

ECOLOGY Today

Published by
ECOLOGICAL DIMENSIONS, INC.
Box 150, West Mystic, CT 06588

Volume 1 Number 3

May 1971



Starvation is just a word to most of us. In other areas of the world, famine looms on a bleak horizon. Today—at least temporarily—millions of people in underdeveloped lands have enough to eat because of the "green revolution" and its champion, Dr. Norman E. Borlaug, his tireless efforts to develop high-yield grains has won him the Nobel Peace Prize in 1970. Our associate, an interview entitled *The Man and the Miracle*, salutes his selfless efforts.

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PHOTO CREDITS: Cover, Richard F. Bauer; Pages 2, 7, Rockefeller Foundation; Pages 4, 5, 6, 8, 10, 11, 24, 25, 26, 32, 39, 46, Richard F. Bauer; Page 11, George P. Kosholek; Pages 12, 13, AS Storstockholms Lokaltrafik; Pages 14, 16, U.S. Forest Service; Pages 28, 29, Richard W. Linfield; Page 33, David Nowlinson.

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ECOLOGY TODAY is published monthly by Ecological Dimensions, Inc., P.O. Box 150, West Mystic, CT 06588. Application to mail at second class postage rates pending at Fort Wayne, Indiana and additional mailing office.

Subscription rates: one year, \$6.00 (United States and Possessions). Special rates to bulk subscribers: five to nine one-year subscriptions, \$5.50 each; ten or more one-year subscriptions, \$5.00 each. Canada and Foreign: \$1.00 extra per year.

ECOLOGY TODAY is printed on recycled paper.

MAY 1971

DSW 334166

STLCOPCB4080744

PCB

MYSTERY POLLUTANT UNMASKED

For some years, researchers concerned about the dangers of DDT have been reporting a mysterious ingredient, sometimes mistakenly identified as DDT residue, but more often suspected to be a new compound even more difficult to analyze than DDT.

Finally, in 1966, Swedish Scientist Soren Jensen reported that the mystery compound was polychlorinated biphenyl (PCB). His discovery, however, was met with skepticism by chemical manufacturers who had always claimed that PCB was not used in ways that allowed it to escape into the environment.

The following year, PCBs were detected in North America. Since then, scientists around the world have come to the inescapable conclusion that this dangerous chemical is being *unintentionally and accidentally* released into the environment in unknown ways.

In December 1969, a concerned member of the chemical industry sent my environmental assistant a copy of Bulletin O/PL-306 from Monsanto Chemical Company, a 50-page description of AROCLOR plasticizers—inert, chemically resistant, fire-retarding PCB compounds. The bulletin promoted "scores of new uses," ranging from protective coatings, sealing compounds, adhesives, inks, varnishes, waxes to fabric coatings and paint pigment dispersions. The plasticizers were advertised as compatible with 27 compounds, including asphalt, resins, paraffins, even rubber, and recommended their

use for everything from vinyl foam and floor tile to bonding for aluminum foil, cellophane and even swimming pool paint.

The versatile PCBs are also used for waxes in dental castings, costume jewelry, heat-resistant aluminum paint for jet engine components and exhaust manifolds, in pigments for decorating glass and ceramics, for long-life insecticides, and as flame-proof and water-repellent coatings for tents, tarpaulins, canvas and cotton.

We read the Monsanto bulletin with increasing alarm because it was evident that such uses certainly resulted in wide dispersal of PCBs into the environment. For three months, we studied the problem, looking for reports on amounts already present in the environment, for experiments on PCB toxicity, and to find out what tolerance level had been set. Amazingly, only industrial exposure levels had been determined. There was no protection for the general public or the environment!

The Committee for Environmental Information of St. Louis, where PCBs are manufactured by Monsanto, published a report in January 1970 by Dr. Robert Risebrough, a marine scientist at Berkeley. He reported that PCBs had indeed become widely dispersed and that effects were beginning to show up in wildlife.

