PEOPLE OR PESTICIDES

A Life and Death Battle

What You Sow, So Shall You Reap

by

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If you plant poisons, you'll grow poisons

Every day countless numbers of us suffer the effects of pesticide poisoning without realizing it. We attribute our headache, fatigue, nervousness, aching bones, and fever to a cold or flu—and the true cause never occurs to us. Doctors rarely recognize these symptoms for what they really are, as there is so little availale research to guide them. And the possible link between pesticides and birth defects and cancer has been virtually ignored by the medical profession. As Dr. Samuel S. Epstein—a cancer expert at the Harvard Medical School—has pointed out, pesticides "could affect and catastrophically so, as many as 1/10,000 of the population and yet probably escape detection by conventional procedures."

Human beings are being used as guinea pigs to test the thousands of commercial poisons that are liberally sprayed on crops to control bugs, funguses, rats, weeds, and other forms of life that commercial farmers consider to be pests. These chemicals are dangerous to humans for they pollute the air we breathe, the water we drink, and the food we eat. The human body has had no previous experience with these synthetic chemicals, and there is no natural machinery in the body to break them down, much less eliminate them. The National Academy of Sciences reports that an average American consumes approximately 40 milligrams of pesticides each year in food alone, and carries about one-tenth of a gram permanently in his or her body fat.[2]

The need for pesticides is a direct result of human ecological ignorance. In a race to plant and prosper, humans have destroyed vast forests and plowed under lush grasslands, replacing them with single-species crops such as wheat, corn, and beans. Most living things were banished from the soil, or killed by artificial fertilizers, and the self-governing harmony of nature was completely lost.

Entire crops were often devastated by grasshoppers, corn borers, and boll weevils—pestilences the human race had brought upon itself by its utter disregard for the balance of nature. In the wild, the myriad species of insects had been kept from proliferating because they preyed on each other. Insects were also a basic food supply for field animals like frogs, lizards, snakes, and birds. In addition, many bugs were actually beneficial to plants and, like bees, served the ecological function of pollination, which produced seeds and fruits. Others fed on decaying organic matter and recycled it back into soil nutrients.

Granted the rare opportunity of an unlimited food supply that stretched over miles of cropland, with most of their natural enemies removed or destroyed, several species of insects increased at an explosive rate abnormal in a natural environment. The expansion of international trade after World War II made matters worse when new crops were introduced to countries where they had never

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before been grown, for new insects came along as uninvited guests. Many of these newcomers had no natural predators, which had helped control them elsewhere, and they multiplied even faster than their indigenous cousins. Furthermore, the widespread use of artificial fertilizers produced many genetically weak plant strains that were especially vulnerable to insects and funguses.

Rather than correct the problem by restoring to nature some of the things they had taken away, farmers resorted to the further use of chemicals. Over the last 33 years, billions of tons of synthetic pesticide compounds have been spewed into the environment. Blind to all considerations except yield per acre—meaning profits—chemical manufacturers conducted practically no research as to the effect of these sprays on other forms of life, on the ecology, or on the soil. As a result, we have paid the price of our good health for this criminal negligence.

DDT

Touted as a "miracle" pesticide by Swiss manufacturers who introduced the synthetic compound to the world in 1942, DDT is one of the most potent poisons known to humans. An obscure German chemist created DDT (dichloro-diphenyl-trichloroethane) in 1874 and it was considered useless until rediscovered by a team of Swiss scientists who were searching for an effective insecticide. Tried experimentally on a Swiss potato crop that was being ravaged by the Colorado beetle, DDT eliminated the bugs and all other predators as well. The poison was remarkably effective because it acted in three ways: on contact, in the stomach, and in the lungs.

During World War II, DDT was sprayed in powder form on American troops, their prisoners, and the civilian populations of the territories in which the troops fought, effectively preventing outbreaks of typhus and cholera, which had always occurred during previous wars. Malaria-carrying mosquitoes were nearly eradicated on South Pacific islands and public health officials predicted the day when malaria would no longer exist. For what seemed a great benefit to humankind, Dr. Paul Herman Muller, the Swiss scientist who perfected DDT's use as an insecticide, was awarded the Nobel Prize in 1948.

When the war was over, DDT's proven effectiveness found a peacetime application and it was used by crop growers to rid their fields of insects. DDT destroyed insects by the billions, and it was sprayed into nearly every corner of the world during the next 27 years. A major contributing factor to its popularity was DDT's extremely low price, which dropped from $1.19 a pound in the early 1940's, to 17 cents a pound a few years later.[3] Few people were alarmed by this widespread contamination of the earth, for not even scientists were aware of DDT's long-term effects. Most praised DDT as a "completely safe," conveniently cheap, super-strong insecticide that would eventually rid the world of pestilence, and subsequently hunger as well.

Some researchers disputed this unrealistically optimistic view of the scientific community, which had been formed at least partially by pesticide industry propaganda, but their valuable—and prophetic—findings were virtually ignored at the time. In July of 1945, the *British Medical Journal* released the results of a study in which experimenters applied DDT directly to their skins. Most of them suffered symptoms of chronic tiredness, irritability, indeterminate body pains, and a "feeling of mental incompetence in tackling the simplest mental task." One researcher was so severely affected by DDT poisoning that he was bedridden for ten weeks.

Reports of DDT's toxic effects on humans and other animals surfaced occasionally in medical and scientific journals, but it was not until 1950 that a Congressional investigating committee revealed to the world that DDT was not the blessing it had first seemed. Testifying before the Delaney Subcommittee, which was attempting to ban food adulterants, Dr. Morton S. Biskind of the American Medical Association issued the following warning:

"The introduction for uncontrolled general use by the public of the insecticide 'DDT'... and the series of even more deadly substances that followed has no previous counterpart in history. Beyond question, no other substance known to man was ever developed so rapidly and spread so indiscriminately over so large a portion of the earth in so short a time. This is the more surprising as, at the time DDT was released for public use, a large amount of data was already available in the medical literature showing that this agent was extremely toxic for many different species of animals, that it was cumulatively stored in the body fat, and that it appeared in the milk."

Dr. Biskind went on to explain that a large number of cases of "virus infections" and "intestinal flu" are actually incidences of DDT poisoning from foods that contained larger-than-usual residues of DDT.

