The miracle that got away

Fishing for coho was the joy of Joe Miller's life. "He ate and ate them fish." Then he started acting strangely. And why was the state killing all those salmon?

By Bruce Ingersoll

Photography by Robert Bradford

Back then, you didn't get any damn warning. I had no idea those PCBs were contaminating fish.

Joseph Miller, angler

Joe Miller is a dedicated salmon fisherman. His New Year's Eve doesn't arrive until the ice floes vanish from Lake Michigan, until the spring thaw freshens the flow of all the tributaries running down to the lake.

Miller is a 47-year-old paving contractor who operates a roller-skating rink and lives in an Indiana hamlet only a half-day's drive from Michigan's famous salmon and steelhead rivers. Give this man his druthers and he will go fishing. In this respect he is no different from thousands of other fishermen who have been touched by the coho-salmon craze.

To their delight, Lake Michigan has been transformed into one of the world's finest sport fisheries. In the last ten years, nearly 100 million lake trout, coho salmon, Chinook salmon, and other "salmonids" have been stocked in its once-barren waters. Awaiting the fish was a feast, and they grew at phenomenal rates, devouring a superabundance of alewives. The lake's transformation amounted to an ecological miracle unique in the history of ichthyology.

What distinguishes Miller from most other fishermen swarming along the lakeshore and trolling the coastal waters is his extraordinary success. He would come back from his jaunts to Michigan with salmon by the hundredweight. Some of the fish he would freeze; some he would smoke.

"I used to eat some every day," Miller said, "I wanted to have an excuse to go back up there."

Usually he did his fishing from late February until April, when he had to go back to pouring concrete for a living. The spring of 1975 was memorable. "I think I spent eight separate weeks up there that spring," Miller recalled. "I'd generally bring back 10 or 12 big coho and steelhead on the weekend."

He delighted in nibbling on smoked salmon. It was a delicacy to enjoy on weekend evenings while the skaters were circling the hardwood floor of his rink. Said his friend Helen Evans: "He ate and ate them fish."

Not just his fishing success and his taste for salmon set Miller apart, however. By May 1975, she said, Miller began behaving strangely. "He was extremely nervous. He became completely disoriented. Believe me, he did some peculiar things. He was afraid to drive his car. He was suspicious of his best friends."

Miller was hospitalized on June 13 for a "nervous disorder." His family and friends were mystified by his suddenly weird behavior. What's more, his doctor was baffled by several strange symptoms that suggested that Miller was suffering from some rare disease.

Miller was complaining of slight numbness in his feet and hands. Headaches plagued him. His face was erupting with what appeared to be acne, as if he were an adolescent. Equally distressing was the change in his eyelids. They had become puffy and red.

"I was mainly confused," Miller recalled. "Sure, I had those other symptoms. I had headaches. My skin broke out. I've tried to forget that part of my life."

But weren't those symptoms similar to those manifested by the 1,081 victims of PCB poisoning in Japan in 1968? Replied Miller, "No question about it."

Back in the spring of 1975, however, Miller and most other fishermen had never heard of PCBs, which is shorthand for the chemical compounds known as polychlorinated biphenyls. The alphabet soup of chemical pollution was already boiling over with insecticides like DDT and 2, 4, 5-T. How was a small town Hoosier to know about the PCB caused "Yusho disease" in Japan? How was he to know that he might be endangering

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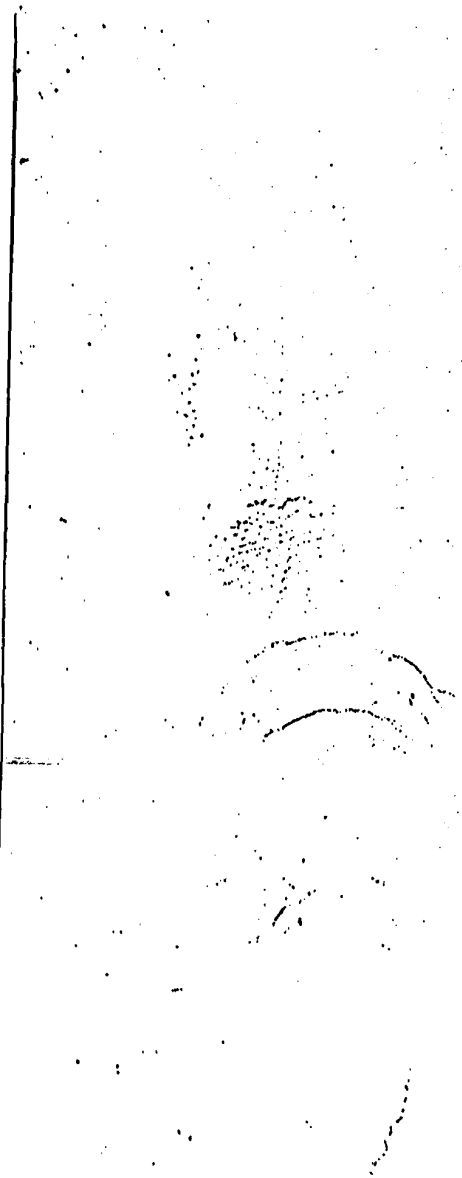

