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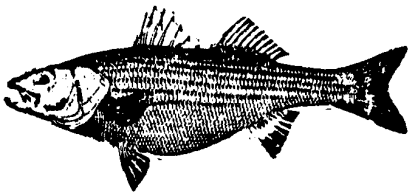

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OUR FISH IN THE HUDSON RIVER AND PCB

Spring more than any other season, is usually celebrated by fish-loving gastronomers for its early run of shad and their highly priced roe, and for the abundance of striped bass. In addition, the seasonal demand for freshwater species such as carp, pike and whitefish is greatly increased, since those fish are prime ingredients of gefilte fish, traditionally served during the Jewish Passover. Lent for the Catholics is a time fish are consumed more, in observance of abstinence from meat on all Fridays.

If the public has become apprehensive about eating these fish, there is every reason for their concern. Given the recently publicized facts about extreme levels of an industrial toxin PCB (poly-chlorinated biphenyls) found in fish habitating the Hudson River. Arguments among scientists about what safe levels of these chemicals are, the difficulty in telling where the fish in stores come from, and the migratory habits of freshwater fish that spawn in the Hudson River and then go out to sea, where they are caught, leaves one the only choice of foregoing such fish to be entirely safe.

"Robert H. Boyle, a devoted Hudson River sports fisherman who reported in 1970 on finding high levels of PCB in striped bass from the river said "Shopping in a fish market these days is like picking your way through a minefield, and it's a shame. Fish is great food-lean protein and delicious."[1]

"PCB's are similar to DDT in that they are both chlorinated hydrocarbons and fat soluble. They each have an extremely long residual life, so they do not readily break down in the environment. However, PCB's in the more highly chlorinated form are nearly indestructible except through incineration at temperatures higher than 2,700 degrees F."[2]

Currently PCB's are used for insulating purposes in transformers and capacitors. Previously they were used extensively in paper products, plastics, printing ink, caulking compounds, and hydraulic fluids. In 1970 such uses were discontinued because of the material's long residual life. They were found to persist in garbage dumps, landfills, etc. PCB's are heavier than water, so when in a water environment

[1]"With Awareness of PCB's in Fish, Consumer Concern Grows," The New York Times, 22 March 1976, sec. L, p. 30.

"Warning Issued On PCB's, " New York State Environment, a monthly periodical, September 1975 vol. 5, p. 5.

PCB's sink to the bottom where they are ingested by micro-organisms and become part of the food chain.

General Electric has two manufacturing facilities, both major users of PCB's in the vicinity of Fort Edwards and Hudson Falls, New York. Both of these G.E. plants have been charged with dumping excessive amounts of polychlorinated biphenyls into the Hudson River. There is documented evidence that PCB's cause toxic effects in laboratory animals, including liver damage, cancer and massive reproductive failures. The Japanese "Yusho" incident, so named for the town, in 1968 in which more than 1,000 people developed a disease after having used PCB-contaminated rice oil, demonstrated some acute effects of PCB on human health as a result of short-term exposure; chronic or long-term effects have yet to be assessed.

Until August 1975, little was done about the Hudsons' PCB contamination which at present at any rate, is attributed to the two General Electric plants. At that time the then New York State Commissioner of Envoronmental Conservation, Ogeden R. Reid, ordered tests which showed alarmingly high concentrations of PCB. As a result of this investigation, Robert P. Whalen, The State Commissioner of Health, issued orders

in February 1976 forbidding all fishing between Fort Edward and the Troy Dam. Also prohibited was the consumption of all eel from the Hudson River and advised that public intake of River fish be limited to one portion per week. Pregnant women and infants were warned not to eat any fish from the River.

Ploychlorinated biphenyls have been known for nearly 100 years. Commercial production of the material was initiated in 1929 in response to the electrical industries need for an improved dielectric (nonconducting) insulating fluid which would also provide increased fire resistant benefits when used in transformers and capacitors.

Mineral oil, the only known alternate material for these applications, has stability and flammability problems that make it potentially hazardous, power surges in electrical equipment can cause arcs. A sustained high-energy arc can vaporize mineral oil to the point where the material will ignite. PCB's unique properties, its inertness, fire resistance, and dielectric insulating ability make it most desirous where fire or explosions could accur, endangering humans and damaging equipment.