Under pressure from the Delaney Subcommittee, the F.D.A. began to test milk products for residues of DDT, which the agency claimed would not be allowed on the market. To its surprise, the F.D.A. discovered that 62 percent of all milk contained DDT; so did 75 percent of the butter and 50 percent of the cheese. Clearly it was hopeless to try to keep DDT and other pesticides out of milk at this late date, so they set tolerance levels for these poisons. The Government allowed 0.05 parts per million (ppm) for whole milk, and 1.25 ppm for milk fat—cream, butter, and cheese. These tolerance levels are still in effect, but they are rarely, if ever, adhered to. Today, it is impossible to drink milk distributed through a commercial source without polluting one's body with an unsafe amount of DDT.

The F.D.A. did prohibit the use of DDT in and around dairy barns, where it had been sprayed directly on the animals for years, since it was discovered that even if DDT was applied to the barns while the cows were outside and the feeding troughs covered, the poison still showed up in the milk the next day. But the cattle feed was already contaminated with DDT, and air-borne sprays often wafted to the barns, so all the F.D.A. had done was to lower the amount of contamination, not eliminate it.

Contaminated milk is a serious problem for infants, who are especially susceptible to pesticide poisoning.

Since milk is a basic food for babies, and since most babies have a large amount of body fat, DDT is stored in their tissues in much greater proportions than in adults. When a baby learns to walk, it uses up its reserve of fat, and the stored DDT is released into the bloodstream, where it has been detected in high concentrations.

Breast-feeding is no solution, for mother's milk also contains high levels of DDT which has been absorbed by the mother from food and the environment. Women, especially if they are lactating, possess a larger amount of body fat than men do, and consequently absorb more DDT. Random samplings have shown that human milk can contain as much as 116 ppm of DDT, which is 2,320 times the legal limit set for cow's milk.[4]

DDT enters the food chain through the soil, where it remains in an active state for up to 40 years. It is a very stable chemical, not easily decomposed or broken down. Tests of soil powdered with DDT retained 80 percent of the chemical seven years later. Since farmers have been spraying crop fields for as many as 26 years, each year's amount has accumulated, steadily saturating the soil with an enormous amount of poison. Thus, we and future generations will be eating DDT for years to come.

Plants absorb minute amounts of the chemical in growth, and pass it along virtually unchanged to the creatures who eat them; the plants also contain surface residues that are ingested. To produce one pound of meat, livestock must eat approximately 16 pounds of feed,[5] which means that huge quantities of DDT are daily absorbed by these animals and passed along to humans, who are at the top of the food chain. The fat-marbled steak that meat-eaters are so fond of is literally a *dangerously* expensive way of obtaining a daily supply of protein.

The DDT stored in the body is not confined to a particular area or organ where it cannot harm the rest of the body. The cells accumulated as fat are constantly undergoing metabolic changes, and they are involved in the "inner-ecology" of all the body's functions. Under conditions of physiological need or stress, fat is released into the bloodstream, and so is DDT. A sudden weight loss from illness or dieting can saturate the tissues with this poison, and cause symptoms ranging from uncontrollable tremors, to loss of appetite, a jaundiced coloring, and fever. Not much is known about the long-term effects of DDT poisoning because the chemical is relatively new to the environment, but the evidence available is a frightening portent of what may be currently happening to many of our bodies.

Testifying in a court case in 1958, Dr. Malcolm Hargraves, a Mayo Clinic blood specialist, stated that he was positive that DDT caused leukemia, Hodgkin's Disease, anemia, and other blood disorders; Dr. Hargraves' educated opinion was based on autopsies and past case histories. All of these diseases are related to liver and spleen functions, and all have increased at a spiraling rate since DDT came into general use in 1945. The incidence of leukemia is now the highest in farm states that have sprayed the most DDT.

As the detoxifying, filtering organ of the blood, the liver must constantly work overtime to cleanse the body of foreign, inorganic substances like pesticides, food additives, and air pollutants. Its main job of straining out the natural toxins that occur in many foods may be seriously interfered with because of this extra burden. DDT has been known to destroy vitamins and enzymes necessary to the proper functioning of the liver and spleen, seriously weakening these vital organs and making them susceptible to viral and bacterial infections. Both hepatitis (inflammation of the liver) and cirrhosis (scarring of the liver) have increased at an alarming rate over the past two decades, and not only among drug users and alcoholics—the traditional victims of these diseases.

The problem of DDT contamination was eventually brought to the attention of the United Nations, which conducted a two-year study under the auspices of its subsidiary, the World Health Organization (WHO). Monkeys were given oral doses of DDT at the rate of 0.2 milligrams per kilogram of body weight for periods of seven to nine months, and most developed hepatitis. The monkeys who did not were continued on the DDT diet and, after a year, they showed signs of liver enlargment and hyperglycemia (high blood sugar), a pre-diabetes condition. In its report, released in 1966, WHO speculated on DDT's possible application to human beings:

"Not much is known about the long term effects of DDT poisoning . . . , but the evidence available is a frightening portent of what may be happening to many of our bodies."

"The possibility that [the bodily accumulation of DDT] might have deleterious consequences later in life cannot be ruled out. In addition, it has not been demonstrated that metabolic changes in liver cells comparable to those observed in [laboratory animals] do not take place in man. At the present time, [the United Nations is] concerned about the storage of DDT which occurs in all species and about the cellular changes produced in the liver of rats by DDT and by other compounds chemically related to it."

The U.S. was also concerned by the mass slaughter of birds that had taken place in the years since DDT was introduced. Naturalist Rachel Carson brought this tragedy to the attention of the world in her best-selling book, *Silent Spring*, published in 1962, when she described the grave-like stillness of verdant farmlands that were totally devoid of birds. Within the space of a single generation the bird populations of the United States and Europe have been decimated to the point where many species might soon be extinct.

The familiar, reassuring chirp that signalled the beginning of spring and the return of birds from their winter

migration had disappeared along with the so-called "pests" destroyed by DDT. The natural enemies of insects that prey on our food plants, birds descend on crop fields to feast on the bugs they find there, whether dead or alive. From the 1940s on, robins, sparrows, and other birds have been observed plummeting from the sky, acutely poisoned by lethal doses of pesticides ingested from bugs, worms, and other sources of polluted food.