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his health by eating salmon and trout from Lake Michigan?

"Back then, you didn't get any damn warning. I had no idea those PCBs were contaminating fish," he says. "Now, when you purchase your fishing license, they warn you that you can get into trouble eating them."

Ever since the outbreak of Yusho disease, scientists here and abroad have been compiling medical evidence about the perils of PCBs. On the strength of this evidence, state and Federal officials have begun warning the public to eat large Lake Michigan salmon and trout only once a week. Eat any more than that and you are dining at your own risk.

PCBs make up a toxic family of industrial chemicals that have been widely used since 1929. They have the advantage of being heat-resistant, nonflammable under normal conditions, and exceedingly durable. Over the years, they have been added to ink, paints, varnishes, sealants, plastics, and adhesives. They have also been used in copy paper for duplicating machines.

It wasn't until 1966, however, that a Swedish scientist exposed PCBs for what they are—an insidious threat to nature. PCBs have since been found to be a global pollutant every bit as ubiquitous as DDT and even less biodegradable.

They've shown up in Arctic polar bears, New York chickens, Swedish eagles, Colorado mountain air, English drizzles, human blood plasma, food packaging, and mother's milk.

In mid-1973, the U.S. Food and Drug Administration took heed of the Yusho epidemic and of PCB research results in this country and ruled that any fish containing five parts per million of PCBs is unsafe for human consumption. FDA officials vowed to seize any interstate shipments of fish in excess of this limit.

Miller is neither a dummy nor an uneducated man, but he was totally unaware of these developments when he got out of the hospital, five days after he went in. His physician, moreover, never suspected that there was any connection between his eating fish and his developing such an alarming array of symptoms.

"My doctor couldn't explain what in hell was wrong with me," Miller said.

He didn't wait around for a clean bill of health before going back to Michigan. He couldn't. Big, sleek salmon were again shouldering their way up the Platte River, bent on spawning. So Miller headed north.

While fishing the Platte, he came across a state fisheries crew capturing coho salmon, stripping them of eggs and milt for artificial fertilization, and burying them in a pit. Miller was dumbstruck.

"These guys were killing coho by the thousands," Miller said. "I asked, 'Why in hell aren't you using these fish? They're a good source of protein.' They said the fish were contaminated with PCBs.

I started w[illegible]ing just what in hell I'd been eating all these years. I decided to check into it."

Miller wrote to the University of Wisconsin, the Michigan Department of Health, and the University of Michigan for all the PCB research reports he could get. His friend Mrs. Evans also began reading material on PCBs, including a scientific paper on the toxic effects of keeping monkeys on a diet containing five ppm of polychlorinated biphenyls.

"When I saw those pictures of the monkeys," she said, "I thought, My God, their eyes look just like Joe's—puffy and red."

That's when Miller swore off eating Lake Michigan fish. "I feel PCBs are what caused me to get sick," he says. He is now awaiting the results of a laboratory test on fatty tissue taken from his buttock. PCBs tend to accumulate in human body fat. Forty percent of all Americans tested in one study were found to have at least one ppm of PCBs in their fat.

If the PCB level in Miller's body fat proves to be high, he will be unique in the annals of American medicine—the first documented case of PCB poisoning from eating fish. And, fearful of becoming a medical freak, he has asked not to be identified. Miller is a fictitious name. "The last thing I need now is publicity," he said.

Great Lakes fish are unfit for human consumption even under the present, outdated FDA regulations.

Nathaniel P. Reed, Assistant Secretary of the Interior, November 21, 1975

Joe Miller had recovered from his pronounced hunt with PCBs by the time Nat Reed told a Chicago conference of scientists and conservationists that "the omnipresence of PCB residues looms as a very dark cloud over all our fish and wildlife programs."