Monsanto Industrial Chemicals Company, Saint Louis, Missouri is the sole manufacturer of PCB's under the trademark AROCLOR 1248 (one of the nine trademarked

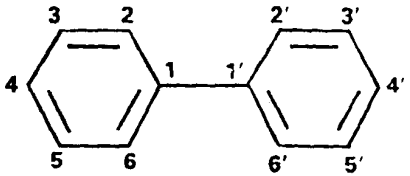
PCB compounds) which sells for 20-25 cents a pound. PCB's are man made organic chemicals with two benzene rings (like DDT) and a varying number of chlorine atoms. The wide variety of chlorine attachments cause PCB to have as many as 209 isomers, 100 of which are known to occur in the environment and 50 to 60 which are commonly found.

"CHEMICAL STRUCTURE - Polychlorinated biphenyls (PCB's) are made by direct chlorination of biphenyl. The biphenyl molecule has ten possible sites at which chlorine atoms can be substituted. The numbering system for the biphenyl structure is shown in Figure 1. By convention, the two rings are numbered identically except the ring with the fewest chlorine substitutes or substituted in the highest numerical positions is designated as primed. Examples of nomenclature for a Tri - and a tetrachloro-biphenyl are included in Figure 1 (contained on page number 6)."[3]

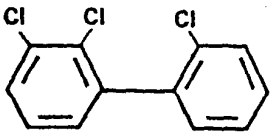
"In 1966 a Swedish biologist (Soren Jensen) while using a new and totally unique technique for the first time identified PCB's in the bodies of fish. In

3. Mieure, J.P., Characterization of Polychlorinated Biphenyls. Monsanto Company publication. National Conference On Polychlorinated Biphenyls, November 19-21, 1975.

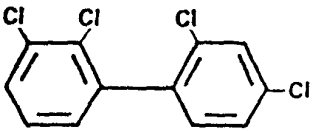
[4]Review of, Pollutions con's lot not 'appy." Chemical Week, April 21, 1971. Monsanto Company, reprinted by permission of McGraw Hill, Inc. New York, N.Y.



BIPHENYL



2,2',3-TRICHLOROBIPHENYL



2,2',3,4'-TETRACHLOROBIPHENYL

Figure 1

1968 Monsanto began studying the Swedes work. One problem: separating PCB from other chlorinated hydrocarbons like DDT and DDE that were known to be prevalent in the environment. To identify PCB, gas chromatography, electron capture and mass spectrophotometry methods had to be refined."[4]

Monsanto in 1970 made the conscious decision to only continue marketing PCB's to industries that used the fluids in "closed" or sealed systems, such as transformers and capacitors. "In making this decision, Monsanto felt, 1) that entry of PCB's to the environment would be effectively limited and controllable as a result of this restricted sales program (which became fully implimented by late 1972), 2) that a more biodegradable, lower chlorinated homolog had been developed for the capacitor industry, and 3) that withdrawal from electrical applications would have brought to a halt production of equipment, essential to the safe and efficient distribution and use of electrical energy (there being no known satisfactory replacement for PCB dielectrics available)."[5]

The Food and Drug Administration has set a level of 5 parts per million (ppm), (one drop in 80 quarts is equal to 1 ppm), of PCB found in fish as

[5]Monsanto Company, a paper, "Polychlorinated Biphenyls, A Risk/Benefit Dilemma." January 1976.

acceptable for human consumption. From all available information there are apparently no outward or visible signs displayed by the infected fish, although an unconfirmed report has stated that fish so contaminated tend to repeatedly swim in circles. "In general contamination of fish is far greater within 30-40 miles downriver from G.E.'s plants that it is either upriver from the plants or in the lower Hudson, south of the Troy Dam. Yellow perch sampled from the lower Hudson for example, average 6.5 ppm of PCB's while those close to G.E. plants, average 171 parts per million. Since our knowledge of PCB toxicity is still very limited and since PCB levels in some species are relatively low, there is as yet no clear evidence that people who eat fish from the lower Hudson are risking calamity. But bearing in mind that the FDA warns against an intake of more than five parts per million of PCB's on a repeated basis, fish lovers can use this information about Hudson fish to determine what and how much to eat."[6]

"The Hudson's commercial fisherman usually take about 1 million pounds of fish from the river each year. Some of their catch is sold to customers within a few

[6]Review of, "There's A Catch To Eating Local Fish," review of River for the Living, by Jack Hope. New York, 1 March 1976, pp. 70.

