PCB—Another Old Ally Unmasked

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WASHINGTON — The substances have been around for 40 years, but only in the past six has their danger to the health of man been suspected.

A Swedish chemist first found them in the tissues of birds and fish and in human hair.

Then a peculiar skin disease that reached epidemic proportions broke out in western Japan. The skin of the victims became pigmented and erupted into a virulent acne. Those affected experienced a profuse sweating of the palms, and a feeling of weakness and numbness. Five died. The attack was traced to heavily contaminated rice oil used in cooking.

Subsequently the same substances have been detected all over the world — in Arctic polar bears, in house dust in Michigan, in a batch of New York chickens, in Minnesota turkeys, in milk from a West Virginia farm, in rainfall over Britain, in packaged noodles and in human blood plasma and human milk.

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THE UBIQUITOUS and persistent substances make up a family of 210 different man-made chemical compounds widely used for industrial purposes called polychlorinated biphenyls or PCBs. They are odorless and colorless liquids and the properties that have made them valuable to industry — they can withstand temperatures up to 1,600 degrees — have made them an environmental hazard. They are slow to decompose and stay in the environment for many years. Scientists do not know how long.

Last week the National Institute of Environmental Health brought together research scientists from universities and government agencies and from four foreign countries to pool available knowledge on how PCBs affect human beings. The scientists met for two days at the isolated Quail Roost Conference Center near Durham, N.C.

Summarizing the conference, Dr. Norton Nelson, director of the Institute of Environmental Medicine at New York University, pointed to the gaps in knowledge.

Little is known about the toxic effects of long-term, low-level exposure nor how PCBs have spread to isolated parts of the world.

Last September, when the President's Office of Science and Technology and the Council on Environmental Quality established an interdepartmental task force to consider PCB contamination of food and other products, Dr. Charles Edwards, head of the Food and Drug Administration, called PCBs "a potential but not immediate health hazard" and warned against "alarmists seeking headlines."

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WITH PRESENT knowledge, the FDA thinks that the only imminent health hazard would come from humans eating large amounts of heavily contaminated food, as happened in the Japanese epidemic but the conference left a number of questions. Among the information gaps that Nelson mentioned was the need for more studies on whether the substance cause cancer and their effects on enzyme actions in the body and on reproduction.

One study reported at the conference showed that the interaction of PCBs with DDT and Dieldrin increased the toxicity of those pesticides. In the restrained language of the scientist, Dr. E. Paul Lichtenstein, department of etomology, University of Wisconsin, said that the potential effects of PCBs on biological systems, "especially in combination with other synthetic chemicals, should not be disregarded."

The conference also left open the question of the role of two impurities, dioxins and penzofurans, found in combination with PCBs.

The Japanese episode is the largest known poisoning of humans by PCBs but there have been other isolated cases. Tests here and aboard have shown that persons with high levels of PCBs suffer from acne, liver enlargement, brain and nerve impairment. These are people that have received massive doses.

There is increasing evidence of PCBs in th tissue of the general popufation. Detectable levels have been found in almost half of human adipose or fat tissue collected from hospitals and analyzed at the Michigan Department of Health. But there has been no indication that low levels contribute to death.

While the effect of the low concentrations in humans is unknown, laboratory studies on birds and animals raise questions of genetic defects for future generations.

In an experiment conducted with pheasants, South Dakota university scientists found that PCB-fed hens produced fewer eggs and that there was an increased number of chicks that did not have the strength to break out of their eggs. PCBs decreased the weight of the hearts and pleens and increased weights of the kidneys and livers of the birds. Another experiment by Cornell University scientists with ring doves also turned up a high rate of embryonic deaths in the second generation.

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PCBs ARE MANUFACTURED in the United States and six other countries — France, Germany, Japan, Italy, Spain and the Soviet Union — and exported to still others. The sole producer in this country is the Monsanto Co. of St. Louis. Its major PCB product is Arocior 1254.

PCBs were developed in response to the electrical industry's need for an explosion-proof insulating fluid for transformers. Other uses opened up — as fluids in heat transfer systems, in capacitors, hydraulic systems, gas turbines and vacuum pump.

The market spread to special paints, lubricants, adhesives, sealants, asphalt tile, some printing inks and carbonless carbon paper. As plasticizers they added flexibility, strength and durability.

They were used in paint for traffic lane markings, for concrete and cinder block that had to withstand hard use.

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One incident of milk contamination came from the leaching of PCBs from paint used inside silos. The PCBs got into the silage that was eaten by the cows. Another when transformer oil was used for defoliant spray on a power line right-of-way near a dairy pasture in West Virginia.

Chickens in New York were contaminated when fed meal that had been ground up in its plastic wrappers. More than 100,000 chickens were destroyed.

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A LEAK IN A HEAT exchange unit in a North Carolina plant processing fish for chicken feed led to the destruction of 88,000 more chickens and 60,000 eggs because they contained PCB levels in excess of allowable standards. The Food and Drug Administration has been unable to track down the sources of PCBs found in 50,000 Michigan turkeys that also were destroyed.

These are isolated incidents of high-level contamination from accidents. But PCBs are turning up with frequency in products in the general market basket.

FDA reported at the conference that the past 18 months, 684 samples of fish, cheese, milk, shell eggs and fish by-products, out of 3,505 samples, have been found to contain PCBs.

They have been detected most frequently in fish ranging from trace levels to 35 ppm, about seven times the [illegible] level set by the FDA.

Recently the FDA found PCBs in a variety of packaged foods. Container manufacturers had used recycled paper including carbonless carbon paper. All of this runs counter to another environmental consideration—the recycling of waste products. While PCBs are not longer used in carbonless carbon paper, there is still a lot of it around. It was used extensivley by banks and by the internal revenue service tax forms.

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AFTER PCBs WERE indentified as a risk, Monsanto cut back its production and limited sales to customers who would use them in closed systems. They have offered to buy back compounds sold to customers for other uses and will no longer sell food processing firms even for closed systems because of the risk of a leak. The company has urged users not to discard the compounds but to send them back to Monsanto where they will be incinerated at 3,000 degrees and destroyed.

Monsanto also is reducing the chlorine content of the compounds it sells making them more biodegradable, but ironically increasing their toxicity.

The National Bureau of Standards reported at the conference that there is no acceptable substitute for PCBs in transformers and capacitors. A total ban on PCB production would require that large electrical transformers to be redesigned.

Until recently Monsanto refused to divulge production figures claiming that potential competitors would be tipped off to the size of the market. Now the company states that it produced 35,500 tons in the peak year 1970 and that production is now about half of that.

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NO ONE KNOWS how much is in the environment. Dr. Adel Sarofim of the Massachusetts Institute of Technology and Dr. I.C.T. Nisbet of the Massachusetts Audubon Society said at the conference that most is confined in sealed containers, either in actiye use or discarded in dumps.

But since PCBs were so widely used in so many products they have found their way into water systems, have become attached to sediment in rivers and lakes and on the Continental Shelf. This explains why high levels are found in fish and fisheating birds.

There also is evidence that PCBs have been airborne. One of the major gaps in information is how they reach the atmosphere.

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