, rather than the usual method for dealing with carcinogens. Instead of extrapolating in linear fashion from measurable effects to unmeasurable low-dose effects in fixing standards, Albert proposed to determine the highest dose in animals at which no carcinogenic effect is seen, and then divide by 1000 to create a safety margin.

Umberto Saffioti, chief of experimental pathology at the National Cancer Institute, wrote that this approach was "developed in the Stone Age of toxicology, best described by the statement I once heard: 'Find a no-effect level in animals, divide by 100, and pray.' " He added that the old toxicological method should not be applied to carcinogens because in the case of normal poisoning, the target cell dies, whereas with cancer, the target cell proliferates "and the health effect keeps progressing when the toxic agent is no longer there."

Like others, Saffioti said there is little scientific basis for regulating genotoxic agents differently from other carcinogens. Steven Lewis, a toxicologist for Exxon, agreed: "There are substantial empirical data to refute the assertion that carcinogenic potential (and associated risk) can be quantitatively estimated from mutagenic potency of a particular material." But he came up with a different conclusion. Since it is wrong to make distinctions, Lewis said, why not regulate both genotoxic and nongenotoxic compounds by the old toxicological approach?

Arthur Upton was skeptical: ". . . I doubt that we know enough today about the mechanisms of carcinogenicity or about testing for genotoxicity to utilize such a distinction as the basis for regulatory decision-making." John Weisburger, director of the Naylor Dana Institute of the American Health Foundation, who himself devised a scheme for ranking carcinogens, wrote: "While we appreciate the fact that the draft of EPA's document recognizes the need to distinguish between genotoxic carcinogens and nongenotoxic compounds, the methods to delineate risk as described do not appear to be useful." I. Bernard Weinstein of Columbia University's Cancer Center wrote: ". . . this is part of a misconception that is being perpetrated that carcinogenic agents that do not have demonstrable mutagenic activity are somehow safer than those that can be shown to be mutagenic." By Albert's count, the comments were divided about equally between favorable and unfavorable.

If applied to water pollutants, Albert's proposal would allow considerably higher exposure to suspect compounds than would the "multistage" model now in use. By Albert's calculation, his scheme would increase the tolerable waterborne exposures roughly as follows: for the pesticide aldrin, the number of micrograms per liter would rise by a factor of 18 to 285; for hexachloroethane, by a factor of 19 to 369; for TCDD, by a factor of 13 to 181; for benzene, by no change to a factor of 10; for DDT, by a factor of 158; and for heptachlor, by a factor of 13 to 179.

EPA officials have not decided what technique they will use in setting criteria for water quality, and Albert has not yet prepared a final draft of his proposal. However, the administrative staff at EPA is eager to have Albert follow through on his plan. It could mark the beginning of a new era of carcinogen regulation, one in which compounds are ranked by risk according to their behavior in bioassays, a far more complex process than the statistical approach now used.—**ELIOT MARSHALL**

Computer Expert Signs Off from World Center

MIT professor resigns as chief scientist of French-backed center, says international ideal undermined, blames founder

An MIT computer science expert who took a leading role in a French-sponsored information science research center to benefit Third World countries has withdrawn from the project on grounds that the center had diverged from its original goals and been politicized by the actions of its originator, Jean-Jacques Servan-Schreiber.

Seymour Papert, professor of mathematics and education at MIT and an authority on artificial intelligence and education, had taken a leave of absence from MIT to act as chief scientist at the Paris-based *centre mondial pour la micro-informatique*. He resigned in mid-November and has returned to this country. Four other prominent non-French computer scientists who had been involved in the establishment of the center earlier disengaged from the project.

The French government late last year made public its plans to put substantial resources into a center for work on the social applications of computers to assist development in the Third World and in modernization in France and other industrial countries. The initiative, championed by Servan-Schreiber appeared to jibe closely with the Mitterrand government's policies (*Science*, 19 February, p. 948).

The original emphasis on international activities had attracted pledges of participation from about a dozen leading computer scientists from outside France. Their association and, particularly, the enlistment as center director of Nicholas Negroponte, head of a highly regarded research group at MIT, and of Papert as chief scientist, was regarded as a major coup conferring immediate international standing on the center. This participation served to counter suggestions by skeptics that the French might intend to use

0036-8075/82/1203-0978$01.00/0

the center to gain access to the expertise of leading foreign computer scientists in behalf of the French electronics industry and to win a foothold for France in Third World computer markets.

A short time after the center began operation in March, misgivings about the way the center was developing prompted a decision to disengage by four of the non-French computer scientists who had been involved in the establishment of the center. The four were Barbro Erlander of Sweden, Kristen Nygaard of Norway, Fernando Flores, a Chilean now in the United States, and Terry Winograd of the United States.

