cial federal documents be supplied; however, the foreign visitors noted that such documents are usually confusing or unreadable, and the State Department officials present appeared to accept the idea.

The shift in the State Department's attitude has also been prompted by a growing acceptance of partial U.S. responsibility for the unintended environmental and health consequences of the pesticide sales. American firms export 600 million pounds of pesticides each year, out of a total production of 1.6 billion pounds. Although the State Department no longer pays for a high proportion of the exports, past promotion is now regarded as having been excessive; also, department officials realize that the U.S. is uniquely suited to provide technical expertise that will minimize the harm of pesticide overuse.

Several harms have been caused by such promotion, according to participants at the conference. One has been hazardous contamination of the environment and of food, resulting most overtly in occasional mass poisonings in Africa or Latin America. The less-developed nations typically lack the capability to measure pesticide residues in food brought to market, but sporadic outside study has detected levels well above U.S. regulatory tolerances. DDT, for example, only one of many pesticides banned in the U.S. but used widely in the Third World, has been detected at high levels in beef, milk, seafood, and grains in Central America. A spot survey made by the Central American Research Institute—revealed at the meeting—turned up potentially toxic amounts* of two other pesticides, aldrin and lanate, in cabbage and tomatoes from the Caribbean.

Some of the banned pesticides have been reimported as residues on fruit and vegetables. The Food and Drug Administration, in a special survey last year, found residues of DDT, BHC (Benzohexachlorophene), lindane, dieldrin, and heptachlor on coffee beans (each is banned for most uses in the U.S.).

Though the monitoring appears to be scarce, the manifestations of pesticide overuse and misuse are widespread. Uncontrolled aerial spraying of crops in Columbia was attributed by that government last fall to have caused the deaths of thousands of animals, widespread population sickness, and the forced migration of peasant farmers. Similarly, in

*The amounts detected ranged up to 109 and 180 ppm, respectively; the U.S. tolerances are .01 and .2 ppm.

Lindbergh Letter to a Congressman Reflects

Charles A. Lindbergh, called the Lone Eagle for his historic solo flight across the Atlantic, was a public figure famous for protecting his privacy. Lindbergh nevertheless maintained an interest and behind-the-scenes involvement in public affairs and seems to have made at least a modest contribution to U.S. science policy.

After former Congressman and first director of the Office of Technology Emilio Q. Daddario assumed the chairmanship of the new House subcommittee on science, research and development in 1963, he sought to contact Lindbergh to invite him to join a small advisory panel for the subcommittee. After months of silence, Lindbergh telephoned. He declined to join the panel, but did come to Capitol Hill for a chat.

Daddario recalls that then and, particularly, in a subsequent conversation in 1970 Lindbergh voiced views which contributed to the idea of technology assessment of which Daddario was the main proponent in Congress.

*A letter written by Lindbergh in April 1970 was published later that year in committee hearings on science policy. That summer Lindbergh once again got in touch with Daddario and breakfasted with him at his home. Lindbergh at the time was particularly concerned about the fate of the Blue Whale and other endangered species and was reflecting on the effects of technology on evolution. The result of the second meeting was the letter below.**

SWITZERLAND, *July 1, 1970.*

HON. EMILIO Q. DADDARIO,
Chairman, Subcommittee on Science, Research and Development, Rayburn House Office Building, Washington, D.C.

DEAR CONGRESSMAN DADDARIO: I have been thinking a great deal about our correspondence, and about the breakfast table discussion at your home in Washington last month. I become constantly more impressed with the wisdom of your new approach to scientific research and development through consideration of its effect on the future welfare of mankind.

In the success of the ideas you advance here may lie, at least symbolically, the answer to whether our human species will continue to progress (even to exist) far into the future—whether we are the trunk or only an overspecialized branch of evolutionary life.

The critically important fact that man is beginning, vaguely, to realize in this 20th-century A.D. is that the impact of the human mind on life's evolution has been negative, and that major changes in his thought and action are essential. We see our surface-of-the-earth environment breaking down at the same time our genetic defects are increasing—both rapidly.

Our science and technology are at once responsible for the rapidity of breakdown and our realization that a breakdown is taking place. Speaking fundamentally, the human intellect is becoming aware of the vulnerabilities that accompany its power, that a crisis exists, and that to avoid self-destruction it must exercise control over its accumulating knowledge.

In this sense of humility impacting on intellectual arrogance, I find cause for hope. It is practically exemplified in the attempt you and your committee are making to estimate the effect of research and development projects on human welfare, and to relate your findings to the support these projects are given.

