

The True Story of DDT

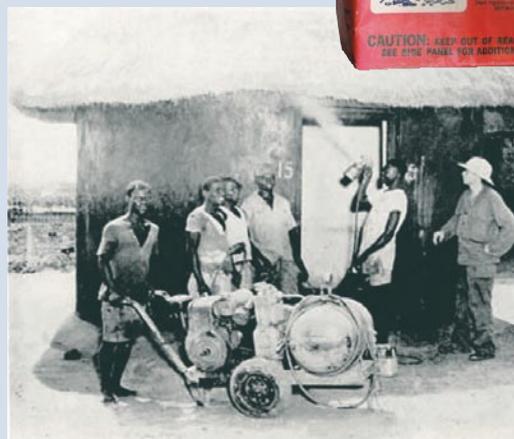
by Przemyslaw Mastalerz



U.S. Army

DDT: Then ...

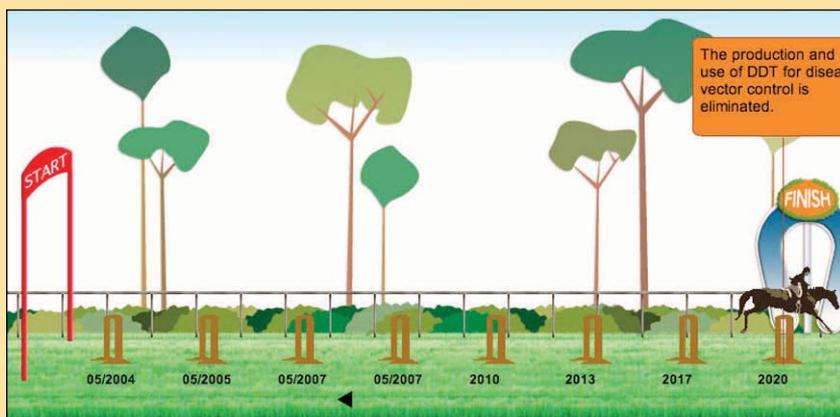
During the war, DDT was used to save the lives of millions of soldiers and civilians from insect-borne disease, making this the first war in which disease did not kill more people than the war itself. Right: DDT residual spraying of a hut with a mobile power spray. Left: DDT dusting in World War II.



U.S. Army

... And Now

The race to eliminate DDT. The Stockholm Convention is racing "toward achieving the elimination of DDT for disease vector control" by 2020. You can click on the button to enlarge the graphic and see how the Convention is progressing in its disease-supporting race to eliminate DDT. <http://chm.pops.int/Programmes/DDT/Overview/tabid/378/language/en-US/Default.aspx>



A chemist looks at the voluminous scientific literature, and concludes that DDT is not hazardous to human health.

1. The Stockholm POP Convention

The letters POP as the acronym for Persistent Organic Pollutants appeared first in U.N. documents during the last decade of the 20th Century. For example, we find POP in the UNEP (United Nations Environmental Programme) document dealing with the preparations preceding the imposition of a ban on the production and application of chemical compounds classified as belonging to the POP group.¹ In a manner typical for the various activities of the UN, the preparations included numerous international conferences. The preparatory activities were finalized at the conference in Stockholm in May 2001 where the representatives of 127 countries signed the document which is known as The Stockholm POP Convention.²

The convention explicitly bans or imposes severe limitations on production and use of 12 chloroorganic compounds (DDT, Aldrin, Dieldrin, Endrin, Chlordane Heptachlor, decachlorobi-phenyl, tetrachlorodibenzodioxin, tetrachlorodibenzofuran). In

the English ecological literature, the POPs are sometimes called “the dirty dozen.”^{3,4} That phrase alone tells what is the “ecologically correct” attitude towards the POP family of chemicals...

The main reason why environmentalists wage war against POPs, is that all POPs are organochlorine compounds and the environmentalists stubbornly believe that all organochlorines are harmful and should be totally eliminated. Skeptics who do not believe that there are people harboring such ridiculous views are referred to the book by Thornton,⁵ pages 1-11 and others.

The POPs were selected for a frontal assault because previous successful bans of organochlorine insecticides and PCBs opened a breach in society's defense against environmentalists and made it more probable that their future victories will be easier to achieve...