The birds who have survived this chemical assault face another equally disastrous problem: they are unable to reproduce. And when they do manage to lay eggs, the few chicks that do hatch often turn out to be deformed or weak mutants who are unable to survive.

By 1965, the peregrine falcon, the brown pelican, and the double-crested cormorant had all but disappeared from their natural habitat along the coast of California. The bald eagle, our national symbol, had stopped breeding in its favorite nesting grounds along the Great Lakes and the Atlantic Coast. According to a five year study conducted by the National Audubon Society, the problem was that their eggs were not hatching. Of 53 nests surveyed in Maine only four produced live bald eagle chicks, an astonishingly low birth rate unheard of before the widespread use of DDT.

Researchers discovered that the chemical is absorbed and concentrated in a bird's bloodstream in much greater quantities than in a human's, especially at egg-laying time. Containing a higher quantity of lipids (fatty substances) that facilitate the hardening of eggs, a bird's bloodstream is a perfect medium for fat-bonding DDT molecules. As the poisons accumulate, a bird's ability to produce hard shells seriously diminishes; many eggs are so thin and fragile that they break apart when the parent sits on them in the hatching process. In 1969, Audubon Society ornithologists discovered the ultimate result of this process of deterioration: an egg with no shell at all, only a transparent membrane that covered the dead eagle embryo.

Birds that feed on fish and water creatures have suffered the same fate as land-feeders, since most of our waterways are badly polluted by pesticides. Flowing from irrigated, rain-washed land, DDT is ingested by all fish, who pass it along to birds and mammals—including humans—who eat them. The Study of Critical Environmental Problems (S.C.E.P.), convened by the Massachusetts Institute of Technology, estimated that more than one-fourth of the 63,400 metric tons of DDT that chemical manufacturers produced in 1968 has found its way into the oceans.

Like all other food chains, the ocean's food chain begins with the smallest forms of life. Therefore, by the time a large fish has reached maturity, it has consumed huge quantities of smaller ones; this means that it has also saturated its tissues with the DDT stored in the bodies of the smaller fish. Thus, it is wise to restrict one's fish intake to the smaller varieties, although this is no guarantee of purity. Clams, oysters, shellfish, and crabs have all been found to contain extremely high levels of pesticide contamination out of proportion to their size.

Other creatures suffer from ocean pollution as well. Concerned over the recent decline in the population of sea lions that live on the California coast, naturalist groups traced the cause to their sea-food diet. Being enormously fat (nature's way of ensuring this warm-blooded mammal's survival in cold oceans), the sea lions had absorbed huge amounts of DDT, which caused females to lose their mothering instincts. Cows were observed to bark at and push their pups into the ocean, rather than rounding them up and returning them to the herd.

DDT Substitutes—Deadlier Yet!

As soon as it became apparent that many species of insects were developing a resistance to DDT, chemists created more effective poisons. Most of these substitutes are very similar to DDT, and they belong to the same chemical family of chlorinated hydrocarbons. These include aldrin, BHC (also called lindane), chlordane, dieldrin, endrin, heptachlor, methoxychlor, and perthane. Their toxic effects are approximately the same as DDT, and accidental ingestion of the pure chemicals, or massive body contact, can cause nervous excitation, convulsions, coma, and possibly death. Each year numerous children and adults die when they eat directly contaminated food, or drink from bottles used to store chlorinated hydrocarbons. Excessive exposure to these innocuous looking powders from improperly stored, open containers causes additional fatalities among farm workers, who inhale the pesticides or absorb them through their skins.

According to Dr. Malcolm Hargraves of the Mayo Clinic, lindane is the most potent member of this group, for it depresses the bone marrow and prevents the formation of red blood cells. In one case, a man suffering from uncontrollable tremors, extreme fatigue, and headaches, was diagnosed as having a rare blood disorder that would soon prove fatal. Mayo Clinic investigators discovered that an exterminator had recently sprayed the basement of the man's house with lindane to kill a termite infestation and that the chemical had gotten into his gas furnace. For several weeks he had been inhaling the fumes from heating ducts that distributed lindane throughout the house. It took a week to decontaminate the premises. The man, however, was bedridden for over two years while his body decontaminated itself.

Another of Dr. Hargraves' cases involved a young woman who was being treated for aplastic anemia, also a rare blood disease, which requires blood transfusions every few weeks for the rest of the patient's life. Suspecting pesticide poisoning as the causative agent, Dr. Hargraves traced the source to an attractive, small, "decorator-look" lindane vaporizer kept on the woman's piano where she practiced several hours a day. Bothersome mosquitoes and flies had been killed on contact, and the woman had been poisoned by the fumes.[6]

Home pesticides are no less lethal than those used in fields. That colorful can of bug killer kept in the utility closet, with its artificial floral fragrance, is as effective against a human being as it is against mosquitoes and flies. A spray or two can be fatal to a curious three-year-old, and

constant exposure to bug-bomb mists and vapor-emitting "pest strips" guaranteed to "kill all day" can seriously interfere with a child's physical and mental development. Ordinary, old-fashioned flypaper, for all its unattractiveness, is the safest means of destroying flying insects in the house.

Chemical manufacturers call these poisons "broad-spectrum treatments," a euphemism for the fact that they kill every living thing they come into immediate contact with, and they try to minimize the harm done to wildlife and humans by using the polite term, "side effects." Even the word "pesticides" is designed to make us think favorably of these chemicals; the reality is that DDT and its ilk kill *all* insects, only some of whom are regarded as pests. Scientists more correctly describe pesticides as "biocides," meaning that they destroy the web of life by upsetting the balance that nature took millions of years to achieve.

Few of us realize that insecticide manufacturers are owned by giant corporations that also own huge, mechanized farms and food processing factories. Today's farmer is actually a financial conglomerate looking for fast, large profits from every arm of its vast, tentacle-like grip on our food supply. As long as artificial fertilizers and pesticides continue to produce three-way profits for them, it is unlikely that agribusinesses will voluntarily stop the mass pollution caused by chemical residues. Corporate giants sponsor pesticide research programs at many universities, which suggests scientific respectability but only provides paid "experts" to justify the use of insecticides. The federal and state governments support these same agricultural colleges, which means that American taxpayers are unknowingly contributing to the invention of new chemicals that will eventually be absorbed into their bodies. In California, where 20 percent of the nation's insecticides are used, five of the eight largest federal government farm subsidies for 1970 went to huge agricultural conglomerates.