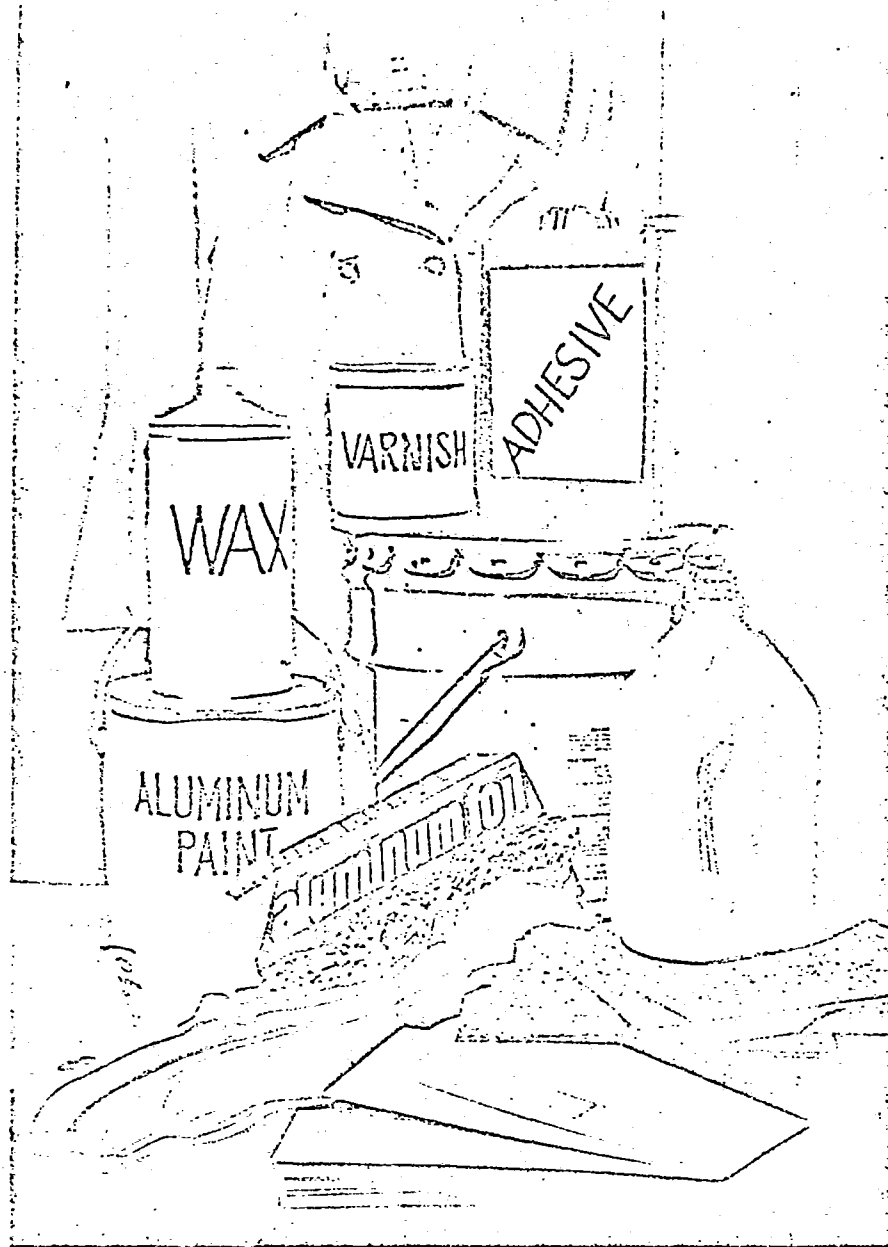
William F. Ryan is the Democratic Representative of the 20th District, New York, United States House of Representatives.

by William F. Ryan, M.C.

PCBs have been found in peregrine falcons in California, Western Gull eggs from San Francisco Bay and in mussels, plaice, cod and dogfish from remote parts of the West Coast. The primary effect of PCBs seems to be interference with reproductive cycles. Dr. Risebrough found there were indications of effects in humans. PCBs have been detected in human fat and mother's milk. While painting at home, he tested paint bought in a Berkeley hardware store and found it contained PCBs.

Dr. Risebrough had attempted to gain the cooperation of Monsanto but found the chemical producer reluctant to admit even that the compounds had been correctly identified as PCBs. Monsanto clung to the idea that "the common uses of commercial PCB would not normally lead to its release into the natural environment."

Our Washington staff consulted private and governmental laboratories, industrial toxicologists and academic researchers. A comprehensive informational kit was prepared that would give interested parties an introduction to PCBs and the hazard they represented. In sufficient amounts, PCBs may affect human beings by direct action on the skin or action within the body after being inhaled. The effect on the skin is chloracne, with early symptoms of pimples and dark pigmentation leading to more serious skin eruptions. Persons continuously exposed to PCBs may suffer nausea, loss of weight, edema and abdominal



pain. More severe effects are jaundice and atrophy of the liver.