The Stockholm Convention is most aptly described as a betrayal of science and reason. It is not without irony that the same phrase was used by Paul R. Ehrlich and Anne H. Ehrlich in the title of their book in which they acidly criticize all efforts to counteract environmentalist propaganda.⁶

Common sense and even a cursory survey of literature indicate that the POP Convention does indeed betray science and reason. It is very difficult to understand why and how science became so totally overshadowed by environmentalist opinions that it was possible to create such a document as the Stockholm Convention.

2. Ideological and Historical Background of the War Against DDT

The history of DDT abounds with important scientific and political events, but the main reason why it should be more widely remembered is that it presents a very instructive picture of the conflict of science and common sense with politics and propaganda. It is a very sad and depressing picture with numerous examples of:

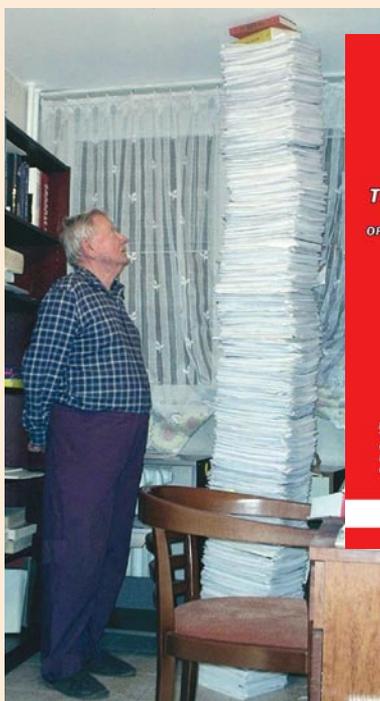
- cheating public opinion,
- contempt of scientific information,
- dishonesty of scientists,
- simple human stupidity,
- domination of ideology and politics over science.

In view of the ongoing confrontation of science with politics and obscurantism, it would be dishonest and even dangerous to put a lid of silence upon that picture.

There are known at present more than 20 million organic compounds and most of them are more or less toxic, but the environmentalists have chosen DDT as the target of their most violent attacks. Their reasons are very difficult to understand, in view of the fact that DDT has extremely low toxicity for most warm-blooded animals and is one of the most safe and most effective insecticides. Probably no antibiotic saved so many people from unnecessary and avoidable death as did DDT, through its use in the fight against malaria.

The campaign against DDT has no rational explanation. It culminated in the 1970s with the DDT ban, but the ugly marks it left in human minds remain to the present day. The campaign against DDT was a political and ideological act without any scientific reasons. However, there were tactical reasons.

From many organochlorine insecticides, which were in common use from late 1940s to early 1970s, the environmentalists chose DDT as the target of their first broadside attack on organochlorines. The reason of their choice was that DDT already was publicized very extensively by the mass media. Most people in North America and Europe knew what DDT was, while only few were aware



THE TRUE STORY OF DDT, PCB, AND DIOXIN

Ecologists claim that dioxin is more toxic than other man-made poisons. It is a false claim. Nobody ever died of dioxin, not even Viktor Yushchenko, the Ukrainian politician who was given a huge dose of dioxin in a failed attempt to remove him from the political scene. It follows that even would-be assassins should be advised not to take ecological claims at the face value.

Przemysław Mastalerz

Prof. Mastalerz stands next to a stack of the 2,000 papers on DDT which he reviewed as documentation for his book.

Editor's Note

Prof. Mastalerz is Professor Emeritus of Organic Chemistry and Biochemistry at the Technical University of Wrocław, Poland. He wrote The True Story of DDT, PCB, and Dioxin in 2005 in an attempt to unearth the relevant facts about these chemicals to put before the public. The book covers the technical details of these chemicals, and presents his findings from a review of more than 2,000 scientific papers on topics like toxicity to birds, fish, domestic and wild animals, and human beings. It includes an examination of the major environmental issues, such as the alleged carcinogenesis, hormonal effects, and decreasing male fertility of DDT.

The book, published by Wydawnictwo Chemiczne in Wrocław, is available for \$20.00 at <http://www.chemia.org/id12.html>. We have excerpted a small part of the 226-page book here, with minor editorial changes to aid the continuity of the excerpts and footnotes.

STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS

The Parties to this Convention,

Recognizing that persistent organic pollutants possess toxic properties, resist degradation, bioaccumulate and are transported, through air, water and migratory species, across international boundaries and deposited far from their place of release, where they accumulate in terrestrial and aquatic ecosystems,

Aware of the health concerns, especially in developing countries, resulting from local exposure to persistent organic pollutants, in particular impacts upon women and, through them, upon future generations,

Acknowledging that the Arctic ecosystems and indigenous communities are particularly at risk because of the biomagnification of persistent organic pollutants and that contamination of their traditional foods is a public health issue,

Conscious of the need for g

Mindful of decision 19/13 United Nations Environment Programme health and the environment through and discharges of persistent organ

Recalling the pertinent conventions, especially the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, and the Basel



The first page of the 2001 Stockholm Convention. To read the rest of the document, see http://chm.pops.int/Portals/0/Repository/convention_text/UNEP-POPS-COP-CONVTEXT-FULL.English.PDF



Stockholm POPs Convention

"A betrayal of science and reason": The Stockholm POP Convention meeting in May 2006.

of dieldrin, chlordane, or heptachlor, with their difficult-to-remember names. The environmentalists knew very well that only by attacking the most popular insecticide would they attract sufficient public attention and secure financial support from society. DDT appears to be the most prominent case of using chemophobia to earn money from scared people.

Attacks on other POPs came later, when environmentalist organizations strengthened their position by having achieved the ban of DDT. That ban was their biggest ever victory. Their campaign against other organochlorines found its culmination in

the Stockholm Convention.

One of the possible explanations of the hostile attitude towards DDT appears to have its roots in the fact that environmentalists reject scientific opinions whenever these opinions do not agree with their canons of faith. For example, the environmentalists do not agree with the results of toxicological and epidemiological studies which demonstrate very clearly that DDT is harmless to humans and other mammals. They also refuse to accept the fact that there is nothing better than DDT to fight the malaria-spreading mosquitoes.⁷⁻⁹

We shall return in later chapters to various aspects of the war of environmentalists with DDT, but it is worth mentioning here that the Stockholm Convention exempted DDT from immediate total ban by permitting its use in malaria eradication programs. Unfortunately, this exemption did not help the poor nations very much, because many relief agencies refuse to sponsor programs in which DDT is to be used, or refuse to sponsor any relief programs in countries which decide to return to DDT in their struggle against malaria.

Fierce attacks on DDT continued from the earliest years of the history of that insecticide, and its opponents have used all conceivable lies as their weapon. One of the earliest examples is provided by a book published in 1955 where the author said that the annual production of DDT in the USA (about 150,000 tons at that time) would be enough to kill all people on our planet.¹⁰ It is an exceptionally crass lie, because it was well known in 1955, or even earlier, that DDT is not toxic to humans. I cite that book to show how difficult it is to argue with environmentalists with their total disregard of truth. An earlier example of a stupendous lie told in a paper published in a scientific journal will be discussed later.

About 20 years after the beginning of DDT history the American author Rachel Carson published her famous book *Silent Spring*. Carson presents there a dramatic

picture of a world ravaged by DDT, which indiscriminately brings death to people and animals.¹¹ The book is now almost forgotten, but in its time it served to establish in the public opinion the picture of DDT as a deadly poison which kills even when applied in very small amounts. The Carson book marks the beginning of chemophobia which now dominates the public attitude towards all chemicals.

It should be stressed that *Silent Spring* must not be totally condemned because it helped to develop ecological awareness in the society. However, one has to remember that Carson's

book is full of lies and exaggerations. A severe critique by professor Gordon Edwards¹² appeared 30 years after the publication of the first edition of *Silent Spring*. With reactions delayed by 30 years there is no chance that professors shall ever win the upper hand in their discussion with environmentalists.

In later chapters, I discuss many examples of false information on DDT taken from scientific journals and popular books. . . .

The Triumph, the Demise, and the Return of DDT

DDT was first synthesized 130 years ago, but did not attract any attention until 1939, when Paul Müller discovered its amazing insecticidal properties. For reasons to be explained later, the date of Müller's discovery, now largely forgotten, should be inscribed in the annals of humanity as one of the greatest scientific achievements. Contemporaries very soon recognized the merits of the new insecticide and Müller received the Nobel Prize in 1948, less than 10 years after the first agricultural applications of DDT. Details of work leading to that discovery are described in papers by Müller et al.^{13,14} and in the book by West and Campbell.¹⁵

Very soon the newly discovered DDT was successfully applied in Switzerland to combat the Colorado beetle, but because of the war, the agricultural applications were not in the foreground before 1946. Instead, the attention was then focussed on eradication of disease-carrying insects. Being aware of the importance of an extremely potent insecticide, the Swiss government made DDT available to the Allies. That gesture made possible a large-scale utilization of DDT for protection of allied soldiers from malaria-spreading mosquitoes and from typhus-carrying human lice.

