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# Persistent PCBs

# Industrial Pollutants May Be Worse Threat Than DDT to Ecology

## They Linger Longer, Are Toxic at Lower Levels Than Had Been Thought

## Sick Monkeys, Minks & Men

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NEW YORK—A group of industrial pollutants that seemed to be coming under control a few years ago is currently emerging as a more serious threat than the insecticide DDT.

The ubiquitous pollutants—a chemical family derived from benzene and called polychlorinated biphenyls, or PCBs—are stirring concern for a variety of reasons. They have caused severe human ailments, including a skin disease and liver problems, and researchers are finding evidence that PCBs are toxic at far lower levels than previously thought. In laboratory experiments, PCBs fed to monkeys have resulted in a high incidence of miscarriages and sickly infants, while rats have developed liver cancer. Evidence is accumulating that PCBs may harm some wildlife — particularly ocean-feeding birds—and even the entire ecological food chain.

Furthermore, PCBs are far more resistant than even DDT to degradation by natural forces. In many places the accumulation of PCBs in the environment either has exceeded or may soon exceed that of DDT.

But because of their advantages—chemical stability, fire resistance and electrical insulating properties—PCBs are important to the safe operation of many electrical transformers and capacitors. They also have been used in such varied products as lubricants, waterproofing chemicals and "carbonless" duplicating paper.

**Used Longer Than DDT**

PCBs have been in use since 1929, more than a decade longer than DDT. But it wasn't until the late 1960s, several years after the late Rachel Carson's book, Silent Spring, focused attention on the widespread contamination by DDT and its danger to birds, that scientists began to worry about PCBs, too. But the federal government wasn't worried enough to curb use of PCBs, as it did with DDT in 1972.

Evidence of contamination now is being discovered far from industrial plants. "It's all over the place—we find PCBs everywhere we look," says Glenn E. Schweitzer, director of the office of toxic substances of the U.S. Environmental Protection Agency. Worrisome quantities of PCBs have been detected in fish ranging from salmon in Lake Michigan to striped bass in the Hudson River—a hint that the chemicals are leaking into the very beginnings of the food chain. Oceanographers have found the chemicals

"Our overall concern about PCBs is greater than ever before," the EPA's Mr. Schweitzer says.

That concern is increased by the fact that a three-year-old voluntary restriction on PCB applications has failed to reduce pollution. "The contamination of the environment is as bad as it has ever been," says Donald I. Mount, an aquatic toxicologist and director of the National Water Quality Laboratory in Duluth.

**Many Buyers Eliminated**

The controls were instituted in the wake of a 1972 report by a federal government task force that urged that PCBs "should be restricted to essential or nonreplaceable uses which involve minimum direct human exposure, since they can have adverse effects on human health." The sole U.S. producer, Monsanto Co., voluntarily stopped selling the chemicals to "several thousand" customers—all except users with "closed system" electrical applications.

The St. Louis-based company says that it now sells to only 40 PCB customers in the U.S. and that its U.S. production has been slashed to about 40 million pounds a year from the 1970 peak of 85 million pounds. Monsanto also makes PCBs in Europe and sells them under the same restrictions.

But the production cutback has failed to reduce pollution levels for several reasons. One is the chemicals' persistence in the environment; PCBs "could be around for years and years to come," says Nicholas S. Fisher, a marine ecologist at the Woods Hole Oceanographic Institution in Massachusetts. Also, many U.S. users of PCBs cut off by Monsanto are obtaining supplies from European producers for use in hand soaps, copying-ink toners and other products that readily contribute to pollution, federal officials believe. And finally, even Monsanto customers in their manufacturing processes accidentally spill PCBs, and direct emissions of the chemicals into waterways have never been stopped.

**Complete Ban Urged**

As a result of the apparent failure of voluntary controls, environmentalists are urging a ban on PCBs. "They are a hazard to human health, so there should be a complete phaseout of PCBs in every use as soon as possible," says Karim Ahmed, a biochemist with the Natural Resources Defense Council in New York.

According to Barry Commoner, a biologist and director of Washington University's Center for the Biology of Natural Systems, the lack of environmental caution in introducing PCBs amounts to "an absolutely shocking and staggering case history."

Mr. Commoner says the ability of PCBs to cause chloracne, a skin ailment, was well-documented by 1943 because of outbreaks among workers handling PCBs and products containing them. But nobody bothered to consider the eventual public-health problems that might result from the environmental pollution, he says.

It's true that only after environmental problems in general and DDT in particular

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# Persistent PCBs: Pollutants Loom As a Worse Menace Than DDT

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became issues in the 1960s did PCBs finally become suspect. In 1966, researchers discovered PCBs in the tissues of fish that at first had been thought to be suffering from DDT intoxication. Subsequent studies confirmed PCBs as a widespread contaminant, entering the environment through pollution of waterways, the burning of trash containing PCBs and other routes.

Then the alarm grew as new evidence of PCBs' toxicity came to light. In 1968, more than 1,000 people in Japan suffered an epidemic of a disfiguring skin disease, dubbed Yusho, that later was traced to rice oil heavily contaminated with PCBs. The victims also suffered abdominal pains and disturbances in liver function. The chemicals had been used as a heat-transfer agent in making the oil, which apparently had been contaminated by leaking equipment.