"The governing principle for the development of chemical pesticides," writes environmentalist Ralph Nader, "seems to be selling pesticides rather than controlling insects."[7] To counter growing accusations that they had shown a total disregard for public health, and to promote the lie that pesticides are benign substances to human beings, manufacturers formed the National Agricultural Chemicals Association. The hero of this public relations organization is Dr. Wayland J. Hayes, Jr., former chief of toxicology of the U.S. Public Health Service, who in the 1950s conducted a much quoted and reprinted study which told the industry what it wanted to hear.

Obtaining permission from the Bureau of Prisons to test the effects of DDT on a group of 51 volunteer inmates, Dr. Hayes fed the men up to 35 milligrams of the pesticide each day for periods of up to 18 months. The dosage was approximately 200 times the amount found in the average American's diet at the time, but somehow no adverse effects turned up. According to Dr. Hayes, the prisoners began to eliminate DDT from their systems after about a year, which indicated that "a large safety factor is associated with DDT as it now occurs in the general diet." Only two of the men complained of ill health, one of whom was afflicted with headaches, watering of the eyes, and bone pains, which Dr. Hayes dismissed as "obviously . . . of psychoneurotic origin."

By prevailing rigid scientific standards, however, Dr. Hayes' findings could in no way be considered conclusive regardless of what the chemical industry wanted the public to believe. First, only five prisoners completed the full 18 months of the study, most having dropped out within the first year. Second, only 35 of the 51 men returned to have their urine and fatty tissues examined for the final tests.[8] Despite its highly subjective findings from such a small sampling, Dr. Hayes' study was widely publicized as the final word on the subject by the N.A.C.A., and for many years effectively countered the well-documented claims of noted conservationists.

When an approval is sought on new insecticides, the powerful N.A.C.A. lobby supplies government regulatory agencies with its own research. Like the F.D.A., the United States Department of Agriculture (U.S.D.A.) too often seems to favor the interests of the industry it is supposed to regulate. This betrayal of the public trust became apparent in the celebrated court case that a citizen's group known as the Environmental Defense Fund (E.D.F.) entered against the Department of Agriculture on behalf of the American people.

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Backed by groups such as the Sierra Club and the Audubon Society, the E.D.F. brought suit to force the U.S.D.A. to totally ban the manufacture and use of DDT and some of its analogues. Under the terms of its charter, the only way the U.S.D.A. could do this was to rescind the registrations of pesticide manufacturers, which gave it a convenient out; U.S.D.A. decisions on the safety of agricultural chemicals, the agency maintained, could only be challenged by registrants. In other words, only pesticide manufacturers could ask to have their products taken off the market, and the public could have no say in it.

On the grounds that it would be impossible to remove pesticides from the American diet, the F.D.A. turned down the Environmental Defense Fund request that a zero tolerance level for DDT be placed on all food. By setting "safe" tolerance levels, the E.D.F. argued, the agency was in effect legalizing an additive that its charter did not cover in the first place, since it was allowed only

the power to ban additives included in food processing. The renowned anthropologist Margaret Mead summed up the dilemma by comparing it to *Alice in Wonderland*. By "deliberately poisoning our food, then policing the result," she stated, the government is acting like Lewis Carroll's White Knight, who thought of "a plan to dye one's whiskers green, and always use so large a fan that they could not be seen."

Unable to defend its industry oriented point of view when faced with hard scientific evidence accumulated by the environmentalists, the U.S.D.A. lost its case. Finding in favor of the plaintiffs in May, 1970, Chief Justice David Bazelon of the U.S. Court of Appeals for the District of Columbia ruled that "the interest of the public in safety" is as valid a reason for challenging the decisions of an administrative agency as "the economic interest" of pesticide manufacturers.

The Secretary of Agriculture was ordered to either ban DDT within 30 days or bring new evidence to the court that would justify its continued use. The agency cancelled the use of DDT and several other chlorinated hydrocarbons on most fruits and vegetables, trees, livestock, and buildings, but allowed its continued free use on citrus fruits and cotton plants. The effect was the same as if nothing had happened, however, for pesticide manufacturers simply appealed the decision in the courts and continued to sell their poisons while they waited to come to trial.

The ban was further delayed when President Nixon brought into existence the much-needed Environmental Protection Agency (E.P.A.), which took over the function of pesticide control from the Department of Agriculture. This meant that the E.D.F. had to re-file its suit because the previous ruling did not apply to the new agency. In January, 1971, the same court handed down an even tougher decision that simultaneously cancelled the industry's protest and ordered E.P.A. boss William Ruckelshaus to call an immediate halt to *all* DDT spraying. Ruckelshaus accepted without contest, but his avowed get-tough, consumer-protection policy proved ineffective, for again a delay was granted and exceptions made.

Spraying of fields with DDT was finally prohibited two years later as of January 1, 1973, except for "public health purposes"—meaning in cases of epidemic disease—which may well turn out to be a legal loophole. The green peppers, sweet potatoes, and onions that you buy at the supermarket are still treated with DDT in storage on the excuse that no effective alternatives are available. For all the efforts made on its behalf, the public had won only a minor skirmish in its battle for unpolluted food. But at least they had fought back and shown their strength. The agricultural establishment and the government had been warned that it is the people who must be served, not the other way around.

In 1975, more than two dozen employees of a Hopewell, Virginia, chemical manufacturing plant brought suit against their employer and several government agencies, charging that their health had been seriously endangered by working with an untested pesticide called Kepone (pronounced Key-poone). Used in more than 40 household products for control of roaches and ants, and exported all over the world to kill fire ants and banana bugs, this DDT-like chemical was blamed for an outbreak of mysterious worker illnesses, including blurred vision, tremors, loss of memory, and unexplained nervousness.