It is a telling and little known fact that the Swiss government made DDT available not only to the Allies but also to Nazi Germany. The Swiss argued that this was required by their neutrality.¹⁶ The Swiss thus demonstrated a rather queer understanding of neutrality.

The success of DDT against malaria and other diseases carried by insects was truly phenomenal and was the reason why Müller was honored with the Nobel prize in medicine so soon after the first practical applications of DDT. Unfortunately, due to tremendous pressure from ecological organizations, the early successes were soon forgotten and are almost never mentioned in newer literature. A striking exception to this is provided by A.G. Smith in a review article where the early history of DDT is objectively presented.¹⁷ Environmentalist books either do not mention, or try to belittle the successes of



Novartis

Nobel Prize winner Paul Müller in his laboratory, where he discovered the insecticidal properties of DDT in 1939.

DDT.^{18, 19}

Mosquitoes bite when their victims are sleeping and before or after feeding, they rest on the walls of human homes. This behavioral peculiarity made possible the phenomenal success of the fight against malaria, because only one spraying of inside walls with minute quantities of DDT protects the homes for several months.²⁰ The effectiveness of such an approach is very well documented in the literature.^{21, 22}

Between 1945 and 1971, malaria was eradicated in 27 countries with a total population of over 700 million, but it returned in later years when the use of DDT was prohibited worldwide. The sponsors from the United States and rich European countries decided that because of the ban, it is unlawful to support the eradication of malaria with DDT. Without financial support, DDT was withdrawn from malaria programs and the results were immediate and disastrous. Millions of poor people in tropical countries again were dying from malaria.

It is true that in some isolated cases DDT was withdrawn because of the appearance of resistant mosquitoes, but the ban was prompted not by insect resistance but for purely political and ideological reasons. Resistance is not a big problem, because even the resistant mosquitoes are repelled by DDT and do not enter sprayed homes. Without being highly effective against mosquitoes and some crop-damaging insects, DDT would not be as popular as it is now in Third world countries. The amount of DDT used globally after the ban, mostly in Asian countries, was estimated in 2001 to approach 50,000 tons annually.²³

Poor, malaria-threatened nations are often unable to afford other, more expensive methods of fighting mosquitoes and thus turn to DDT even if that means a loss of financial help from the United States and Europe. It is truly disgusting that the environmentalists from rich countries condemn poor people to death from malaria, by denying funds only because the use of DDT is against their canon of faith.²⁴

From the earliest days, the successes of DDT did not prevent scientists from noticing some disturbing symptoms. The first papers on the toxicity of DDT to fishes, frogs, and laboratory animals appeared in 1944²⁵⁻²⁷ and the toxicity to humans was first mentioned in 1945.²⁸ The accumulation of DDT in animal fat and its appearance in milk were also described in 1945.^{29, 30}

The earliest studies were carried out in the laboratories of the U.S. Army and published with much delay because of the secrecy enforced by war. The details were described a quarter-century later by W.B. Deichman, who had supervised some of



U.S. Army

The Army routinely dusted displaced persons and others in Europe with DDT to protect civilians and the Army from typhus, a louse-borne killer disease. The Supreme Headquarters of the Allied Expeditionary Force (SHAEF) made public health a command responsibility, setting up DDT dusting at border control stations and elsewhere.

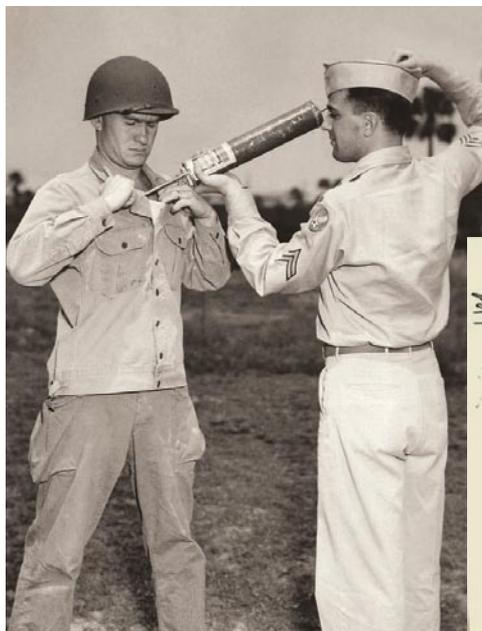
the early work.³¹ Since the appearance of the first papers, thousands of scientific papers on biological properties of DDT have been published, but the early publications are now forgotten and are hardly ever cited.

