and the delays involved, has advisers to the program agitated. Emotions include worry, scorn, and fear that the government will abandon all experimental policy programs if ERDIP doesn't work out.

For one thing, the lack of a clear consensus on what exactly ails the mysterious beast called the process of innovation is viewed by some as at the heart of the ERDIP's difficulties. "The program as announced by the President has very little intellectual content," said a critic in government who asked not to be named. "The project set up is a straw man."

He indicated that "people understand invention and innovation. You can make generalizations about it. There's no great big mystery here . . . but the fact is that nobody has the guts to take any one of these steps," such as tax incentives or capital gains laws changes. "It's questionable if you can make 'experiments.' You end up spinning your wheels."

Economist Edwin Mansfield of the University of Pennsylvania, who has specialized in the economics of R & D and advised the government and NSF, stated that studies of stimuli for aiding the laboratory-to-marketplace process are worthwhile but less urgent than evaluating the social returns from research. Mansfield said he was concerned that the program wasn't "trying to get information on where the shortfalls are greatest," where the "social returns are high and the private returns are low," although he thought the staff was "aware of these considerations." In other words, NSF hadn't identified fields where aiding the commercialization of products would be of the most value to society.

The prospect that NSF will fund the so-called peanut butter proposals seems to worry a good many people. "The proposals are all coming from institutions which would be performing the experiment," said an industry consultant. "This is the same old NSF way of doing things: they get in a lot of ideas, look them over, choose the best, and fund them. . . . I was hoping there would be one group that would be terribly imaginative."

Commerce Department economist Michael Boretsky, who has theories about the importance of high technology to the health of the economy (*Science*, 2 March) indicated that the programs in NSF and NBS, as he understood them, would substitute public funds for private funds. "If a guy comes to you with a brilliant idea, and you give him money, and it then becomes a commercial success, what have you learned? That government funding of good ideas leads to successes."

And the late Donald Marquis of M.I.T. stated, "I think the NSF and . . . NBS should take the lead in designing the kinds of experiments they think would be fruitful and then putting them out for bid rather than relying on unsolicited proposals," but he added that NSF "doesn't have the clout to carry out the experiments."

The earlier remark diagnosing a lack of Webb-like dynamism and political savvy was echoed in other comments by outsiders concerning the ERDIP staff. Many who had made inputs to the program thought Smith and Bisplinghoff were both "sensitive" to the complexity of the problem. But there were plenty of other comments reflecting impatience with the delay. "Those guys have completely alienated industry," said a professor who helped bring industry officials to talk with NSF. He said when the program was announced a year ago that many of the people he knew were very enthusiastic and eager to help NSF, "but they [NSF] just didn't react. These guys are used to action." "There are 12 to 20 people in the country who know something about the innovation process," said another university adviser. "None of them are among that staff."

Once NSF finally clears some plans with OMB and announces some specific actions, the anxiety, impatience, and confusion now surrounding the program may clear away. OMB may finally remove its spiked boots, step back, and let ERDIP officers conduct their business normally for a change. And, in what NSF estimates will take 5 years, some results useful to federal policy-making could start rolling in.

However, as Bisplinghoff himself stated in an interview, if the economy recovers, "There would be a tendency to take a lot of the steam out of it [ERDIP]," since the impetus for the program stemmed from economic troubles. Another government official said, "If the economy begins to move . . . they can turn the program off and say we don't need the stimulus. It'd be easy."

Whether or not ERDIP ever gets off the ground, at the moment, appears to depend on how adroitly NSF can maneuver to close the credibility gaps ERDIP has opened inside and outside government. It may also depend, incidentally, on whether ERDIP can actually do something about an urgent national problem.—DEBORAH SHAPLEY

Endangered Species: Moving Toward a Cease-Fire

It was the third week in February, and hope was turning rapidly to despair among a small band of conservationists and biologists who had spent the past decade trying to arrange a worldwide treaty to protect endangered plants and animals from the depredations of illicit trade. Only 10 days before, in a grand culmination of this long enterprise, the delegates of 88 nations had trooped into the State Department in Washington to thrash out the final details of an international cease-fire of sorts on endangered species. In an opening round of speeches the diplomats had staunchly pledged themselves to saving the earth's vanishing animals and plants. But now, in the private shirt-sleeve sessions that followed, negotiations were bogging down in a mire of conflicting amendments and semantic disputes, and it had begun to look as if the long-awaited agreement might not be signed.

