

mercialization of technology in ocean mining, space, energy, and integrated circuits. "Meanwhile, back in the U.S., we are bailing out Chrysler. Are we going to succumb to pressures from the status quo and subsidize geriatric industries, or are we going to subsidize our strengths?" Stevenson inquired.

"We are not here to present the Administration's total economic policy," replied science adviser Press. But, he observed, "American industry leaders would not want the American government to intervene in that way in American industry."

Both the Administration witnesses and their congressional audience appeared to agree on the premise that American industrial innovation is lagging. Senator Gaylord Nelson, chairman of the select committee on small business, noted that manufacturing productivity in the United States increased only 46 percent be-

tween 1976 and 1978, compared with increases of 116 percent in Japan and 75 percent in West Germany. Total R & D expenditures by government and industry, estimated to be \$51.6 billion in 1979, have only recently started to rise after a decline (in real terms) from 1967 to 1975. As a percentage of economic output, R & D in the United States fell 20 percent between 1968 and 1978, but rose by 16 percent in West Germany and by 20 percent in Japan. Patents granted to U.S. residents have decreased every year since 1971, while those granted to foreigners have steadily increased.

This is the gloomy side of the picture. Other statistics tell a brighter story. According to figures in a recent *National Journal* article, the balance of trade in research-intensive industries, such as chemicals, machinery, aircraft, and scientific instruments, has been improving steadily throughout the 1960's and most

of the 1970's. Another measure of how profitably research is put to use is R & D spending as a percentage of value added in manufacturing. Here the United States outperforms its rivals with a measure of 5 percent in 1973, compared with 2.9 percent for West Germany and 3.7 percent for Japan.

Industry representatives have not yet had time to study the proposals in detail. One sentiment is that a healthy economic climate would do more than anything else to help innovation. "If the government will allow us to make a profit, we will innovate," says a representative of the National Association of Manufacturers. The White House's proposals seem to be welcome as far as they go, even if some had hoped they would go further. The mountains of the federal bureaucracy have labored, but will they produce a better mousetrap?

—NICHOLAS WADE

## Cracking Down on Illegal Wildlife Trade

*The Justice Department estimates that illicit import of live animals may be a \$100 million annual business*

Six years after passage of the Endangered Species Act and four after the Convention on International Trade in Endangered Species (CITES) went into force, the federal government is taking serious steps to crack down on illegal wildlife trade in this country.

Officials connected with the effort say that the scope of illegal activities is probably greater than anyone imagined. Tropical birds and reptiles in particular are pouring into the country, either smuggled over the Mexican border or passed through the eight designated ports of entry for wildlife. And federal officialdom has neither the manpower nor the expertise to stem the high percentage of traffic that is illegal.

On 2 October, at the behest of the President, the Department of Justice established a new office, the Wildlife Law Section, to coordinate and step up law enforcement efforts. It is headed by Kenneth Berlin, who has spent the past 6 months looking into wildlife trade and who now estimates that illegal importation of live animals alone is a \$50 million to \$100 million annual affair. No one will yet hazard a guess on the worth of the animal products—such as ivory,

hides, shells, feathers, trophies, and furs—that are coming into the country under less than proper auspices.

The federal government's new interest in stemming illegal trade was expressed in President Carter's environmental message on 2 August, in which he called on the Justice Department to coordinate agency efforts. In background material accompanying the speech, the President put forth the following facts:

- Of approximately 200,000 documented shipments of wildlife into the United States in 1978, some 10 percent contained species listed by CITES.

- Justice Department personnel believe 10 to 25 percent of all shipments of birds into California in the last half of 1978 contained illegally imported species.

Illegal trade in flora and fauna has become an international phenomenon of massive proportions. Diminishing wildlife and habitats combined with human avarice have made such trade ever more lucrative as it becomes increasingly hedged in bylaws. Private collections in this country as well as zoos supply a voracious market for live tropical birds and reptiles. Macaws from South America

and cockatoos from Asia fetch up to \$8000 apiece.

Such trade is now restricted by a network of mutually reinforcing laws—the Convention, which prohibits commercial trade in some species and requires import and export permits for others; the Endangered Species Act, which protects foreign as well as domestic species; the Lacey Act, which makes it illegal to trade in species that are protected by foreign or domestic laws, and antismuggling statutes.

Although the legislative framework is now regarded by most people as adequate, penalties for violations are in some cases so weak that they can often be written off as part of the price of doing business. The main problem, though, is enforcement, a responsibility shared by the Customs Service, the Commerce Department, the Justice Department, the Interior Department, the Agriculture Department, and the Department of Health, Education, and Welfare. Spotting illegal shipments is an extremely difficult matter. To take one example, Agriculture Department inspectors are responsible for examining incoming plants and some animals for the presence of pests and dis-

## Smith Receives NASW Prize

News and Comment reporter R. Jeffrey Smith has won the National Association of Science Writer's "Science-in-Society" journalism award in the physical sciences for his article "Skylab Is Falling and Sunspots Are Behind It All" (*Science*, 7 April 1978). The award, which carries a \$1000 stipend, was presented on 7 November at the annual seminar of the Council for the Advancement of Science Writing in Palo Alto, California. David A. Perlman of the San Francisco *Chronicle*; Lewis Thomas, president of Memorial-Sloan Kettering Cancer Center; and Earl Ubell of CBS Television News served as judges.

ease; they are simply unequipped, however, to judge whether a particular shipment of orchids belongs to a protected species.

