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The Greatest Unfounded Health Scares of Recent Times

Part I: DDT

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Background

DDT (dichlorodiphenyltrichloroethane) was first synthesized in 1877,[1] but it was not until 1940 that a Swiss chemist discovered that it could be sprayed on walls and would cause any insect to die within the next six months, without any apparent toxicity to humans.[2] DDT's effectiveness, persistence, and low cost (only 17 cents per pound) resulted in its being used in antimalarial efforts worldwide. It was introduced into widespread use during World War II and became the single most important pesticide responsible for maintaining human health through the next two decades. The scientist who discovered the insecticidal properties of DDT, Dr. Paul Müller, was awarded the 1948 Nobel Prize in Physiology and Medicine.[3]

The Scare

In 1962, Rachel Carson's lyrical yet scientifically flawed book *Silent Spring* was released. The book argued eloquently but erroneously that pesticides, and especially DDT, were poisoning both wildlife and the environment and also endangering human health. The emotional public reaction to Silent Spring launched the modern environmental movement.[4] DDT became the prime target of the growing anti-chemical and anti-pesticide movements during the 1960s. Reasoned scientific discussion and sound data on the favorable human health effects of DDT were brushed aside by environmental alarmists who discounted DDT's enormous benefits to world health with two

allegations: 1) DDT was a carcinogen, and 2) it endangered the environment, particularly for certain birds.

In 1969, a study found a higher incidence of leukemia and liver tumors in mice fed DDT than in unexposed mice.[5] Soon, too, environmentalists were blaming the decline in populations of such wild bird species as the osprey and peregrine falcon on the contamination by DDT of their environment. A number of states moved to ban DDT, and in 1970 the U.S. Department of Agriculture announced a plan to phase out all but essential uses.[6]

The Reaction

Numerous scientists protested that the laboratory-animal studies flew in the face of epidemiology, given that DDT had been used widely during the preceding 25 years with no increase in liver cancer in any of the populations among whom it had been sprayed. And when the World Health Organization (WHO) investigated the 1969 mice study, scientists discovered that both cases and controls had developed a surprising number of tumors. Further investigation revealed that the foods fed to both mice groups were moldy and contained aflatoxin, a carcinogen.[7] When the tests were repeated using noncontaminated foods, neither group developed tumors. In 1970 the National Academy of Sciences declared, "In little more than two decades, DDT has prevented 500 million human deaths due to malaria, that would otherwise have been inevitable."[8] Additionally, the evidence regarding the effect of DDT on eggshell thinning among wild birds is contradictory at best. The environmentalist literature claims that the birds threatened directly by the insecticide were laying eggs with thin shells. These shells, say the environmentalists, would eventually become so fragile that the eggs would break, causing a decline in bird populations, particularly among raptors (birds of prey).

In 1968, two researchers, Drs. Joseph J. Hickey and Daniel W. Anderson, reported that high concentrations of DDT were found in the eggs of wild raptor populations. The two concluded that increased eggshell fragility in peregrine falcons, bald eagles and ospreys was due to DDT exposure.[9] Dr. Joel Bitman and associates at the U.S. Department of Agriculture likewise determined that Japanese quail fed DDT-produced eggs with thinner shells and lower calcium content.[10]

In actuality, however, declines in bird populations either had occurred before DDT was present or had occured years after DDT's use. A comparison of the annual Audubon Christmas Bird Counts between 1941 (pre-DDT) and 1960 (after DDT's use had waned) reveals that at least 26 different kinds of birds became more numerous during those

decades, the period of greatest DDT usage. The Audubon counts document an overall increase in birds seen per observer from 1941 to 1960, and statistical analyses of the Audubon data confirm the perceived increases. For example, only 197 bald eagles were documented in 1941,[11] the number had increased to 891 in 1960.[12]

At Hawk Mountain, Pennsylvania, teams of ornithologists made daily counts of migrating raptors for over 40 years. The counts - published annually by the Hawk Mountain Sanctuary Association - reveal great increases in most kinds of hawks during the DDT years. The osprey counts increased as follows: in 1946, 191; in 1956, 288; in 1967, 457; and in 1972, 630.[13] In 1942, Dr. Joseph Hickey - who in 1968 would blame DDT for bird population decline - reported that 70 percent of the eastern osprey population had been killed by pole traps around fish hatcheries.[14] That same year, before DDT came into use, Hickey noted a decline in the population of peregrine falcons.[15]

Other observers also documented that the great peregrine decline in the eastern United States occurred long before any DDT was present in the environment.[16-17] In Canada peregrines were observed to be "reproducing normally" in the 1960s even though their tissues contained 30 times more DDT than did the tissues of the midwestern peregrines allegedly being extirpated by the chemical.[18] And in Great Britain, in 1969, a three-year government study noted that the decline of peregrine falcons in Britain had ended in 1966 even though DDT levels were as abundant as ever. The British study concluded that "There is no close correlation between the decline in population of predatory birds, particularly the peregrine falcon and the sparrow hawk, and the use of DDT."[19]

In addition, later research refuted the original studies that had pointed to DDT as a cause for eggshell thinning. After reassessing their findings using more modern methodology, Drs. Hickey and Anderson admitted that the egg extracts they had studied contained little or no DDT and said they were now pursuing PCBs, chemicals used as capacitor insulators, as the culprit.[20] When carefully reviewed, Dr. Bitman's study revealed that the quail in the study were fed a diet with a calcium content of only 0.56 percent (a normal quail diet consists of 2.7 percent calcium). Calcium deficiency is a known cause of thin eggshells.[21-23] After much criticism, Bitman repeated the test, this time with sufficient calcium levels. The birds produced eggs without thinned shells.[24]