With the conference half over and the prospects for a broad, forceful agreement growing dimmer by the day, the U.S. Interior Department could

More than 200 African leopard skins appear in this 1968 photo of a Paris import firm.

hardly have chosen a better time to release what turned out to be electrifying news. Appearing before newsmen on 21 February, Assistant Secretary of the Interior Nathaniel Reed (himself a member of the U.S. delegation) disclosed that customs and wildlife agents in New York had cracked a major international fur-smuggling ring that had accounted for half the U.S. market in spotted cat hides and had done much to exterminate some of the very animals the diplomats were trying to save.

In one 18-month period ending last May, Reed said, 33 defendants, including the New York furriers of Vesely-Forte, Inc., handled no fewer than 100,000 smuggled pelts of leopard, cheetah, ocelot, margay, otter, jaguar, and puma. In cooperation with poachers and middlemen on four continents, Reed said, Vesely-Forte and its 32 codefendants (all of whom have pleaded guilty) managed in less than 2 years to peddle the hides of fully one-tenth of the world's known surviving cheetahs.

By the end of the 20-day conference, a number of delegates and their scientific advisers were convinced that Reed's disclosure had had a major, salutory effect on the mired proceedings. "It brought home the fact that we were not engaged in a theoretical exercise," said Perez Olindo, the director of Kenya's national park system and a prime mover behind the endangered species convention. "It became clearer to everyone that we were dealing with a real, multimillion dollar problem," Olindo told *Science*. "We could not afford to leave without signing an agreement."

And indeed the conference did conclude an agreement—one that was broader and less obviously vulnerable to circumvention than even the optimists had hoped for at the outset. The agreement formally initialed by the United States and 79 other nations on 2 March (eight delegations were not empowered to sign) establishes a worldwide system of export and import permits designed to ban all commercial trade in 375 species or genera judged to be on the verge of extinction. The system will also make it possible to monitor—and thus to regulate—international trade in over 250 other, less endangered animals and plants. The agreement applies not only to whole specimens, dead or alive, but also to any "readily recognizable" products therefrom. In addition, at the insistence of the United States, the convention extends protection to seals, sea turtles, whales, and other endangered species taken on the high seas, a region flexibly defined as the area beyond the territorial jurisdiction of any country. The United Nations' newly formed environmental secretariat, directed by Maurice E. Strong, will monitor the operation of the permit system.

In substance, the signed convention differs little from the draft agreement the conferees, started with on 12 February (*Science*, 23 February). Essentially it provides three levels of protection:

► For animals on the brink of extinction, the killing or capturing of each specimen would require an export permit from the country of origin and an import permit from the country of destination. Such permits would be granted only under "exceptional circumstances," a phrase meant to imply vital health research or research that might materially enhance the species' chances of survival. Thus protected are most of the spotted cats; most crocodilians including the American alligator; a large number of birds, primates, and other mammals, including the same five species of whales for which the International Whaling Commission declared a moratorium on killing last year. In no way, however, does the convention step beyond or supersede the IWC's authority.

► For those species known to be declining in numbers but which are not in jeopardy of extinction, trade would still be permitted. Importing countries would require each specimen or product to have an export permit, but no import permit would be required.

► A third list of animals is reserved for those endangered in limited areas, but not on a global scale. By asking that a plant or animal be placed on this list, a nation would signify its desire for international cooperation in regulating trade for that species. In addition, the agreement contains provisions for adding or deleting species from all three lists.

With an agreement as complex as this (it consists of 25 articles and runs 36 single-spaced pages), major disagreements during the negotiations were inevitable. Less predictable were the battle lines along which the 88 nations aligned themselves.

Certainly one of the conference's more remarkable aspects was its apparent lack of traditional polarities between Eastern and Western, developed and developing nations. In part, this unusual public amicability probably stems directly from talks between U.S. and Soviet environmental officials last fall, in which basic understandings were said to have been reached on a number of issues concerning the preservation of wildlife. Credit is also due Christian A. Herter, Jr., the State Department official who presided over the conference, with a deft impartiality that drew considerable praise from delegates.

Where conflict did occur, it tended to develop instead between "exporting" nations, who generally favored strict trade controls, and "importing" nations who pressed for laxer, more narrowly construed regulations. Thus, in long bargaining sessions that sometimes

stretched into the early morning hours, the Americans found themselves allied with Africans and Latin Americans—in opposition to Japan and Western European nations, most notably Britain and the Netherlands, both with major fur-processing industries.