Reed questioned the wisdom of spending millions of tax dollars to stock the Great Lakes with lake trout and other salmonids if the fish were going to turn into inedible "eunuchs" incapable of reproducing in PCB-polluted waters.

That cloud Reed was talking about was darkest over Lake Michigan. One of the largest fish stocking programs ever undertaken was suddenly in jeopardy. More than one million fishermen a year were making treks to this huge cul-de-sac of fresh water only to find the fish they coveted riddled with as much as 50 ppm of PCBs—ten times the FDA limit.

Last October, Indiana officials ran PCB tests on lake trout caught offshore from Michigan City. Twenty-two out of 23 composite samples exceeded the five-ppm limit. One sample contained 122 ppm—more than 24 times what the FDA deems safe.

Small wonder, then, that the Indiana Department of Natural Resources advised anglers against eating even one meal of lake trout a week. Said Robert W. Hollingsworth, chief of Indiana fisheries: "Go out and catch 'em. Mount 'em. Feed 'em to the cats, but don't eat 'em."

Nobody has a greater personal stake in the fate of Lake Michigan than Howard A. Tanner, director of the Michigan Department of Natural Resources. He was more responsible than anybody else for the lake's transformation into a great sport fishery.

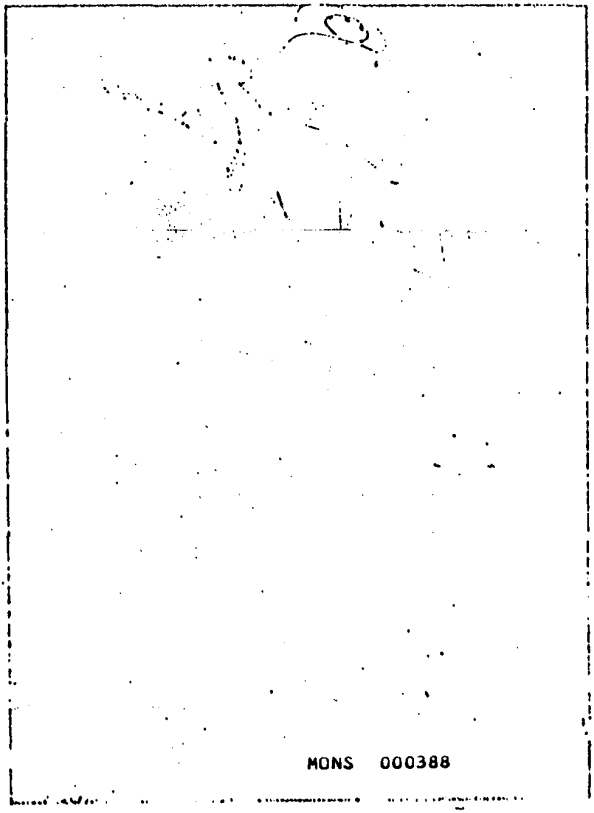
Back in 1964, when Tanner became chief of fisheries, his boss told him: "Howard, do something with our fish program and, if you can make it spectacular, so much the better." With this mandate, Tanner surveyed the scene. This is what he found:

• Sea lampreys had invaded Lake Michigan by 1936 and had all but wiped out the lake-trout population by the early 1950s. With their suction cup mouths and rasping teeth, these parasites sucked the blood and bodily fluids of the lake trout.

• Alewives had invaded Lake Michigan by 1949 and had taken over the lake by the early 1960s. The lake trout's disappearance had left the lake without any predator to keep the alewives from proliferating.

• The exploding alewife population had suppressed all the other species of fish. The smelts, chub, and perch could not compete with this interloper for food and space. Said Tanner, "The alewife had reached the point where it dominated all aspects of Lake Michigan life."

As a result of predation by the sea lamprey, the alewife invasion, and overfishing, Lake Michigan's commercial fishing industry was nearly moribund. The commercial lake-trout catch had fallen from a peak of 11.7 million pounds in 1921 to 34 pounds in 1954. The whitefish catch had dwindled from



[illegible] to 25,000 pounds in 1957.

Dismal as the situation was, Tanner saw "a great aquatic opportunity," a chance to capitalize on a lake brimming with alewives. Remember, the year was 1964, and nobody even suspected PCBs of being an environmental scourge.

Tanner decided it was time to turn Lake Michigan and the other Great Lakes into a sport fishery. For one thing, his state's inland waters were overrun with fishermen, boaters, and water skiers. Fishermen needed new horizons, and, as Tanner saw it, the coastal waters of Superior, Huron, and Michigan could provide them with all the room they needed.