[7]Ibid., p. 69.

miles of the fishermen's docks. Some is shipped to Europe. And some, especially shad and striped bass, is sold to wholesale outlets such as Fulton Fish Markets and thence to stores and restaurants within the city. About two-thirds of the total catch is eaten by consumers within the Metropolitan area."[7]

Since PCB's collect in fatty tissue and since they are almost insoluble compounds that sink to the river bottom, they are generally found in greatest concentration in fatty bottom-feeding fish. Also PCB levels tend to be higher in fish that spend their life-time in the Hudson River, instead of those that visit only to spawn.

"Eels are fatty and are bottom feeders; thus they have the highest PCB levels and should be avoided. In the lower Hudson they have averaged 81.5 ppm with a range from 26 ppm to 240 ppm. Striped bass average 18 ppm with some having none at all and others having as many as 60 ppm of PCB's. The Hudson is the Northeast's primary source of these fish, and there is a better than 50 percent chance that any striper eaten in the New York area has spent part if its life in the river. Some may spend their entire lifetime within the Hudson while others may visit the river only to spawn and then return to sea, dispersing along the Atlantic Coast.

[8]Ibid., p. 70.

This would explain the variation in PCB levels measured in these fish. More than 100,000 pounds of stripers are caught within the Hudson each year, but it has been estimated that the river annually yields as many as 20 million pounds of striped bass, most of which are caught at sea."[8]

The Hudson is one of the Nations most popular sports-fishing rivers. While commercial fishing takes place in the lower Hudson, south of the Albany/Troy area, sports fishing is done along most of the rivers 315 mile length, ironically the Hudson is measurably cleaner than it was a decade ago, since most of the industrial polluters of the river and its primary tributary, The Mowhawk, have complied with State Law. As a result, water samples along most stretches of the river show significant declines in coliform bacteria, a primary biological indicator of pollution. There are more fish in the river today than could be found a few years ago, especially ocean or offshore species such as bluefish, spot (Lafayette), and fluke, almost unknown previously are found regulary.

"In this country in a recent experiment on laboratory rats, PCB's caused liver cancer. Last week in Chicago the scientist in charge of that experiment, Dr. Renate D. Kimbrough of the U.S. Public Health Service,

[9]Robert H. Boyle, "The Spreading Menace Of PCB," Sprots Illustrated, December 1, 1975, pp. 20.

delivered a paper in which she warned, 'Because of these findings in experimental animals, ingestion of PCB's in humans must be curtailed.' The environmental Protection Administration estimates that about half the American public now carries around with it from one (1) to three (3) parts per million of PCB's in its fatty tissues."[9]

"Another speaker at the Chicago meeting was, Dr. James R. Allen of the University of Wisconsin Medical School, who fed eight female rhesus monkeys a diet that included 2.5 ppm of AROCLOR 1248, for six months. They were then bred to normally fed male rhesus monkeys. Two females resorbed their fetuses, one suffered a stillbirth, and the five infants born were all undersized. Two of the infants, died while nursing, the three survivors are now eight months old, and although they have been on a PCB-free diet for four months, preliminary observations by Dr. Diane H. Norback, a colleague of Dr. Allen, indicate that the youngsters are hyperactive."[10]

"In a 1973 case, analysis of the brain and liver of a dead Herring Gull(a fish eating bird) from Michigan's

[10]Ibid.

[11]"Warning Issued On PCB's," New York State Environment, a monthly periodical, September 1975, vol. 5, p. 5.