Testifying before a Senate Agriculture subcommittee, one workman said that his hands were shaking so badly that "I couldn't drink a cup of coffee without spilling it on my clothing, and when I walked I sort of bounced." Other workers who complained to the company doctor said that they were told they were suffering from overwork or excessive drinking, and that Kepone had nothing to do with it. Meanwhile, the city government had closed the James River for fishing because it was so badly polluted from effluents emitted by Life Science Products, resulting in a loss in income to fishermen expected to run into the millions.

None of the workers was warned about the dangers of Kepone, the suit claims, even though the manufacturer was aware from research conducted in the 1960s that the pesticide caused sterility and liver cancer in laboratory animals. The report had evidently been suppressed, and it was not until recently that a study made at the Life Science plant by the American Cancer Society revealed the truth. Meanwhile, the company—which operated out of a converted service station—had gone out of business, so the workers transferred their suit to the company's contractor, Allied Chemical. Also included in the action are the state air, water, and health agencies, the E.P.A., and the Occupational Safety and Health Administration, all of whom neglected to police the chemical factory.[9]

The 1973 E.P.A. order did not affect the export of DDT to other countries, nor did it affect use of other chemicals of the chlorinated hydrocarbon group. A year after the ban went into effect, the American pesticide industry was doing business as usual to the tune of 1.2 billion dollars in domestic and foreign sales.[10] Eager to increase crop yields to feed starving masses, underdeveloped "third world" countries in Africa, the Middle East, and Asia bought America's unwanted DDT. Studies made by Dr. Chester Himel, a University of Georgia entomologist (the science of insects) "show that up to 99 percent of pesticide sprayed with current equipment is wasted, because only from one to ten percent of spray droplets are small enough to be effective."[11]

Years ago, rain water was considered a symbol of purity, but today it is likely to be laced with a long list of pesticides that spreads an international chain of death and desolation. Most of these chemicals are wafted into the air and absorbed by clouds that carry them to every part of the world. Sprays applied in Africa have been found to fall out in rains over Europe and the Americas, all the way to the North and South Poles. Although no pesticides have been sprayed within thousands of miles of them, both Eskimos and polar wildlife have been found to contain DDT in their fatty tissues. The independent *Pesticides Monitoring Journal* which has been keeping track of

pesticide residues in the American diet since 1968, reports that while DDT contamination of vegetables, grains, and fruits has diminished since the ban, there has been no significant decrease in the amount carried by cattle, other livestock, poultry, and fish. The damage has already been done, and even if DDT and its sister sprays were immediately banned in every country of the world, its residues will remain in our food for another 100 to 200 years.[12]

As Frances Moore Lappé suggests in her excellent book, *Diet for a Small Planet,* the only way we can minimize this threat to health is to "eat low on the food chain." Ms. Lappé presents a convincing case for vegetarianism when she points out that people who eat animals become "the final consumers, and thus the recipients, of the highest concentration of pesticide residues." This is because we are ingesting all the DDT that the animal has stored in its system (just as the large fish ingests the DDT stored in the body of the small fish). Those of you who feel unable to give up what the author calls "the great American steak religion," would be well-advised to substitute soybeans, legumes, and other high-protein vegetables for at least half of your weekly meat meals. Growing your own vegetables or buying them from certified organic growers further reduces the risk of body pollution and its attendant ills. Try to accustom your taste to skim milk, cottage cheese, and other dairy products low in fat and DDT.

"Nerve Gas" Pesticides—Instant Overkill

In the summer of 1969, public indignation rose to a fever pitch when it became known that the Department of Defense was planning to ship 27,000 tons of chemical war gases by rail from Colorado to New Jersey for dumping into the Atlantic Ocean. Led by Congressman Richard D. McCarthy of New York, citizens' groups denounced the Pentagon's lack of concern for the well-being of those who might be poisoned if the containers leaked or exploded in transit through densely populated areas. The Pentagon did it anyway, for they were well aware that many times that amount of organic phosphate pesticides—close relatives of nerve gases—were yearly shipped around the country by truck, and thus exposed to the even greater hazard of traffic accidents.

If the public were aware of this constant menace the outcry would undoubtedly be greater and something might finally be done to stop these shipments. But the pesticide industry maintains a low profile, which includes neglecting to mark many of their tank trucks with the possibly customary "Danger" warning. Few people are aware of the dozens of annual pesticide disasters that occur on America's highways. In her book, *Unfit for Human Consumption,* Ruth Mulvey Harmer reports that many of the accidents involve leaks and spills rather than collisions and turn-overs.

Three persons were hospitalized several years ago after an American Potash Company truck leaked nearly a ton of a nerve gas pesticide along a heavily traveled Arizona highway. Thanks to the direction of the wind and the quick thinking of the highway patrol, who closed off 60 miles of road and decontaminated it, casualties were kept to a minimum. "The U.S.D.A. reported 540 individual... poison container failures in transit during the first nine months of 1968," writes Ms. Harmer. "There is no way of knowing how many persons were inadvertently exposed to poisons as a result of those, or the other failures which went unreported."

Despite their name, organic phosphates are as synthetic as DDT. They were intended to be a "less harmful" substitute. While it is true that these artificial compounds break down in the soil in from 10 to 12 days and subsequently do not accumulate as readily in living tissue, they nevertheless present formidable dangers to human beings and the environment. They are actually *more* poisonous than DDT over the short term and have very adverse effects on most living creatures if they are inhaled or eaten in chemically treated foods.

The most potent of this group is parathion, developed from World War I nerve gases, which is used almost as indiscriminately as DDT was. Absorbed through the skin, inhaled, or ingested, parathion attacks the nervous system and inhibits the action of an enzyme (cholinesterase) necessary for sending signals to the brain. When the connection between the nerve synapses, or junctions, is severed, the nerves are kept in a state of stimulation, as if they were constantly being sent messages. Symptoms begin with a runny nose, ringing in the ears, a tendency to daydream, and may include irritability and depression; any one or all of which, of course, can be easily misdiagnosed. Extreme parathion poisoning can produce nausea and vomiting, loss of control of the bladder and bowels, drooling and sweating, and blindness. If untreated, the patient goes into convulsions, the heart, muscles, and lungs slowly become paralyzed, resulting in suffocation.