Winograd, a professor at Stanford is well known for his work on artificial intelligence and natural language. In describing the decision to withdraw, Winograd said that the founding scientists had been led to believe that Servan-Schreiber would "do the legwork to establish the center, but would then turn to a committee of scientists to guide it." No such mechanism was set up, says Winograd, and it soon became clear that Servan-Schreiber would "maintain central control and not pay much attention to the scientists." The four ended their association with the project without making a public issue of their action.

Papert says that at the time he was also concerned, but was hopeful that the situation could be retrieved. Now Papert says bluntly that he resigned to protest the politicalization of the center. "The real outrage," he says, "was that Servan-Schreiber without scientific basis continually and increasingly exerted control, thus exploiting the presence of the scientists to legitimize political action."

A different view is taken by Raj Reddy of Carnegie-Mellon, another of the computer scientists included in the founding group. Reddy remains a member of the board of the center, but says he has not played an active role in its affairs. He regards the present conflict as "teething problems," attributable at least in part to "unrealistic expectations." The problem for the center is "getting a team that can work together," says Reddy, who observes that there were also differences in style and outlook among the foreign scientists associated with the center.

Servan-Schreiber, who has so far made limited public comment on the criticism (see below) gained prominence as a journalist-intellectual and also enjoyed a period of political success by leading the revival of the small Social Radical Party and serving for a time as a cabinet minister. His political star declined about a decade ago. Since last year's socialist election victory, however, Servan-Schreiber is said to have become an adviser and confidant of some influence with Mitterrand, who apparently found congenial the ideas expressed in Servan-Schreiber's latest book, *The World Challenge*.

Papert feels that Servan-Schreiber has used the center to "put himself in a more powerful position politically." But he adds that developments also reflect pressure to "make the center highly reactive to French needs in a crisis."

As an illustration, Papert cites the recent shift of jurisdiction over the center from the research ministry to the telecommunications ministry. The French government is planning a major expansion of cable television service, which Papert suggests has the aspect of a "massive public works project." Papert says that strong pressure was exerted on the world center for major participation in the cabling project. He says that Negroponte and he were not consulted on the shift in authority.

What Papert describes as the "turning point in his relations with Servan-Schreiber occurred late last spring after an interview with Servan-Schreiber appeared in the magazine, *Nouvel Observateur*. In the interview, Papert says that Servan-Schreiber alluded to a center project in Senegal as being under his direction and described the project's purpose as helping to bring Senegal from the neolithic age to the postindustrial culture.

The remarks rankled Papert not only because the project predated the establishment of the center—Papert had helped to establish it—and Servan-Schreiber had nothing to do with its management, but also because in the characterization of the project Papert felt that "French colonialism came through."

The person in charge of the Senegal project, a citizen of Cameroon, wrote a letter saying that the interview drew a false picture of the project's goals which was published in the magazine. Papert also signed the letter. Papert says Servan-Schreiber took this as a personal attack and working relations between the two virtually broke down.

After several attempts at internal negotiations, Papert says that he and Negroponte decided to approach President Mitterrand in the hope that differences with Servan-Schreiber could be resolved. A talk with a top aide to the President resulted in an agreement that the matter would be studied. Papert says the eventual result of this initiative was the new organization plan that was "sprung on us without consultation."

An incident that Papert says illustrates the point of his objections involved the Senegal project. A program for the computer education of children was progressing well with equipment donated by foreign manufacturers, notably personal computers by American Apple computer company. The Senegalese wanted to expand the program and wrote to the center asking for more computers. Papert says that unknown to him, Servan-Schreiber "took it upon himself" to write to the Senegalese minister in charge saying that expansion "would have to wait until the French were ready to supply a French machine."

Papert says he was outraged not only because the action treated the program like a "marketing device for French computers," but also because the center's original intention to be "as respectful of other cultures as possible," had been "sabotaged."

Papert left Paris in mid-November and will return full time to MIT next term. Papert says that Negroponte will stay on into the new year to provide continuity in leadership of the center, but is believed to be renegotiating his status.

Papert says he believes that the international character of the center has been undermined and that the center's policies of recruiting the most capable scientists available has been abandoned in favor of hiring French scientists.

Asked if he originally saw his involvement with the center as something of a risk, Papert said, "Of course I was aware of the mixed motives," behind the center's creation. At the outset, however, he says, he thought there was a "convergence between Mitterrand's interest and our own scientific and social interests." "When you play the game you take a chance," he said, "The cynics were obviously right."—**JOHN WALSH**

David Dickson writes from Paris: The disillusionment of foreign research workers at the *centre mondial* has come as little surprise in Paris, where the project—and the political ambitions of its patron and founder, Jean-Jacques Servan-Schreiber—has been a continuous source of controversy ever since it was first established last year.

Formally, the center still has the full support of President François Mitterrand—perhaps explaining why some of the criticism has not come too far into the open. But certainly, there is deep resentment of the center and its relatively lavish resources (its current budget is 60 million francs, about $9 million, and this is expected to increase to 100 million

(Continued on page 982)

(Continued from page 979)

francs next year) in many university computer departments, which are still desperately short of funds despite the government's declared commitment to boost microelectronics as one of the waves of the industrial future.