Grand Traverse Bay showed an accumulation of 2,600 ppm of PCB's."[11]

"In 1968 coho salmon taken from the tributaries of Lake Michigan during the spawning run in 1967 were made available to commercial mink ranches as food and resulted in a precipitous increase in newborn mink (kit) mortality. The extent of the mortality appeared as a time-dosage response to coho salmon in the diet. Analysis of coho salmon from Lake Michigan yielded values ranging from 12 to 20 ppm of PCB's in whole fish."[12]

From November 19 through the 21, the U.S. Environmental Protection Agency sponsered a National Conference on PCB, held in Chicago, Illinois, which attracted 400 scientists, state and federal officals, conservationists, fisherman and industry representatives. The findings included findings of PCB's in the drinking water supplies of New Bedford, Massachusetts, Bridgeport, Connecticut. The abundant starling birds were also found to contain PCB residues. Analysis of duck wings showed that waterfowl in the Atlantic Flyway carry the highest PCB residues. New York State Attorney General Louis J. Lefkowitz held a public hearing on December 12, 1975, in New York City to investigate the hazards linked to PCB chemicals. A wide

[12]"Department Contests GE Company On PCB Discharge into Hudson," New York State Environment, a monthly periodical, December 1975, vol.5, p. 3.

variety of witnesses covered scientific, public policy, legislative, industrial, and citizen group considerations, and over-whelmingly agreed that careful but timely action should be taken.

At present there is lacking comprehensive information concerning the effects of PCB on humans. During one of the recent hearings concerning the problem an article appeared in the New York Times, by Richard Severo, dated Albany, November 10, 1975, stating, The General Electric Company conceded today that at least 65 of its employes has become ill over a 15 year period under conditions that may have been caused by or at least aggravated by exposure to PCB's. The illnesses described were minor skin irritations, nausea, dizziness, eye irritation, asthmatic bronchitis and fungus.

"It is now clear that cancer is not one disease, but rather a series of diseases caused by a variety of factors. The most recent estimates by cancer experts from the World Health Organization and the National Cancer Institute are that between 80-90 percent of all human cancers are environmentally caused."[13]

PCB's are only one of the thousands of chemicals that have been indiscriminately dumped into our envoron-

[13]"Cancer: Mostly a Disease of the Environment," New York State Environment, a monthly periodical, February 1976, vol. 5, p. 4.

without concern or regulation - without concern that is, until the evidence starts to accumulate on the toxic and carcinogenic health hazards posed by exposure to such chemicals. Even in light of these findings we are painfully slow to react. Even today as we become to realize the implications of dumping our waste and junk into our rivers and oceans along with burning waste, we still continue to do so.

Indifference, it costs too much money, what else can we do with it! , are the real issues here. PCB's can be destroyed, but it costs more money, to burn in a specially constructed furnace. Politics, also are a motivating factor to be overcome, recently General Electric offered to pay over two million dollars to the State of New York, for their contributory negligence, for a total unconditional release from blame. New York State Environmental Conservation, Commissioner Ogden R. Reid turned them down flat. "I'm getting strong pressure from GE and collateral interests in Albany to accept the offer, said Reid, describing his refusal as, 'a position upon which I will not change nor would any attorney representing the state that looks into this."[14] A day later newspapers articles quoted Reid as saying it would cost

[14]"Reid Spurns GE's 2M Bid to Clean Up the Hudson," Sunday News, New York, N.Y., 25 April 1976, p. 58.

$20 Million to cleanup the PCB's in the Hudson River. Shortly thereafter Commissioner Reid announced his resignation and has been relpaced by a new Commissioner Peter A.A. Berle, who must now assume the burden and rectify the situation. Without a doubt there is no "easy solution" to the PCB problem in our Hudson River. Since we began using polychlorinated biphenyls, we also have been allowing them to be emptied into the Hudson. To be dumped along with land fill, which contains all to often "our" the "humans" discarded electrical appliances such as T.V. sets, refrigerators, air conditioners, and the like which will rust in due time and the capacitors and transformers containing PCB will also decay and then leak their thick, viscous, aromatic fluids into the environment.

Studies must be advanced to determine exactly what dangers are present to humans from polychlorinated biphenyls, then once we have determined just what they are, take the necessary measures to cope with it. Next take corrective measures to protect the aquatic and wild-life species.

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