The developments during the first years of DDT history were described by E. Russell in an article published in 1999. It is a very interesting article based on documents from American governmental archives. Unfortunately, the Russell article is heavily biased, with focus upon the harmful properties and omission of the useful properties of DDT. For example, Russell



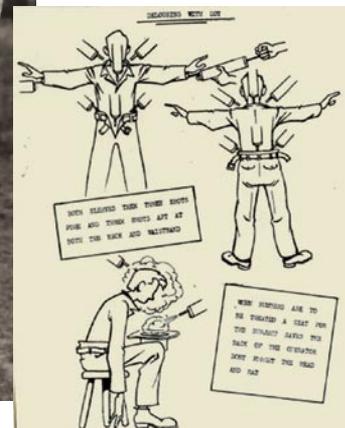
U.S. Army

DDT spraying was carried out by the Army around the world. Here residual spraying of living quarters in Assam, northeast India.



U.S. Army

U.S. troops were routinely dusted with DDT for disease control. Here a soldier demonstrates how to spray, and an World War II Army poster describes the process of delousing new recruits.



National Museum of Health and Medicine at Walter Reed Army Medical Center

does not at all mention the eradication of malaria.³² I refer to his article only to remind the readers that reviews are not a good source of objective information on matters contested by environmentalists.

The Toxicity Question

The very low toxicity to humans and other mammals was noticed at the very beginning of wide-scale application of DDT. For example, people infected with lice were literally sprinkled with copious amounts of powders containing several percent of DDT without harmful effects³³ (see photographs).

Evidence that DDT is very safe to use was provided also by its application on a very large scale in agriculture, without any indication of harm to humans.

Unfortunately, the excellent safety records of DDT encouraged its indiscriminate use on fields and in forests, which resulted in isolated cases of poisoning of fish and birds. At the same time, it was learned that DDT is very persistent in the environment and is present in detectable amounts in animal and human tissues.

Toxicity and persistence were very much exaggerated by environmentalists, who from the earliest days of DDT history claimed that it is too dangerous to be used and should be banned. Soon a very heated public discussion began of the merits and hazards of DDT.

Unfortunately, it was always a political discussion, which proceeded with total disregard of science. The following two examples of argumentation illustrate the extremity of positions taken by the participants of these discussions. Both quotations come from medical journals:

"DDT is a deadly poison for humans and for all animal species."³⁴

"It was incontrovertibly shown that DDT prevents human illness on a scale hitherto achieved by no other public health measures entailing the use of a chemical."³⁵

It is difficult to believe that these two so radically different statements refer to the same chemical compound. We shall see later that in the literature on DDT there is no shortage of contradictory opinions and information. Here I shall only comment briefly on the situation in 1960-1970 when there were heated discussions in the media and in courts of law. The discussion finally resulted in the worldwide ban on DDT. The most important and influential were the protests of environmentalist organizations and discussion in the media which drove the society to hysterical fear of DDT and of the chemical industry. The most important legacy of those years is the chemophobia and the common belief that chemistry is poisonous. A popular account of the origins of chemophobia is given by E.M. Whelan.³⁶

For a popular and very competent presentation of the DDT problem as it was at the beginning of the 1960s, the reader is referred to the book by the American politician J.M. Whitten, who participated in public discussion during the 1960s.³⁷

Environmentalists most often used the following three accusations to support their attacks on DDT³⁸:

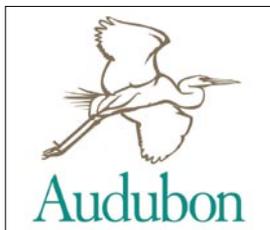
- DDT brings a hazard of bird extinction.
- DDT is so persistent that its removal from the environment is practically impossible.
- DDT is a hazard to humans because it is carcinogenic.

In later chapters I present detailed and compelling evidence that all these accusations are without scientific foundations.