By this time, the Great Lakes Fishery Commission had succeeded in bringing the sea lamprey under control. (The breakthrough had come in 1959 with the development of a chemical lampricide known as TFM.) The Federal government thus was preparing to restock Lake Mic[illegible] lake trout and revive the commercial [illegible] industry. Tanner had a bitter falling out with the Feds when he insisted it made more sense to build up sport fishing. With the backing of George Romney, then governor of Michigan, he bulled ahead with his plan to stock Lake Michigan with an "exotic" game fish from the Pacific Northwest—coho salmon.

"How did we choose salmon? Well, we toyed with the idea of introducing striped bass," he recalled. "We decided against it because we're on the northern end of the striped-bass range. We wanted a 'status fish,' so we chose a member of the salmonid family, the coho salmon."

The coho, Tanner said, grows faster and reaches sexual maturity sooner than lake trout. It is easier to catch than the deep-dwelling "lakers." It puts up a better fight. What's more, it is a saltwater species that adapts well to fresh water. Most important, the coho likes to sup on anchovies, which are remarkably similar to alewives.

"In the spring of 1966," he said, "we stocked 660,000 cohos. In the fall of '66, we had a small run of precocious salmon—they're called 'jacks'—come back. Lo and behold, we found we had jacks weighing five to seven pounds. Just think of it—they had grown from one ounce to five or seven pounds in the course of one summer.

"That really got everybody excited. We could hardly wait until the fall of '67, when the fully mature fish would return," he continued. "We weren't disappointed. We got a 36-percent 'return' on the fish we'd stocked. On the West Coast, they only get a one-percent return. We should have anticipated such a whopping return, because Lake Michigan was just a lake full of alewives. The coho had no predators."

The schools of young coho had nothing to fear, while their silver-sided brethren in the Pacific were being netted by Russian and Japanese fishermen and eaten by seals, killer whales, and other predators, he explained.

Then came the huge alewife die-off in the summer of 1967. "We had a pile of alewives a foot high and 300 miles long," Tanner recalled. "It drove people away from our lakeshore resorts. Businessmen were screaming their heads off. The next summer there was no alewife problem. It was pure serendipity, but everybody said the salmon solved the alewife problem. The salmon were the wonder fish."

That fall, coho mania swept the lower peninsula of Michigan. Within 18 months the coho in the initial batch had grown to prodigious sizes ranging from 10 to 20 pounds, dwarfing Pacific coho of the same age. So eager were some fishermen to hook these salmon that they disregarded small-craft warnings for Lake Michigan. Ten drowned in a storm. And as the coho surged up tributary rivers to spawn, some fishermen went semi-berserk. In their frenzy, they resorted to clubbing fish in the shallows.

These insanities aside, Tanner and his successor, Wayne Tody, were clearly onto something momentous. The success of the coho experiment was not lost on fish-management officials in Wisconsin, Illinois, and Indiana. They saw that the coho craze could not be ignored. What's more, Michigan had begun introducing another exotic creature, the Chinook salmon, and this fish would soon eclipse the wondrous coho in the hearts of fishermen. The huge Chinook is the king salmon, the most prized of all.

Within a few years, every Great Lakes state from Minnesota to New York had embarked on salmon stocking. What happened on Lake Michigan between 1966 and 1976, however, was unprecedented. A total of 99.7 million salmonids were poured into the lake, including 26.6 million lake trout provided by Federal hatcheries and millions of coho, Chinook, and Atlantic salmon, steelheads, brook trout, German brown trout, and rainbow trout.

Of these, Michigan, blessed with the largest water area and the best rivers for salmon and steelhead spawning runs, planted 66.6 million salmonids. Wisconsin planted 25.7 million. Indiana and Illinois, having far less lake under their jurisdiction, stocked 3.9 million and 3.5 million respectively. Indiana has managed to establish spawning runs on Trail Creek and the east fork of the Little Calumet River. Explained fisheries chief Hollingsworth: "We're trying to take advantage of what we've got. God isn't making any more lakes and rivers, and the Army Corps of Engineers isn't building any more reservoirs in our state."

The fish-stocking results surpassed the most grandiose expectations. Chicagoans discovered they had spectacular fishing on their doorstep. Richard J. Daley became a salmon-fishing aficionado and began dreaming of salmon runs up the Chicago River. Instead of going to British Columbia and Alaska, anglers flocked to Hammond and South Chicago to catch king salmon beneath the pall of steel mills. As Hollingsworth put it, "The south end of Lake Michigan is the only place in the world where you can catch high-quality game fish and emphysema at the same time."