Evidence of toxicity continues to increase. After PCBs became an issue three years ago, the Food and Drug Administration set maximum levels, effective in 1973, to be tolerated in foods; the tolerance for fish, for example, was put at five parts per million. But recent research suggests that PCBs may be hazardous at the stipulated levels or lower.

The evidence comes from the University of Wisconsin's Primate Research Center. James R. Allen, a professor of pathology, says rhesus monkeys, only a few months after being put on diets containing as little as 2.5 parts per million of PCBs, suffered loss of hair, general metabolic disturbance and, in effect, a severe stomachache. Moreover, even low levels of PCBs in monkeys apparently caused abortions and sickly offspring. "This indicates that if man were exposed to similar levels over the same time, he also would become extremely ill," Mr. Allen says.

The monkey studies are considered significant because many fish contain more than five parts per million of PCBs. Through an insidious phenomenon known as bioaccumulation, PCBs tend to build up in the fatty portions of animals and man; authorities say PCB concentrations in fish may be up to 200,000 times as great as in the water in which they feed.

Fish from the Great Lakes, the Hudson, Milwaukee and Ohio rivers and other waterways are showing worrisome PCB levels. Recent samples from Lake Michigan average 8.6 parts per million in bloater chubbs, 28.9 parts per million in large lake trout and 19.5 parts per million in coho salmon. PCB levels tend to be somewhat lower in edible portions of fish but still exceed the five-parts-per-million limit.

Two shipments of Great Lakes canned salmon recently were seized by the FDA as contaminated, and several states have been trying to police fish sold within states. But many people, mainly sport fishermen, are believed to be still eating contaminated fish, despite warnings by health authorities in New York and the Midwest. And serious problems could loom for commercial fishermen. After studying Lake Michigan, for example, a special task force recently concluded, "Although all species aren't affected by PCBs, the potential exists for a significant portion of this fishery being curtailed."

Moreover, there are hints that PCBs also might cause cancer in man, although this possibility is far from having been proved. One soon-to-be-published study by Renate D. Kimbrough, a physician currently with the federal Center for Disease Control in Atlanta, provides the strongest indication to date that PCBs can cause liver cancer in rats. "This serves as a warning that PCBs may be a low-grade carcinogenic agent in man," she says. Some scientists speculate that if the chemicals cause cancer in man, it would be only after heavy exposure over many years and possibly only in longtime workers in PCB plants.

The dangers to some forms of animals has been definitely established. For example, mink that ate Great Lakes fish containing PCBs failed to reproduce, and PCB pollution is said to have forced some mink growers out of business. And the chemicals are prime suspects in wildlife problems. Robert W. Risebrough, an ecologist with the University of California's Bodega Marine Laboratory, says there is a "strong but still unproven" case that PCBs are killing birds such as the herring gull and osprey.

Scientists also worry that PCBs in the oceans will eventually decimate some forms of algae, with a possibly fatal impact on tiny animals, near the bottom of the food chain, that eat those specific algae. Experimentation also has suggested that PCBs somehow interfere with the process of photosynthesis through which plants flourish. More recent research at Woods Hole, however, suggests that photosynthesis isn't impaired, but cell

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division is; the result would be fewer cells and *less total photosynthesis* in types of algae sensitive to PCBs. Nobody knows what the eventual impact, if any, will be on man.

Amid all these uncertainties, few people are seriously arguing that PCBs shouldn't be cleaned up. The EPA promises "aggressive" action. Mr. Schweitzer of the toxic-substances office says that next February the EPA will finally set effluent limitations for PCBs aimed at stopping industrial polluters. (Since 1972 the agency has had the authority to issue such standards, but hasn't done so. In the absence of standards, most PCB users have been free to pollute waterways, though some regional EPA offices have tried to regulate emissions through permits.)

The EPA also is citing PCBs in renewing its call for passage of the long-proposed Toxic Substances Control Act. The legislation, which isn't considered likely to clear Congress soon, would expand the EPA's powers to curb pollution. But environmentalists call the proposed legislation weak since it wouldn't require new testing procedures that presumably would stop dangerous chemicals from ever coming to market.

And skeptical environmentalists doubt the EPA, even with new laws, will accomplish much. "We're distressed at EPA because it's been a useless piece of bureaucratic machinery," says David N. Seymour, president of the Hudson River Fisherman's Association. The EPA's Mr. Schweitzer replies: "Maybe we should have given higher priority to the PCB problem — that's easy to say in hindsight. Certainly PCBs now have emerged as a high-priority item."

Proposals for a complete phaseout of PCBs, of course, imply that there is a substitute for their vital electrical applications. And Dow Corning Corp., a joint unit of Dow Chemical Co. and Corning Glass Works, claims that for transformers it has developed a workable substitute, polydimethyl siloxane, which is being used successfully in Japan. But doubts are expressed by General Electric Co., a major PCB user, self-acknowledged polluter and, ironically, a producer of polydimethyl siloxane. GE says there isn't any satisfactory substitute for PCBs in electrical gear, at least as the equipment is currently designed. It argues that the risk of banning PCBs—possible transformer fires and explosions — would outweigh the risk of keeping them.

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