How might people come in contact with PCBs? One way, we found, was eating fresh fruit. PCBs have been detected in citrus peels and fruits. A source for contamination might be PCB-impregnated plastic wrappings. Humans might ingest PCBs in such contaminated foods or they might absorb them through the skin from the handling of wrappings.

On April 10, 1970 we publicly called for a mobilization of governmental and private efforts to fully detail the extent of the threat of PCBs and the steps that could be taken to eliminate them. We asked the Department of Agriculture to ban the use of PCBs in pesticides. Previously, no

control had been exercised because the department had considered PCBs to be "inert ingredients." We asked the Food and Drug Administration to set food tolerance levels, to consider whether many of the suggested uses should be banned, and to require that all products containing PCBs be labeled. We asked the Department of the Interior to provide fish and wildlife protection from the hazards of PCBs. Finally, we called upon Monsanto to cooperate with governmental agencies to determine the extent of the danger.

The media reacted ultracautiously. In spite of our researched presentation, newspapers and TV used the "Ryan said—Monsanto said" approach, allowing Monsanto blandly to

deny that PCBs were being used in the ways their own bulletin suggested and in the ways tests had disclosed.

In Saint Louis, however, only a few miles from the Monsanto PCBs plant, the *Globe-Democrat* reported our findings, interviewed Dr. Risebrough and researched the controversy independently. Monsanto told the *Globe-Democrat* that it has spent "more than one million dollars on scientific studies, monitoring the use of the chemical PCB and seeking substitutes for it." Considering that Monsanto has been manufacturing PCBs for more than thirty years, this would seem to be a belated gesture.

Monsanto further stated that "we do not know of any current use of PCB in insecticides. Even so we are asking the U.S. Department of Agriculture to reject any insecticide which has PCB as an inert carrier."

In direct opposition to this statement, Ned D. Bayley, Director of Science and Education, Department of Agriculture, affirmed: "There are only five registered pesticide products containing polychlorinated biphenyls." It is difficult to believe that Monsanto did not know of these pesticides. Furthermore, while maintaining that PCB is not "highly toxic"—contrary to scientific findings—Monsanto curiously announced that they were working on alternate products to be introduced late in 1970.

Finally, on June 30, 1970, we received a letter from Monsanto's Organic Chemical Division. John Mason, assistant general manager, wrote that effective August 30, 1970 Monsanto would "no longer sell the chlorinated biphenyls to customers for use in general plasticizer applications where disposal of the end product cannot be controlled. This includes all the applications referred to in our bulletin O/PL-305."

Monsanto still refused, however, even to consider releasing information concerning production and distribution, information needed by scientists if they are to determine what quantities

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of PCBs are escaping into the environment. Monsanto would release such data "only to responsible governmental agencies" and, only upon receiving assurance the figures would remain confidential. Such restrictions, however, would prevent research by independent scientists already at work on the problem!

In a later press release, Monsanto resumed its former defensive position, complaining about "political charges" and how "sensational headlines" presented a false picture, nor did critics develop what the consequences of the non-use of PCBs might be. Monsanto proceeded to credit PCBs with protecting the public from dangers of fire and explosion. Then, at the end of the release, Monsanto said they were discontinuing certain sales of PCBs, re-formulating PCBs for other uses and in general tightening up production techniques.

An important step was taken in the Fall of 1970 when the Pesticides Regulation Division of the Department of Agriculture, since transferred to the Environmental Protection Agency, advised our office: "It is our current policy to refuse registration for products containing polychlorinated biphenyls or polychlorinated terphenyls."

In an article June 20, 1970, *New Yorker* magazine reported: "The acute effects on human beings of high doses of PCBs are evident from a series of outbreaks of poisoning, traced to cooking oil extracted from rice hulls, that occurred two years ago in western Japan, in which at least ten thousand people were affected." The article described an abnormal number of miscarriages and stillbirths in affected women, with abnormally darkened skin pigmentation in infants. Victims of PCBs also showed symptoms of jaundice and other liver damage. It is known that PCBs are used in Japan as herbicides in the rice paddies.