Ten years ago, neither Howard Tanner nor anybody else anticipated what an economic splash the fish would make. Waves of prosperity swept over the charter-boat ports and resort communities. Tourism boomed. Marine sales—boats, outboard motors, boat trailers, downriggers, navigational gear—skyrocketed. "We figure this sport fishery generates $350 million a year in business," said Eldon Robbins, an editor of *Fishing Facts* magazine. "That's a very conservative estimate. We're talking about big business."

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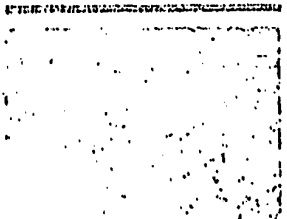
As the coho surged up tributary rivers to spawn, some fishermen went semi-berserk. But the fish they coveted were riddled with as much as ten times the FDA limit of PCBs.



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"The way PCBs were used ten years ago, you would have thought they were as safe as water. We have never found a fish in Wisconsin that did not contain PCBs."

What's more, it is a year-round business. "Every port on the lake likes to call itself the salmon capital of the world," Robbins said. "There is a certain amount of truth to their claims. These fish congregate in the south end of the lake and, as the water warms up in the spring, they move north along both shores. In April the salmon capital could be Michigan City. In May it could be Waukegan, and in June it could be Kenosha. It's sort of a floating crap game, and the fishermen follow the action."

To fathom the fervor of the fishermen, you must understand what Lake Michigan was like in 1966. It was a body of water almost bereft of game fish. "At age six, I started out perch fishing with a bent pin and a piece of stove string," said Joseph "Coho Joe" Sachar, conservation director of Salmon Unlimited, a dynamic group that has raised $125,000 to help stock Illinois waters with trout and salmon. "Now I'm a senior citizen. I've fished both oceans and the Gulf of Mexico. I consider Lake Michigan the world's finest freshwater fishing hole."

The fishing bonanza has already weathered the DDT problem of the late 1960s and the mercury scare of 1970-71. There has been an encouraging decline in DDT levels in Lake Michigan since virtually every significant use of DDT has been outlawed in the U.S. and in Canada. Mercury pollution was never really as widespread, being primarily limited to waste discharges from paper mills and chemical plants. As for PCBs, they are proving to be a far more diffuse, intractable problem.

"The way PCBs were used ten years ago, you would have thought they were as safe as water," said Paul Depuree, a microbiologist with the Wisconsin Department of Natural Resources. "PCBs made good plastic coatings for everything from [automobile] seat covers to copy paper. And when you use PCBs in everything and then throw everything away, you end up with PCBs leaking out all over. We have never found a fish in Wisconsin that did not contain PCBs."

PCB compounds are seeping out of landfills, being discharged from sewage treatment plants and going up in smoke from the incineration of PCB-impregnated paint, copy paper, and plastics. Thomas Murphy, a DePaul University researcher, estimates that PCB fallout from rain and snow over Lake Michigan amounts to five tons a year.

Then there is industrial pollution, as exemplified by the Outboard Marine Corporation in Waukegan. From the early 1950s to 1972, the company acknowledges using 8.4 million pounds of PCB-bearing hydraulic fluid in its die-casting machines. By its own estimate, 20 percent of the fluid leaked into Waukegan Harbor or a ditch leading into Lake Michigan.

The bottom muck in this nondescript ditch was found to contain 246,000 ppm of PCBs, making it the worst PCB polluted waterway in the nation. Concentrations as high as 9,960 ppm were found in the harbor mud. State officials are now negotiating with the company on how to clean up the mess.

Nobody knows exactly how much PCB pollution has accumulated in Lake Michigan or how much is still reaching the lake. PCB levels in the water are in the parts per trillion range, but once PCBs enter the food chain, they become greatly concentrated. Fish can pick up PCBs through their gills, fins, and skin. Predators at the top of the food chain, such as salmon and lake trout, contain PCBs at 100,000 to one million times the concentration in the water. Just as in humans, the PCBs collect in the body fat of fish. The flesh of salmon and lake trout is marbled with fat.

Most Lake Michigan fishermen are neophytes. They don't know what they're catching, but they do know the fish are good eating.