After many years of carefully controlled feeding experiments, Dr. M. L. Scott and associates of the Department of Poultry Science at Cornell University "found no tremors, no mortality, no thinning of eggshells and no interference with reproduction caused by levels of DDT which

were as high as those reported to be present in most of the wild birds where 'catastrophic' decreases in shell quality and reproduction have been claimed."[23] In fact, thinning eggshells can have many causes, including season of the year, nutrition (in particular insufficient calcium, phosphorus, vitamin D, and manganese), temperature rise, type of soil, and breeding conditions (e.g., sunlight and crowding).[25]

In the years preceding the DDT ban, the National Academy of Sciences,[26-27] the American Medical Association, the U.S. Surgeon General,[28] the World Health Organization[29] and the Food and Agriculture Organizations of the United Nations[30] had been among those who spoke out in support of the continued use of DDT as a disease fighter and crop protectant.

In 1971, authority over pesticides was transferred from the Department of Agriculture to the newly formed Environmental Protection Agency (EPA). In April 1972, after seven months of testimony, Judge Edmund Sweeney stated that "DDT is not a carcinogenic hazard to man... The uses of DDT under the regulations involved here do not have a deleterious effect on freshwater fish, estuarine organisms, wild birds or other wildlife... The evidence in this proceeding supports the conclusion that there is a present need for the essential uses of DDT."[31]

Two months later, EPA head William Ruckelshaus - who had never attended a single day's session in the seven months of EPA hearings, and who admittedly had not even read the transcript of the hearings - overturned Judge Sweeney's decision. Ruckelshaus declared that DDT was a "potential human carcinogen" and banned it for virtually all uses.[32]

Conclusion

The ban on DDT was considered the first major victory for the environmentalist movement in the U.S. The effect of the ban in other nations was less salutary, however. In Ceylon (now Sri Lanka) DDT spraying had reduced malaria cases from 2.8 million in 1948 to 17 in 1963. After spraying was stopped in 1964, malaria cases began to rise again and reached 2.5 million in 1969.[33]

The same pattern was repeated in many other tropical - and usually impoverished - regions of the world. In Zanzibar, the prevalence of malaria among the populace dropped from 70 percent in 1958 to five percent in 1964. By 1984, it was back up to between 50 and 60 percent. The chief malaria expert for the U.S. Agency for International

Development said that malaria would have been 98 percent eradicated had DDT continued to be used.[34]

In addition, from 1960 to 1974, WHO screened about 2,000 compounds for use as antimalarial insecticides. Only 30 were judged promising enough to warrant field trials. WHO found that none of those compounds had the persistence of DDT or was as safe as DDT. (Insecticides such as malathion and carbaryl, which are much more toxic than DDT, were used instead.) And - a very important factor for malaria control in less developed countries - all of the substitutes were considerably more expensive than DDT.[35]

And what of the charges leveled against DDT? A 1978 National Cancer Institute report concluded - after two years of testing on several different strains of cancer-prone mice and rats - that DDT was not carcinogenic.[36] As for the DDT-caused eggshell thinning, it is unclear whether it did, in fact, occur and, if it did, whether the thinning was caused by DDT, by mercury, by PCBs, or by the effects of human encroachment.16,[37] And as recently as 1998 researchers reported that thrush eggshells in Great Britain had been thinning at a steady rate 47 years before DDT hit the market; the researchers placed the blame on the early consequences of industrialization.[38]

Regardless of whether DDT, exclusive of other chemicals, presented a threat to bird populations, it remains in the news. DDT has a long half-life, and residues sometimes persist for years in certain environments. Also, DDT is an organochlorine. Some organochlorines have been shown to have weak estrogenic activity, but the amounts of naturally occurring estrogens in the environment dwarf the amounts of synthetic estrogens.[39] A recent article in the journal Environmental Health Perspectives suggested that the ratio of natural to synthetic estrogens may be as much as 40,000,000 to 1.[40]

In addition, Dr. Robert Golden of Environmental Risk Studies in Washington, D.C. reviewed the research of numerous scientists and concluded that DDT and DDE (a breakdown product of DDT) have no significant estrogenic activity.[41]

The 1996 book *Our Stolen Future* speculated on a link between DDT and breast cancer, noting that DDE has been found in some breast tumors.[42] Recently, charges have been made associating DDT and DDE with breast cancer - specifically, the finding that women with breast cancer had higher levels of DDE in their blood than did women without breast cancer.[43]

However, elevated blood DDE could quite plausibly be a result of the mobilization of fat from storage depots in the body due to weight loss

associated with breast cancer. Breast cancer thus may be a risk factor for elevated DDE, rather than DDE's being a risk factor for breast cancer.[44]

In a 1994 study published in the J*ournal of the National Cancer Institute*, researchers concluded that their data did not support an association between DDT and breast cancer.[45] The researchers did note that breast cancer rates are higher than the national average in many places in the northeastern United States; but the data also indicated that the higher levels could be accounted for by nonenvironmental factors among women living in these regions - factors such as higher socioeconomic status and deferral or avoidance of pregnancy, both of which increase the risks of breast cancer by up to twofold.[45-46]

In October 1997 the New England Journal of Medicine published a large, well-designed study that found no evidence that exposure to DDT and DDE increases the risk of breast cancer.[47] In the accompanying editorial Dr. Steven Safe, a toxicologist at Texas A&M University, stated, "weakly estrogenic organochlorine compounds such as PCBs, DDT, and DDE are not a cause of breast cancer."[48] Dr. Sheila Zahm, deputy chief of the occupational epidemiology branch at the National Cancer Institute, agrees that the body of evidence that DDT can cause breast cancer "is not very compelling."[49]

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