"Although no pesticides have been sprayed within thousands of miles of them, both Eskimos and polar wildlife have been found to contain DDT in their fatty tissues."

One of the most hazardous methods of applying pesticides is spraying them from a low-flying airplane, a practice that has resulted in numerous deaths of "crop-duster" pilots. One crop duster crashed outside of Belpre, Ohio, in 1968, and crawled from the wreckage of his plane through a pool of parathion that had leaked from his tanks. By evening 11 people had to be hospitalized, and three of them, including the pilot, died. A nearby dairy farm lost most of its cows and had to stop milking the survivors.

Another farmer lost all his cattle and hogs within a few

minutes after he sprayed them heavily with TEPP, another organic phosphate. The farmer said that the container the chemical came in was labeled with the warning to wash with water if any of the pesticide spilled on the skin and to call a doctor if taken internally. There were no other instructions. The container also had pictures of farm animals, from which the farmer inferred that animals could be sprayed directly.

More than 100,000 pesticide poisonings are reported each year, and countless others are mistakenly treated as "flu." While people working in parathion manufacturing plants are constantly tested for indications of toxic symptoms, farm workers are not. Testifying before Senator Walter F. Mondale's Subcommittee on Migratory Labor in 1969, pesticide critic Jerome B. Gordon tried to convince legislators to correct this situation. "Uncounted thousands of the nation's migrant farm workers, farmers, and suburban homeowners have been fatally overcome or seriously disabled," Gordon protested, his appeal falling on deaf ears.

Conducting a study of the nutrition of farm children in a rural California county, Dr. Lee Mizrahi, the head of a free clinic, discovered that nearly half of the children he examined showed signs of organic phosphate poisoning. Many were listless, apathetic, with burning eyes and skin rashes, while others showed excessive vomiting and difficulty in breathing, which are signs of advanced damage. "To me, it is tragically absurd that in 1969 such a study by an obscure rural doctor should be the first one ever done on children," Dr. Mizrahi told a House Subcommittee. "We think this problem is widespread."[13]

Unable to get the Federal government to take action, Dr. Mizrahi brought his evidence to Dr. Thomas Milby, chief of the California State Department of Public Health, who compiled an official report. Dr. Milby agreed that parathion poisoning had reached "near-epidemic proportions" since replacing DDT and that an in-depth study should be undertaken. As of this writing, the insecticide is still being used.

If the tragedy that recently occurred on the island of Jamaica had happened here, it is certain that immediate action would be taken. In January, 1976, seventeen Jamaicans died and 78 were hospitalized after eating flour contaminated with parathion. Used in the spicy meat pastries that are a Jamaican speciality, the flour had absorbed the chemical from the hold of the ship that had transported it from West Germany. Not even cooking had destroyed its potency.[14] Pesticide manufacturers attributed the incident to "improper handling," rather than regarding it and similar incidents as a reason for developing an effective means of insect control that does not kill humans.

Herbicides—Turning the Earth into a Desert

Also known as defoliants, herbicides are used by farmers to kill troublesome weeds that keep growing back among food crops. Developed from a biological research project conducted by the Army during World War II, herbicides enter the plant's system, causing its metabolism to speed up at a fantastic rate that literally makes it grow and die overnight. Herbicides actually rearrange and destroy the plant's chromosomes, the carriers of the genes that direct reproductive cells, which can cause either a defective new growth that will not survive, or a cancerous condition that kills the plant. Obviously, the question arises whether these chemicals will have the same effects on man.

The U.S.D.A., the U.S. Fish and Wildlife Service, and the F.D.A. were unconcerned about the answer, however, for they sanctioned unlimited application in 1948, without first conducting proper tests. These science-fiction-like plant killers subsequently became one of the fastest growing and most profitable branches of the pesticide industry, and production increased by nearly 300 percent in the years between 1966 and 1972. In the space of a few years, herbicides equaled the pollution caused by DDT and other pesticides when they were applied indiscriminately to ditches, pastures, crop fields, weeds on water, forests, and even backyards.

The most popular of these, 2,4,5-T (2,4,5-Trichlorophenoxyacetic acid) was used as was originally intended and was dropped over one-eighth of the total area of South Vietnam. Jungle vegetation was cleared and ambush cover removed, but so were valuable croplands and rubber plantations. In March, 1966, the State Department gave a shocked American public the unsubstantiated assurance that "the herbicides used are non-toxic and not dangerous to man or animal life. The land is not affected for future use."[15]

The South Vietnamese Government was also masking the harm done by defoliants, which were primarily responsible for the birth of many deformed children whose mothers had breathed herbicide-laden winds that had blown over urban centers. Fearing another outburst of anti-American demonstrations, Premier Thieu forbade local newspapers to report the incident. Rumors of what had happened leaked out, however, and in 1968 the U.N.'s World Health Organization began a year-long investigation to get at the truth. Released on November 21, 1969, WHO's report cautiously stated that defoliants used in Vietnam seemed to be related to the increase in birth defects, and that their use should be immediately discontinued.

The United States Government was already aware that 2,4,5-T was a biological timebomb, however, having commissioned a study from the Bionetics Research Laboratory in Bethesda, Maryland. Among other things, Bionetics found that mice and rats given large oral doses of 2,4,5-T in the early stages of pregnancy "showed a statistically increased proportion of abnormal features" in their offspring, "in particular, cleft palate and cystic kidneys were significantly more prevalent." The report was ready in 1966, but it was not released by the government until three years later, and then only because concerned scientists threatened to bring it before the public. In the meantime, the Dow Chemical Company was selling tons of the defoliant and increasing its stock market rating while thousands of pregnant Asians inhaled

2,4,5-T from clouds spewed by American war planes, and on a less radical though no less dangerous level pregnant women in America were exposed to this lethal chemical while working on their yards.