Joseph "Coho Joe" Sachar, co-founder of Salmon Unlimited

Sachar, an outspoken man who comes by his nickname honestly, is devoted to the pursuit of Pisces. He fervently believes that the coho and Chinook he brings to the gaff are edible. Pare off the belly fat or fillet the fish, he says, and they are eminently edible. On the other hand, he doesn't recommend making a daily diet of them, much less being a glutton about it. Moderation—that's his advice.

"If you smoke cigarets lightly, you can do it all your life," Sachar asserted. "And if you eat Lake Michigan fish only once a week, you

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Above, figure of seated Kuan Yin
Chinese, Late Sung Dynasty, 960-1279

can do it all your life without any problems."

An apologist he isn't. As he sees it, there is no need to justify spending millions of Federal and state dollars on fish propagation and management: "We have never had one known case of PCB poisoning from eating Lake Michigan fish."

This isn't to say there is no such case out there among the myriad fish eaters, going undiagnosed and untreated. It is possible that the test results on Joe Miller's fatty tissue will show that he is indeed a PCB-ridden man, the first fish-eating American to manifest the Yusho symptoms.

Cases of occupational exposure to PCBs began cropping up among chemical- and electrical-plant workers as long ago as 1936. None of them created as big a stir in scientific circles as the 1969 report on the Yusho outbreak. An estimated 15,000 Japanese were stricken after eating PCB-contaminated rice oil. But only 1,081 were officially diagnosed as Yusho victims.

Many of the symptoms were hideous and painful. Faces broke out with purplish "chloracne," a term that reflects the chlorine content of polychlorinated biphenyls. Changes in pigmentation left skin dark brown. Eyelids became swollen, and eyes began discharging excessive mucus.

Some of the victims developed painful deformities in their fingers, toes, ankles, wrists, or vertebrae. Some lost hair or had teeth fall out or snap off. Other symptoms included general fatigue, nausea and vomiting, stomachaches and headaches and neuralgia-like pain, dizziness, nervous disturbances, and forgetfulness. Moreover, women who showed no symptoms gave birth to babies who did.

Twenty-two deaths have been traced to this long-lingering disease. The incidence of liver cancer has been found to be 6 to 16 times higher among its victims than among the general population of Japan.

In this country, researchers have put mink, rats, and rabbits on PCB-contaminated diets and come up with disturbing results. The thyroids of rabbits atrophied. Rats developed liver cancer. Mink fed a diet of only two ppm died after 90 days.

To better ascertain what toxic effects PCBs would have on humans, Dr. James R. Allen, a University of Wisconsin pathologist, began experimenting with nonhuman primates -- rhesus monkeys.

Initially, Allen fed the monkeys diets containing 300 ppm and 100 ppm. Within one month, the monkeys had puffy eyes, acne, hair loss, and other symptoms. Within three months, they were dead.

Allen exposed another batch of monkeys to 25 ppm for just two months. They all developed symptoms during the first month. One died of PCB poisoning two months after it was taken off the experimental diet. The survivors showed ill effects for two years.

Next, Allen undertook a round of experi-

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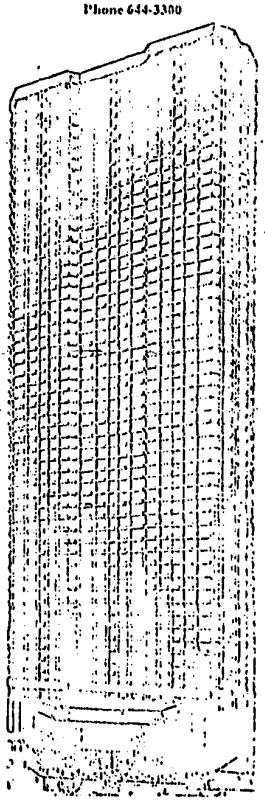

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"How many of us get joint pains or have children who are hyperactive? We think these things are just part of living. Well, maybe they're something else."

ments to see how the health and reproductive capabilities of monkeys would be affected by very low PCB levels. He also wanted to assess the impact of PCBs on their offspring. The Japanese had already discovered that babies pick up PCBs from their mothers, first in the fetal stage in the womb and then in the breast-feeding stage.

In one experiment, female monkeys were fed either 2.5 ppm (the FDA limit for PCBs in milk and dairy products) or five ppm (the limit for fish and poultry). Within four months, their menstrual cycles were altered and, within six, they all had acne and swollen eyelids. Many of the monkeys miscarried or gave birth to stillborn babies.