What you are trying to do, as I see it, and what man has not yet accomplished, is to relate intellectual action to human progress and evolution in the basic sense. Here, I think, it is necessary to bear in mind that life and awareness were developed by instinctive evolution working over

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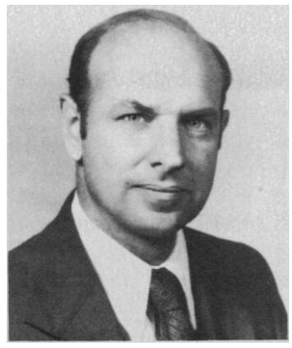
Egypt in 1976, 1000 water buffalo were found to have been fatally poisoned by the pesticide leptophos, which was manufactured then in the U.S. Incidents of human poisoning, with some fatalities, have occurred in Iraq, where 6500 people were poisoned in 1972 by methylmercury pesticide; in Pakistan, where 2900 people were poisoned in 1976 by the pesticide malathion; and in Sri Lanka, Nicaragua, Indonesia, and Malaysia. Overall, the World Health Organization estimates that 500,000 such cases occur annually, with a fatality rate of 1 percent.

Such fatal poisonings have also occurred in China, according to Chunming Chen, a visiting deputy director of the Chinese Institute of Health. "Carelessness in our pesticide use, and contamination of food or vegetable oils has caused some people to die in the past,"



Thomas Pickering

Chen said. "Now, every brigade has a plant protector." China produces most of its own pesticides, although it reportedly signed a recent agreement to import from some American chemical firms.

A third consequence of pesticide overuse is insect resistance, which in the case of mosquitoes has serious consequences for malaria control. Thought to be virtually wiped out in the 1960's by house-to-house spraying of DDT, malaria is now resurging in more than a dozen countries because so many species of the *Anopheles* mosquito—a malaria carrier—have become resistant to pesticides in wide use for both crops and insect disease control. As an example, an irrigation project currently funded by the World Bank in the Seyhan region of Turkey (near Adana) led to increased mosquito breeding, overuse of pesticides, insect resistance, and a local malaria epidemic. According to a recent World Bank report, "The remaining effective insecticides are few, and the need for quick, efficient measures (to prevent the spread of malaria) is critical for Turkey

Philosophical Approach to Science Policy

aeons, that the human mind impacted on this instinctive or "natural" evolution only a short time ago, and that the titanic problems we now face have been caused by a still much shorter period of intellectual domination. (I am tempted to say intellectual tyranny.)

Has our human intellect the wisdom to replace instinct or—since I think replacement is neither possible nor desirable—to work with it in basic evolutionary progress? We have no acceptable alternative to making the attempt. Ways must be found, through approaches such as you are planning, to give intellectual support to the fantastically complicated requirements for basic progress—requirements that are here obvious, and there so infinitely subtle that no mortal will ever be able to fully recognize and control them.

It seems to me essential for us to accept the fact that intellectual support of basic progress will necessitate reconsideration of long cherished ideals, laws, and customs. In guiding such reconsideration, we can lay down certain principles, one of them being that man must place more value on the human lifestream than on himself as an individual—realizing that he is only a temporary manifestation of that lifestream, that his salvation and immortality lie in it rather than in himself. Possibly this will involve an intellectual religion rooting into intuitive religions of the past. I do not think it will involve sacrifice when its full significance is understood.

Since all projects must relate to our environment, I believe your studies will quickly bring out the primary and pressing needs of protecting that environment both for our lifestream and for existing individuals. I do not see how adequate protection can be achieved other than by government supervision of natural resources, based on the proposition that each generation is their custodian for generations that will follow and that no one has a right to despoil or waste mankind's aeon-formed inheritance.

Such supervision will not be a curtailment of freedom but an emphasis of it, for we have reached a time when a framework of regulation is unavoidable if we are to maintain an environment in which the freedoms we have known are meaningful or can continue even to exist.

In hindsight, realizing the damage that has been done through our science and technology, I do not see how it could have been prevented except through laws, regulations, and accompanying education. It seems to me the same situation will apply to most future research and development projects. The study of probable effects may well indicate that support should be increased for one project and reduced or eliminated for another. I should think that major savings in talent and money could be made in this way. But I believe that sufficiently effective results can be achieved only by paralleling research and development programs with the laws, regulations, and education needed to turn the final results of these programs to the basic benefit of man.

Here we return to the ultimate question of whether the human intellect has enough wisdom to regulate its own creations, to use its science and technology for real rather than apparent progress. If it has, our future seems unlimited, with man's present-day awareness only an indication of what an immortal human lifestream may achieve. If it has not, then we may be close in time to our own extermination.

Let me say again that I believe you and your committee's approach to the problems involved gives cause for encouragement.

Sincerely,

CHARLES A. LINDBERGH