Economic considerations were doubtless an important factor in the conservative Japanese and European positions. (Britain, for example, is widely believed to process a large portion of fur seal hides taken legally and illegally in the Atlantic.) But at least among the Europeans, the practical difficulties of enforcing major new customs regulations were also a source of concern. As one British delegate observed privately, "It is the American style to clobber a problem with a law that is not enforceable, and then to try enforcing it as best they can. In Britain, unenforceable law is considered bad law."

In the end, U.S. officials were plainly elated at the conference's outcome. As one biologist advising the U.S. delegation put it simply, "We won." Assistant Secretary Reed, while conceding that fur smuggling would surely continue, said he was confident that it would never again reach the scale of the Vesely-Forte ring.

Nevertheless, the practical value of the endangered species convention depends largely on the good faith of the signatory nations and thus remains to be proved. For one thing, each nation must still ratify the agreement, and most will have to enact new legislation to enforce it. (Neither ratification by the U.S. Senate nor amendment of the Endangered Species Act appears to pose any problems, however.)

Moreover, a number of U.S. officials fear that, in the year or more the convention will take to come fully into force, poachers the world over may engage in one last, potentially catastrophic slaughter of wildlife. A grandfather clause in the convention exempting hides stockpiled before the convention takes effect could encourage such a slaughter, Russell Train, the chairman of the President's Council on Environmental Quality, warned the closing session of the conference.

It is also possible that some countries may decide to abstain from protecting specific animals while adhering to the rest of the agreement. The French leather industry, for just one example, is expected to apply considerable pressure to President Pompidou's government to ignore the convention's ban on trade in most crocodilians.

Above and beyond all this, those who drafted the agreement were well aware that destruction of wild habitat, and trade within nations, play at least as great a role in the decline of rare species as trade among nations. Even so, the convention stands as an important, possibly historic achievement—on paper, if not yet in the wild.

—ROBERT GILLETTE

Psychosurgery: Legitimate Therapy or Laundered Lobotomy?

The controversy over what some call the "new wave" of psychosurgery has been gaining momentum over the past year. It has rushed into a realm where data are scanty and unreliable, and where there are few legal, medical, or ethical guideposts. Neither the government nor the medical profession has established standards for the selection and treatment of psychosurgery patients, and some people think the way is clear for a new lobotomy boom like that which occurred in the 1940's and early 1950's.

One measure of the visibility of the problem is that Senator Edward Kennedy (D–Mass.) recently devoted a morning to hearings on the subject in connection with a bill he plans to introduce on medical experimentation with human beings.

If any single individual is responsible for getting the issue out in the open, it is Peter Breggin, a Washington psychiatrist who writes "brave new world" novels about psychosurgery. Breggin opposes any and all psychosurgery on the grounds that the operations have a general blunting effect on emotions and thought processes and that there is no theoretical or empirical justification for any of them.

This argument presupposes general agreement on a precise definition of "psychosurgery," but no such agreement exists. Grossly speaking it can be defined as the destruction or removal of brain tissue for the purpose of altering certain behavior. There are many kinds of procedures—what has aroused most concern is the fact that some surgeons are doing brain surgery on subjects prone to habitual violence. Critics think this is only a step away from using psychosurgery or the threat of it as a tool for social control.

The antipsychosurgery factions see little difference between current procedures and the old prefrontal lobotomies, of which about 50,000 were performed for disorders ranging across the spectrum of mental illness and brain disease. Lobotomies reduced the populations of mental hospitals. They also left an indeterminate number of semivegetables in their wake.

It was not the medical profession that called a halt to these operations. Rather, it was the development of a new family of tranquilizing drugs called phenothiazines. But as it became evident that there are some people whose condition intensive drug therapy can't alleviate, psychosurgery began a tentative comeback, this time in a far more refined form. The lobotomy has been abandoned in favor of interventions in various parts of the limbic system—the portion of the brain that rules the higher functions of emotion, self-awareness, and creativity. Stereotaxic surgical procedures, which enable electrodes to be inserted and directed to any part of the brain, have made operations highly selective. The trouble is, there is still no conclusive evidence correlating specific brain structures with specific behavior.

At present, probably no more than 500 psychosurgery operations per year are being performed in this country, by perhaps a dozen neurosurgeons. Nonetheless, the new ways scientists are finding to tamper with the nature of life itself, combined with the social aware-