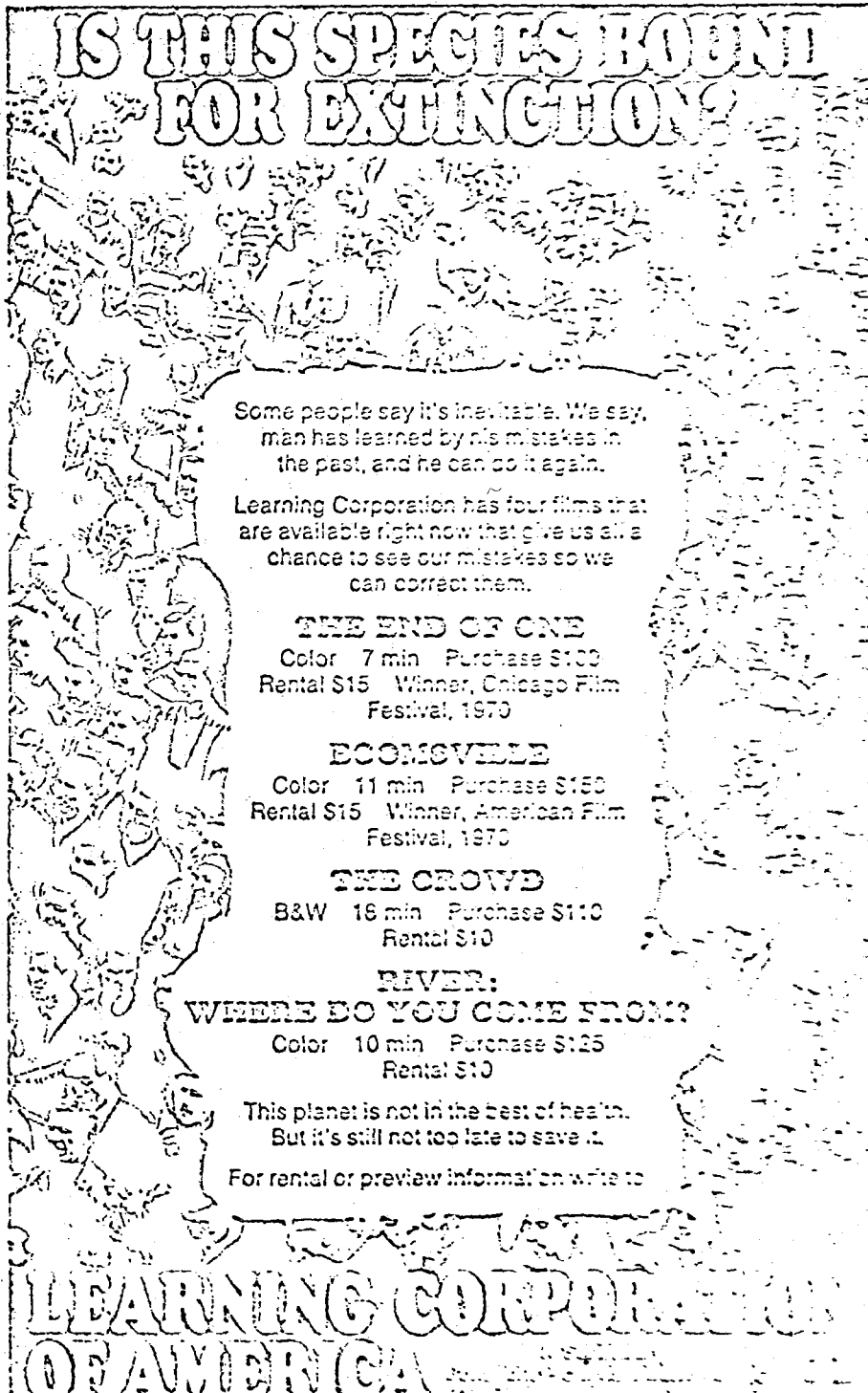
Closer to home, in March 1971, dairymen in Ohio and Kentucky have lost their licenses

to sell milk because PCBs have been found in the milk produced by their cows. The animals had been fed silage stored in silos lined with an epoxy-type product containing PCBs.

Chicken farmers noticed their birds dying in Missouri after chickens were placed in feeding houses which had been freshly painted with an epoxy paint. Investigation revealed that the toxic factor was a PCB binder in the paint.

PCBs are showing up in more everyday items in our domestic markets. They are used as ballast for fluorescent fixtures, in bulk news forms, even in the transparent receipts used in credit charge slips. Eventually all of these things wind up at the city dump or incinerator for burning, but the PCBs do not burn. They vaporize into the atmosphere. Another environmental source is runoff from industrial wastes and

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LETTERS

Sirs:

Just a line to congratulate you on Volume 1, Number 1, of *ECOLOGY TODAY*. It is a fine magazine, coming to grips with our major national problems of today.