The Bionetics report mobilized the powerful chemistry industry lobby, which immediately produced their own studies which purported to prove that experiments on animals did not give irrefutable evidence that similar results would occur in humans. This claim was rejected as nonsense by most scientists in view of what had occurred in South Vietnam. Furthermore, the deaths of millions of young chicks in a hatchery in the late 1960s was laid to residues of 2,4,5-T in corn by-products that were used in their feed. While they might be able to cast doubt on the herbicide's role in birth defects, the industry could not deny such hard evidence of its extreme toxicity.[16]

"Agent orange," as 2,4,5-T is called by the chemical industry, was finally banned by the E.P.A. in 1973, except for military use. A close chemical relative, 2,4-D, has taken its place on food crops, lawns, and golf courses, and little is known about the possible side effects of this new herbicide—unless the government is suppressing another negative report. For the safety of their unborn offspring it is recommended that pregnant women avoid all herbicides for yard use.

South Vietnam stands as a frightening example of what can happen to the land when herbicides are indiscriminately applied in massive doses. As of March, 1976, WHO reports that thousands of acres of soil are so completely sterilized there it will be years before they can once again support life. Mosquitoes cover the land and a malaria epidemic is in progress; tuberculosis bacteria have infected much of the population; and leprosy and bubonic plague are once again spreading and taking lives, going against the trend of most other countries. Radical tampering with its ecology has left the country in ruins.[17]

Mercury Poisoning—"Mad As a Hatter"

For years, most of us thought of mercury as the silvery liquid inside a thermometer. Scientists had long been fascinated by this curious metal—the only one that is liquid at room temperature—which is so dense that it will not wet skin or clothes but will penetrate the finest crevices like water. Manufacturers considered mercury to be absolutely safe to human beings, and they used it in a number of ways that most of us were not aware of. Light switches, furnace thermostats, and air conditioner switches depend upon a tiny drop of the metal to open or close a circuit; fluorescent lamps and street lights turn night into day with mercury vapor, which provides 70 percent of America's lighting[18]; floor waxes, paints, fabric softeners, camera film, wash-and-wear clothing, and the antiseptic mercurochrome all depend upon mercury to some extent; even dental fillings contain a mercury amalgam.

In 1970, farmers in the United States sprayed 800,000 pounds of mercury pesticides over millions of acres of cropland, [19] and planted millions of seeds coated with mercury to protect them from funguses. The practice might have continued to this day, if not for a tragic incident that revealed mercury's deadly double nature.

Sent home from school because she seemed dazed and unsteady on her feet, Ernestine Huckleby, an eight-year-old girl in Alamogordo, New Mexico, was promptly put to bed by her parents, who believed she was suffering from a mild case of "flu." Instead of recovering, however, Ernestine lost control of her bodily functions during the next few days and was rushed to a hospital, where she lapsed into a coma. Doctors believed the girl was afflicted with viral encephalitis—and then the mysterious malady struck again. Overnight, Ernestine's fourteen-year-old brother became paralyzed and he could see only straight ahead as if looking through a tunnel. Two days after Christmas in 1969, Ernestine's 22-year-old sister was similarly afflicted and deaf as well.

Playing a hunch that this unexplained sickness might be a form of heavy metal poisoning, New Mexico Medical Service Director Dr. Bruce Storrs sent urine samples of the three people to the F.D.A.'s toxicology laboratory in Atlanta. The report was positive; all three contained high levels of methylmercury, the most poisonous form of the metal. State and Federal health officials traced the source of the mercury to several bags of grain that Ernest Huckleby, the children's father, had found and carted home to feed to his hogs. The seeds had been dyed pink to show that they were coated with a highly toxic fungicide called Panogen. He was not going to give them to his family to eat, and Huckleby assumed that it was all right to feed these "bad seeds" to livestock.

"These science-fiction-like plant killers . . . became one of the fastest growing and most profitable branches of the pesticide industry and production increased by nearly 300 percent between 1966 and 1972."

Several of the pigs eventually died of what a health official called "the blind staggers," in which the animal has a loss of equilibrium and runs around bumping into things. They were slaughtered and the mercury-laden pork fed to the family daily for a period of three months. As a result, three Huckleby children were permanently paralyzed, and two of them became blind. The fourth, born to Mrs. Huckleby five months later, poisoned in his mother's womb, was born blind and severely retarded. Obviously, dying seeds to alert consumers that food has been coated with a deadly toxin is a totally ineffective method of warning. The real question is, of course, why contaminate them at all?

Similar "mysterious" epidemics due to mercury coated seeds had been reported previously in Iraq in 1956, in West

Pakistan in 1961, in Guatemala in 1963, and again in Iraq in 1972 when villagers used the grain seed to make bread and feed animals. That year, 450 people died in Iraq and thousands more were permanently afflicted.[20]

In 1966, health officials in Sweden had warned the United States about the dangers of mercury poisoning when they banned the metal's use in agriculture and placed severe restrictions on its use in industry. The government also was aware of the mass poisoning that occurred in the Japanese village of Minamata between 1953 and 1960, where more than 100 people died or suffered severe disabilities from eating fish contaminated by mercury waste from a plastics factory. The United States seemed to be unconcerned, however, perhaps because so little was known here about mercury's effect on the food chain.

Inorganic mercury has long been recognized as a hazard to miners and factory workers, who shake so uncontrollably that they cannot walk or feed themselves when they inhale or absorb too great a quantity of the invisible, odorless fumes. The expression "mad as a hatter" originated from the mental disability exhibited by nineteenth-century hat makers, who spent the day dipping felt strips into tubs of mercuric nitrate to soften them for shaping. This type of poisoning binds mercury to body proteins, but the damage is reversible and the metal will be excreted slowly over a period of several months. On the other hand, *organic* mercury poisoning accumulates permanently in the brain and other body tissues and results in irreversible damage. The methylmercury that inflicted such tragic damage on the Huckleby family and others in various parts of the world is a member of this group.

Formerly it was believed that all mercury compounds, whether pesticide and seed residues, or effluent from chemical factories, simply sank to the bottom of oceans and waterways when they were washed from the land. Being heavier than water and of no food value to ocean life, the metal was thought to stay there for thousands of years until it was finally broken down and reabsorbed into the earth. Three researchers, Dr. Carl Rosen of Sweden, Dr. J. M. Wood, and F. S. Kennedy—both from the University of Illinois—knew otherwise and brought their findings to the attention of U.S. officials in 1967.