The most common way to illegally import a specimen of wildlife is to supply it with false documentation—either a false identification that could only be spotted by an expert, or by "laundering" a species through a country that permits its export. Hyacinthine macaws, for example, a great favorite of bird fanciers, come mostly from Brazil, where their export is prohibited (and their import therefore precluded by the Lacey Act). It is not difficult, however, for traders to catch the birds in Brazil, take them to neighboring Bolivia, which does not prohibit their export, and get them a Bolivian export permit. Traders also use cruder methods, such as dyeing birds or pulling out feathers to disguise their identity. Small animals are commonly smuggled in false bottoms of suitcases; larger ones are concealed in containers within crates of animals accompanied by legitimate documentation.

The increasing rarity of exotic species makes them ever more desirable. The head of a trade monitoring group told *Science* that the cockatoo extensively featured in the television series "Barretta" set off a great demand for Australian silver-crested cockatoos. Australia prohibits the export of any of its indigenous species, but with the birds fetching prices of up to \$5000 apiece, more than one entrepreneur has found the business worth the risk.

If any single thing has spurred the new federal initiative, it appears to be the case of the reptile trading operation uncovered in Philadelphia in 1975, which is only now nearing completion. In January of that year a Philadelphia customs agent, Joseph O'Kane, learned that a large number of reptiles had arrived at the Philadelphia Reptile Exchange, run by Henry Molt, Jr., accompanied by very small duty payments. On visiting Molt's offices, O'Kane was allowed to

inspect the records and was exposed to a dazzling array of documents from all over the world—Africa, Asia, Australia—which hinted at extensive smuggling, double invoicing, and other false documentation. There was enough information there to indict Molt and several associates, but the U.S. attorney's office in Philadelphia decided to probe further.

In 1976 O'Kane and Thomas Mellon, Jr., from the U.S. attorney's office, took a 45-day world tour, visiting the source countries of Fiji, Australia, and Papua New Guinea and meeting middlemen in such places as Bangkok, Singapore, and Switzerland. The trip was an eye-opener for the two, who knew little about the wildlife trade and found themselves getting acquainted with a vast network of souls who make their living "engaged in the business of extinction," says Mellon. Having traced Molt's supply network, they returned to Philadelphia and looked into his customers. It seems that most of the customers were not private collectors but zoos—nine major zoos, including those in Washington, D.C., and Philadelphia, have been implicated. Mellon said they got an outright confession from one curator and that "it is preposterous" to imagine zoos did not know what was going on. The zoo matter was turned over to the Interior Department on the decision of the U.S. attorney in Philadelphia; however, the office has secured 20 indictments of Molt and his associates in Philadelphia alone, and more are in the works.

Mellon thinks the Molt case illustrates the paralysis and lack of coordination of enforcement efforts in Washington. "We kept saying to Washington we know this is a multimillion dollar business and no one's doing anything about it." Molt had been taking regular global acquisition trips since 1973, bringing back reptiles that he purchased for a few thousand dollars and then sold for tens of thousands. In 1979 he was convicted for selling six iguanas for \$2000 and ten radiated tortoises from Madagascar (an endan-

gered species) for \$8000. (The tortoises went to private collectors because they were "too hot for zoos to buy at that time," says Mellon.)

If a scandal of these proportions can be uncovered in Philadelphia, which is not even one of the eight ports designated for import of wildlife and their products, it may well be asked what kinds of shenanigans wait to be exposed at the big ports such as New York, Miami, Los Angeles, and San Francisco. Berlin, of the Justice Department, who has seven lawyers working on investigations in his office, hints that things will really start popping in 6 months or so.

All the relevant agencies are giving new priority to cracking down on wildlife trade. Enforcement task forces, combining officials from Customs, the Fish and Wildlife Service (Interior), Agriculture, and the National Marine Fisheries Service (Commerce), are being set up around the country to promote cooperation among agencies whose efforts have often been compromised by jealous warring. At the same time, Congress is holding hearings on the Administration's recommended amendments to the Lacey Act, which are designed to jack up penalties and make culpability easier to establish.

Although the major focus is on illegal importation of live animals, there is also increased attention to traffic in exotic plants. Orchids and cacti are the most valued, with rare orchids sold for up to \$2000 apiece.

Coinciding with the federal government's attempts to tighten enforcement efforts has been the establishment of a private group called TRAFFIC (for Trade Records Analysis of Flora and Fauna in Commerce). This group was set up in London in 1975 and established an office in Washington, financed by the World Wildlife Fund, last summer. According to its director, Nicole Duplaix, the group has been working closely with relevant government agencies and has been gathering scientific and trade data in an effort to help piece together the vast puzzle of world wildlife traffic.

The picture is grim and the figures increasingly appalling. But that is partly because data gathering is finally starting to improve. The battle is an unequal one, but the effects of CITES are beginning to be felt. Those who wish to protect what remains of endangered and diminishing species can find hope in the fact that the main source countries are Third World nations which are getting tired of being ripped off by the industrialized world and recognize it as in their interest to stem the exodus.—CONSTANCE HOLDEN