Joseph E. Cyrils

Commissioner, Parks & Recreation
Boston, Massachusetts

Sirs:

Congratulations on your first issue. It is a most attractive magazine. Why, if you are going to remind housewives that soap contains no phosphates, not include at zero content Duz soap powder? I have never used anything else. It's a heavy-duty soap powder (remember the "Duz does everything" slogan?).

Frances E. Calhoun

Woodbury, Connecticut

Editor's Note: Our apologies to phosphate free Duz soap powder. We tried, in the phosphate chart, to stick with offenders, and didn't include many of the fine biodegradable detergents now on the market.

Sirs:

I just read through the first issue of *ECOLOGY TODAY*. It looks like a journal worthy of its title. However, one thing that struck me was an inconsistency between a "fact" stated on page 20 and another "fact" stated on page 23. Poindexter says on page 20 that every American produces ten pounds of solid wastes per day, while Mines says on page 23 that each American produces six pounds of solid waste per day. It seems that people who toss ecological statistics around should do so only after a bit of verification has taken place, or at least should credit the sources of their information. There is a great deal of difference between ten and six pounds of solid waste per person per day. People who are not ecologically minded can spot these discrepancies and use them as examples to show that environmentalists don't always know what they are talking about when they toss out statistics.

Robert E. Holtz

Assistant Professor of Biology
Concordia College
Saint Paul, Minnesota

Editor's Note: Unfortunately, it wasn't specified that David Poindexter was including per capita industrial waste in his figure of ten pounds each day. Samuel Mines' figure of six pounds refers only to household solid wastes. We apologize for this oversight on our part.

ENVIRONMENTAL LEGISLATION

continued

programs, research funds, and administration of the Federal program will be extended for several years, at levels much higher than past authorizations. The Congress will give close attention to proposals to alter the sewage treatment works program substantially. Such proposals include increasing the Federal share of costs to a flat 75 percent or creating an Environmental Financing Authority to buy local bonds, both designed to alleviate the pressure on hard-pressed communities for local matching funds.

Another proposal involves the complete takeover of sewage treatment plant construction by the Federal Government, perhaps on a regional basis with the Corps of Engineers as the construction agency. The costs of construction and operation, in this and other proposals, would be recovered by user charges on all those contributing effluent for treatment.

I would like to comment on another aspect of the Nation's environmental programs. Legislation and enforcement are not the only answers. We need to educate our citizens that their own practices of consumption are at the root of the problem. And we must have a recognition that the cost of pollution control must be borne by all of us, not just by industry.

The focus of public attention has been on the effect of present law on the private, profit making sector. But in the final analysis, people will pay the cost. A healthful environment which protects all of us will require a tremendous commitment in public and private funds. Product prices, costs of services, and taxes will reflect that investment.

What I am saying is, I think, quite simple. There will be no easy course in the future. Environment is not a passing issue. Costs of cleanup cannot be avoided. Any savings will come about through efficiency and ingenuity, not avoidance and delay.

MYSTERY POLLUTANT

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dumps. And a third source is the point of manufacture, PCBs escaping into the atmosphere through plant ventilation and exhaust systems, and through industrial sewer systems.

Enough PCBs have streaked into our environment to show up in rainwater in England, seals off the coast of Scotland, eagles in Sweden, pelican eggs in Panama, Arctic terns, shrimp in Florida, river water in Japan, the Great Lakes and finally human hair and fatty tissue.

What we have to find out now is the chronic effect of PCBs. As PCBs accumulate in human organs, which they are doing now, what will the toxic effects be? What compounds are responsible for the toxicity? Can PCBs mixtures be modified to eliminate their toxic components?

And it's about time we found out the annual production of PCBs, regardless of what Monsanto thinks.

These are some of the questions that must be answered if we are to prevent further environmental contamination by PCBs. We must continue to press for action from appropriate governmental agencies.

In October 1970 I urged the United Nations Conference on the Human Environment, to be held in Sweden in 1972, to study the PCB danger to animal and human life throughout the world. I also requested the Conference to ban PCBs in any use that would allow these compounds to escape into the atmosphere.

The PCB story—and it hasn't ended yet—is but another example of the carelessness which industry has shown in the use of man-made chemicals. We must find better regulatory procedures. Industry must assume greater responsibility for determining that no hazard exists before selling new compounds. It's tragic today that government and the concerned public are forced to prove the presence of a grave threat before industry finally acts.

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