The Rosen-Wood-Kennedy research team had discovered that micro-organisms in the mud of seabeds were able to absorb organic mercury and turn inorganic mercury into the more poisonous methylmercury. Algae subsequently ate the metal-contaminated bacteria, small fish ate the algae, and large fish ate the small fish. The poison was subsequently concentrated many hundreds of times over in the largest fish—along with massive quantities of DDT and other pesticides—which meant that the greatest danger lay in eating tuna and swordfish, as they swim closest to shore and their fat tissue absorbs the poison most readily.

Spurred to action by the Huckleby tragedy, the Rosen-Wood-Kennedy findings, and the coverage given in the media, the F.D.A. imposed a tolerance level of 0.5 parts per million of mercury in fish in 1970, three years after the evidence was reported. One million cans of contaminated tuna were quickly removed from grocers' shelves, prompting many to wonder how many poisoned cans had been consumed by Americans in the 30 years or so that mercury has been dumped into the oceans. Swordfish was found to contain as much as 50 times the acceptable level of mercury, and it has virtually disappeared from the market.

On February 18, 1976, the Environmental Protection Agency finally banned the production of virtually all mercury pesticides. "Economic, social and environmental costs and benefits of the continued use of mercurial pesticides are not sufficient to outweigh the risk to man or the environment," proclaimed Russell E. Train, new chief of the agency. Fungicides containing mercury compounds to treat awnings intended for outdoor use, and those used for the control of Dutch Elm disease and brown mold were not affected.

While it is unlikely that the ban will result in decontamination of fish in the near future (possibly not within our lifetimes), you can minimize the risk by eating only small fish, which do not contain as many pollutants. If tuna is your dish, buy only the albacore, which weighs about 45 pounds and has white-colored flesh. Yellow fin—the tuna that was removed from the market—weighs about 150 pounds, and big eye and blue fin average about 230 pounds, making them poor risks. Remember that even though you can't see, taste; or smell mercury and DDT in big fish, these contaminants are there just the same.

Natural Alternatives to Pesticides

Mounting evidence indicates that the indiscriminate use of pesticides has actually increased the number of pests while lowering the quality of human life. Malaria-carrying mosquitoes are once again on the rise, and many other species of insects have mutated and developed a genetic resistence to man's chemicals. In California, cotton growers who sprayed their fields to get rid of the lygus bug discovered that the pesticide also killed predators of the boll worm, when then began to increase. The spraying had actually brought back an old pest.

Farmers in the Cañete valley of Peru had been so impressed by the efficacy of DDT that they sprayed it over their fields "like a blanket." Four years later, the pests returned with a vengeance, along with five new insects. Their natural enemies had been killed and these new predators quickly took over the land and decreased the yield to pre-pesticide levels. The list of similar incidents is endless.

While these "super-flies" may have outwitted chemists, they cannot outwit nature. The best way to combat crop pests is to develop and grow species of grain, fruits, and vegetables that have a natural resistance to insects, mites, and funguses, and to institute a program of biological controls. A new strain of alfalfa was developed in the 1960s which effectively resists the dread spotted alfalfa aphid that once nearly destroyed the entire alfalfa industry. Illinois biologists stopped the spread of the western corn rootworm, which had developed an almost total resistance

to pesticides, by yearly alternating corn and soybean crops in the same fields. Rotating the crops solved the problem because the worm does not eat the soybean plant and dies when soybeans are planted. The screwworm, which used to kill millions of dollars worth of southern cattle each year, was eliminated through the introduction of sterile strains of the insect that produced no offspring at breeding time. Other pest damage can be kept to a minimum by rigorous tilling of the soil to destroy insect larvae, and staggering crops so that no single insect problem gets out of hand.

If these methods are not enough, *botanical* pesticides can be used. These come from plants, and most are safe to warm-blooded animals with a few exceptions, such as the highly poisonous nicotine extract. However, pyrethrum, obtained from two species of chrysanthemums, is not environmentally disruptive, nor is rotenone, which comes from the root of the derris plant. In buying a home insecticide always look for products that contain only these natural extracts, and never buy a mist spray "bug bomb." While they are organic, pyrethrum and rotenone can nevertheless cause skin and lung irritations.

Most of these biological, non-chemical, and environmental methods of insect control were known as far back as the turn of the century, yet they account for only 10 to 20 percent of pest eradication activities.[22] Chemical pesticides may be cheaper and an easy shortcut but their long-term residual effects are proven to be dangerous and ultimately very expensive.

The Future of Pesticides

Meeting under the aegis of the National Academy of Sciences in Washington, D.C., early in 1976, sixty specialists who had worked independently in pesticide use and hazards to health issued the following statement:

"We believe the state of Federal knowledge in this critical area is highly inadequate. The pest control enterprise places a billion pounds of toxic materials into the environment each year, but it is 'normal' for us to have only the vaguest idea of how much of each compound was used and where, and even then only after half a decade's lag."

Preparation of their report, which represents the viewpoint of the American science establishment, took a total of three years. During this time, investigators were surprised to learn what many conservationists knew all along: Injuries from pesticides are seriously underestimated because there is no effective reporting or diagnostic system. The panel called on the government to institute programs to identify and study this menace to public health, and to develop alternatives to chemical pesticides.[23]

Although this is a step in the right direction, new legislation is needed if the chemical industry is to be effectively censored and prevented from developing and marketing chemical substances which are harmful if not fatal. At present there are simply not enough F.D.A. and E.P.A. inspectors to assure that set tolerances and bans are adhered to. However, no legislation can eliminate or even reverse the damage already done. But in the absence of new restrictive laws, the pollution of our bodies by past, present, and future pesticide sprays will continue unchecked.

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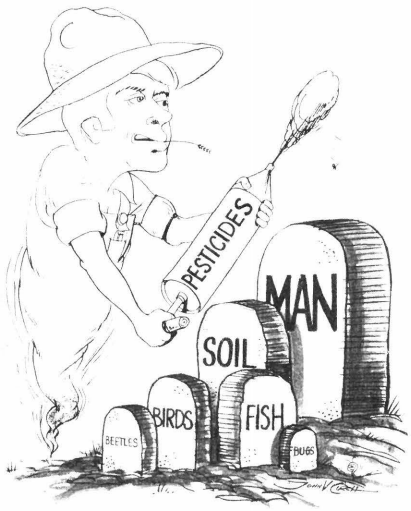

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