Six babies were born alive, but all were puny and undersized. Their body fat had PCB concentrations as high as their mothers'. They picked up more PCBs from breast-feeding. For three of the baby monkeys, the exposure was just too much. They died of PCB poisoning only four months after birth. Three survived—only to develop learning deficiencies and behavioral aberrations.

The implications for nursing mothers are unsettling. Noted Allen: "The PCB levels in the mother's milk of the monkeys were not too much higher than those found in human mother's milk." A recent 12-state survey turned up PCBs in 65 out of 67 samples of mother's milk. The mean was 1.8 ppm.

At this time, Allen is leery of drawing any hard and-fast parallels between his monkeys and us. For one thing, the PCB content of our diet is but a fraction of theirs. He does worry about the subtle, long term effects of PCBs.

He pointed out that after monkeys had been off PCBs for a year, they seemed fine and behaved normally. Yet, when bred, they all bore small infants that showed Yusho symptoms. Four out of ten babies died after being breast fed. And autopsies revealed that the baby monkeys had no thymus glands and only rudimentary lymph nodes, which reduced their ability to ward off infection.

"We have to ask ourselves," Allen said, "if we are willing to live with low-level PCB exposure which might be causing subtle changes in our population.

"How many of us get joint pains or have gastrointestinal problems? How many of us have children who are hyperactive or slow learners? We think these things are just part of living. Well, maybe they are or maybe they're something more."

Not all scientists are as convinced about these subtle effects as Allen. "I just don't see where this stuff, as it exists in fish, is toxic," said David Stuiber, professor of food science at the University of Wisconsin. "There are just too many unanswered questions."

He pointed out that monkeys and other laboratory animals have been fed nearly pure PCB compounds, while the PCBs we inadvertently eat have been weathered in the environment. This, he argued, could make a significant difference. Moreover, many of the PCBs used in experiments contain minute amounts of toxic impurities. It is possible that these impurities caused the ill effects, he said.

Allen is quick to acknowledge that no overt signs of PCB poisoning have turned up in the U.S. population, even among heavy fish eaters. Neither he nor Stuiber has heard of the as yet unconfirmed case of Joe Miller.

Harold E. B. Humphrey of the Michigan Department of Public Health has studied a group of sport fishermen and found a direct link between the amount of Lake Michigan fish they have consumed and the PCB level in their blood.

The blood levels ranged from a low of .007 ppm among those who ate less than six pounds a year to a high of .366 ppm among those who ate 24 pounds a year. None of the heavy fish eaters had any of the symptoms seen in Allen's monkeys. None experienced what Miller went through. Humphrey, nonetheless, said the question warrants more study.

In view of these research findings, the FDA announced last April that it will lower the tolerance limits for PCBs in all foods in interstate commerce. With the exception of freshwater fish, the PCB taint in foods has diminished in recent years as a result of FDA efforts and a joint state-Federal crackdown on PCB dischargers.

The St. Louis based Monsanto Chemical, the sole U.S. manufacturer of PCBs, said it will halt all production in October. And by then, the U.S. Environmental Protection Agency might have figured out what to do with 758 million pounds of PCBs in current use. Most of these PCBs are contained in supposedly "closed systems"—electrical transformers and capacitors, which are to be gradually phased out of service. The EPA plans to store them in special landfills until their PCB fluid can be safely incinerated.

If the plan proves anything less than leak-

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ploys, the potential for disaster is enormous. An estimated 150 million pounds have already fouled our air, water, soils, and sediments, and now the EPA must somehow dispose of five times as many PCBs.

Lake Michigan could least afford to absorb a major leak. Said Gilman Veith, an EPA chemist: "There is nothing to compare with Lake Michigan. Of all the large bodies of water in the world, it is the most PCB-contaminated of all."

Furthermore, he said, only a few PCB "hotspots"--rivers polluted by discharges from transformer and capacitor plants--have fish as badly tainted as those in Lake Michigan.

When the FDA lowers the tolerance limit to two ppm, probably this fall, the boom will fall squarely on the commercial fishing industry. Judging from the PCB levels in their catch, commercial fishermen on Lake Michigan will be the hardest hit.

"At two parts per million, there would be almost no marketable fish," Veith said. Yellow perch coming out of the lake average 5.8 ppm, chub six ppm, and whitefish three ppm. Concentrations of PCB in carp in Green Bay are running as high as 17 ppm.

Commercial fishing is less than lucrative. These days some fishermen have to poach protected lake trout out of Lake Michigan and black-market them, PCBs and all, in Chicago--just to make ends meet.