Meanwhile, Servan-Schreiber has firmly rejected criticisms of his running of the center. Replying to an article in the newspaper *Le Matin*, which made public the complaints by foreign researchers, he pointed out that the center has had requests from researchers all over the world who want to come and work there and that many of its social projects are now coming to fruition. He added that Papert is said to have asked for a new contract as a scientific adviser.

"There has never been any question in the minds of the founders of the center, that its efforts to diffuse computer technology for social uses and for developing the capabilities of individuals, should be separated from its role in stimulating the French electronics industry toward the production of personal computers—or from its role in helping the accelerated education of both adults and children," Servan-Schreiber said.

U.S. Softens Toxic Chemicals Accord

Paris. Despite considerable pressure from its industrial partners, the United States has successfully blocked efforts to persuade all western advanced nations to adopt a uniform system of premarket testing of potentially toxic chemicals.

One such system, known as Minimum Pre-marketing Data (MPD), has been under development by the Organisation for Economic Cooperation and Development (OECD) in Paris for several years. It has already been accepted by the 10 member countries of the European Economic Community as a common standard for their chemical industries, and the Carter Administration had previously indicated that it would propose its acceptance in the United States as well.

Last week, however, the administrator of the U.S. Environmental Protection Agency (EPA), Anne Gorsuch, told a meeting of her counterparts from other OECD countries in Paris that the Reagan Administration was not prepared to accept the MPD system for U.S. chemical manufacturers. Instead, the United States will stick with the requirements of the Toxic Substances Control Act (TSCA), which, some critics say, can be interpreted in a less rigorous manner than those which have been adopted in Europe.

The council of the OECD is expected to give its formal approval to an agreement, reached informally at the meeting, committing all member states to provide information on the toxic effects of new chemicals "in a meaningful form" before they are marketed. The council will suggest the MPD as one way in which this *can* be done; but it will not endorse MPD as the way it *should* be done, and will therefore permit other countries—notably the United States—to develop or maintain their own systems.

The Reagan Administration's reversal on MPD has been sharply criticized by environmentalists in the United States. They are also angered because a representative from the Natural Resources Defense Council, Jacob Scherr, was dropped from the U.S. delegation just 2 days before the meeting opened. An industry representative was also dropped, ostensibly for budgetary reasons, but Scherr says, "I am convinced the real reason is that they didn't want me on the delegation, and they removed the industry guy to make it look evenhanded."

After the meeting, those who had been involved in the negotiations with the United States put a brave face on the outcome. Chairman Blair Seabourn, Canada's deputy environment minister, described the result as a "breakthrough" which had "laid the ground very well for council action which has been pending for some time." Privately, however, there was the general feeling that the United States had successfully dug in its heels, with the result that the council decision is likely to be weaker than many countries had hoped.

Minimum Pre-marketing Data was developed in response to a decision by the ministers of the OECD states that it would help international trade in chemicals—which currently account for about 10 percent of the total trade between OECD countries—if agreement could be reached on harmonizing standards for chemical regulations in each country. It sets out a list of data components that might be required before a chemical can be made available to the public, including chemical and physical characteristics, the results of repeated dose toxicity tests, acute toxicity tests, mutagenicity tests, degradation tests, and so on.

Members of the EEC have already agreed to use MPD as the basis on which they will meet the requirements of the so-called Sixth Amendment to the Community's rules on chemicals. Athanase Andreopoulos, director-general for the environment and consumer protection at the EEC commission, told last week's meeting that, following previous agreement by OECD members to accept the validity of tests carried out in other countries according to agreed laboratory procedures, international agreement on MPD was the "next essential step" toward a system that would adequately protect man and the environment while maintaining international trade in chemical products. The U.S. chemical industry, however, has argued that, given the current requirements of TSCA, those of the MPD would be unnecessary and would result in further testing costs. Reflecting this position, Gorsuch, in her opening statement, told her colleagues that the Reagan Administration was opposed to "inflexible, across-the-board, one-time notice requirements for all new chemicals." The United States, she said, was currently moving towards a more flexible system which would increase the testing burden on some chemicals and reduce it on others.

Symbolically, however, the EPA's firm stance on MPD indicated U.S. determination to oppose what it considers to be excessive regulation in the international arena—despite the different interpretation of some of its industrial allies—in the same way that it has done domestically. This was also reflected in the lack of any significant movement toward agreement on a common approach to the export of potentially hazardous chemicals to Third World countries, where the Reagan Administration has also taken a strong stand against new regulations.

By the end of the meeting, there seemed to be a resigned acceptance that the United States was not going to shift its position—and relief that at least a minimal form of accommodation had been reached.—**David Dickson**

0036-8075/82/1203-0982$01.00/0