"If the standard is lowered to two parts per million, it will be a disaster," said a Wisconsin prosecutor who is investigating the poaching racket. "It will be the end. It will affect whitefish, the mainstay of legal fishing. It will mean, sadly, that no more commercial fishing boats will grace Lake Michigan."

Critics of the FDA argue that lowering the tolerance level does not get to the heart of the problem. They point out that Lake Michigan sport fishermen, who will be unaffected by the ruling, consume far more PCB-ridden fish than the man on the street.

FDA officials, having calculated the commercial fishing losses from the two ppm level at $49 million nationwide, knew they would be publicly flogged by the industry. Yet, they felt duty bound. Explained Elizabeth Campbell, a consumer safety officer: "Recent data indicate PCBs are more toxic than we thought. There are also indications that they are carcinogenic. It was our conclusion that we should decrease human exposure as much as possible."

It is not yet clear what will become of Lake Michigan's $350 million sport fishery. Not one of the men who let loose all those millions of Pacific salmon and lake trout, not Howard Tanner, not Bob Hollingsworth--nobody wants to think of its being curtailed. Unquestionably, two ppm will force the four states to re-evaluate their eat-only once-a-week warnings to anglers. The fish they bring home, after all, will be anywhere from 5 to 50 times the new tolerance.

"Even if all fish were at two parts per million, we certainly wouldn't recommend eating one meal a week; we'd only recommend one meal every ten days," said the FDA's Ms. Campbell. "We just don't know what's a safe amount. So if we do anything, we're going to err on the side of safety."

The monkey researcher, Allen, is still intent on finding out what's safe. Having fed his primates 300 ppm on down to 2.5 ppm, he has embarked on another round of experiments. This time he is feeding them ground-up fish meal, from fish caught in Lake Michigan. And this time he does not have them on a steady diet. The monkeys, instead, are eating fish intermittently, much as we do.

Eventually, by lowering the PCB level in the fish meal and watching for Yusho symptoms, he hopes to pinpoint one of the most elusive things in medicine--the so-called "no-effect level."

And if Allen finds that every level, no matter how low, has an ill effect, what then? What happens if he determines that even trace amounts are unsafe? If another researcher corroborates his findings?

Then all four states would have to extend to every species of sport fish Indiana's warning against eating any lake trout at all. It is conceivable that the PCB peril would flatten angling ardor, that the coho craze would pass, and that the states and the Feds would abandon fish stocking altogether. Ronald Poff, a Wisconsin official, doesn't see that ever happening.

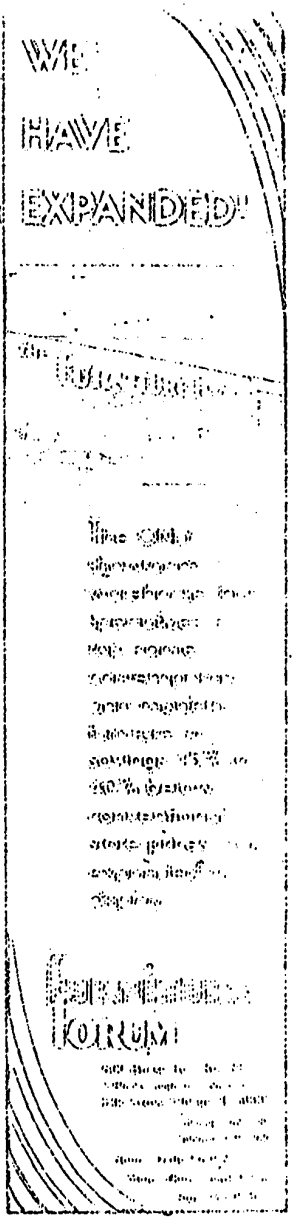
"We won't discontinue our stocking program," he said. "That would be giving up on Lake Michigan. We can't do that."

Carlos Fetterolf, Jr., executive secretary of the Great Lakes Fishery Commission, agrees. "Whether the fish are edible or not, you would still have a desirable ecosystem out there. Stocking those predator fish helps control the alewife nuisance," he said. "We discovered a selective toxicant to control the sea lamprey and then we took advantage of an ecological niche in the lake for salmonids. Hell, the tremendous resurgence of interest in the lake and in fishing comes pretty close to a miracle."

Nonetheless, there is no ignoring it. Lake Michigan is already an adulterated miracle, and, for the fishermen, it may yet be paradise lost. ☐

Celebrating far-out art in the MCA's tenth year

Next month in Chicago



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