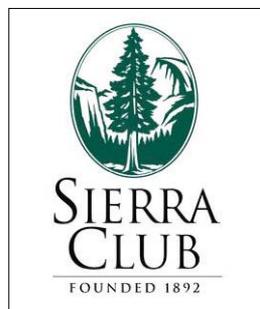
The Attacks Escalate

The truly dangerous attacks on DDT begun in 1969, when three potent environmentalist organizations (Environmental Defense Fund, Sierra Club, and National Audubon Society) submitted to the Department of Agriculture a petition demanding a ban on DDT. The main argument of these organizations was that DDT is carcinogenic.³⁹ In response to the petition, the Department of Agriculture issued a partial ban prohibiting DDT use in human habitats, tobacco plantations, and water areas.

But this decision was not satisfactory for the environmentalists, who brought the matter to a



The three leading environmental groups in the crusade against DDT, which gained them both fame and funds.



court of appeal, which ruled that the DDT problem should be considered by a court appointed by the Environmental Protection Agency (EPA). In sessions lasting from August 1971 to the Spring of 1972, this court heard the testimony of over 100 witnesses, representing both the opponents and supporters of DDT. In April 1972, the EPA hearing examiner Edmund Sweeney, after reviewing 9,300 pages of testimony, recommended to the EPA that a more extensive ban on DDT than that already in force was not necessary or desirable. The highlights of Sweeney's verdict are as follows:⁴⁰⁻⁴²

- DDT has extremely low toxicity to man and is not hazardous when used as directed in registration documents.
- DDT is not carcinogenic to man.
- DDT uses according to registration do not have a deleterious effect on fish and wildlife.

One would assume that such clear verdict should save DDT for continued use. However, EPA administrator William Ruckelshaus ignored Sweeney's recommendation and imposed a ban of DDT. In doing so, Ruckelshaus declared that the wealth of scientific data presented during court sessions was irrelevant and started a long chain of irresponsible decisions made by EPA.

The Ruckelshaus decision belongs to the biggest scandals in the history of science and politics. Details of the background of this infamous decision are not known. There are reasons to be-



EPA

EPA administrator William Ruckelshaus, an active member of the Environmental Defense Fund, banned DDT in 1972, in what he later admitted was a decision based on political reasons.

lieve that Ruckelshaus was influenced by the ecological organization Environmental Defense Fund, of which he was an active member.⁴³

In developed countries, where the farmers have access to a variety of insecticides, the ban of DDT was without many disturbing effects. The situation was very different in poor countries infected with malaria where the removal of DDT had devastating consequences,⁴⁴ as it resulted in unnecessary death of millions of people from malaria. It is true that with his single signature Ruckelshaus committed the crime of genocide on an unimaginable scale. His willing accomplices were ecological organizations with their relentless propaganda against DDT.

Environmentalists plead not guilty and say that removal of DDT was due to increasing insect resistance, but by doing so they only commit one more lie. The best evidence against the claims of the environmentalists is the continued "illegal" use of DDT in third world countries.

The Population Question

The potential to save human life was used as an argument by both the supporters and opponents of DDT. The supporters argued that DDT must not be banned because it prevents millions of death cases from malaria, while the opponents said that there are too many people on this planet and DDT ban would lessen the problem of overpopulation. J.G. Edwards, a distinguished participant in the DDT discussion, quotes the following statement made by Alexander King, the chairman of the Rome Club:

"I am against DDT because eradication of malaria increases the overpopulation."⁴⁵

Similar but much more direct is the statement by C.F. Wurster, the scientific advisor of the Environmental Defense Fund:

"There are too many people and banning DDT is as good a way to get rid of them as any."⁴⁶

These quotations tell us that for a proper judgment of environmentalist intentions, it is useful to remember what dark ideas lurk behind the scene of public discussions on DDT.

The astounding effectiveness of DDT against malaria is illustrated by the following statistics of malaria cases before and after introduction of DDT in some countries (after H. Hug, *Der tägliche ökohorror*, München, 1997). Such statistics are never referred to in publications authored by writers who are convinced that DDT is an extremely haz-

ardous substance.

Country	Number of Malaria Cases	
	Before DDT	After DDT
Turkey	1,185,969	2,173
Italy	144,631	10
Romania	333,198	4
Bulgaria	144,631	10
India	over 1,000,000	287,000

The DDT Family

It is necessary to define DDT, PCBs, and dioxins prior to the discussion of the effects they have in the environment. Unfortunately, nothing is easy or simple concerning these three most important POPs, and even their definitions are complicated.

The structure of DDT shown in the figure does not give a full picture of what is now understood as DDT in the environment. In addition to the

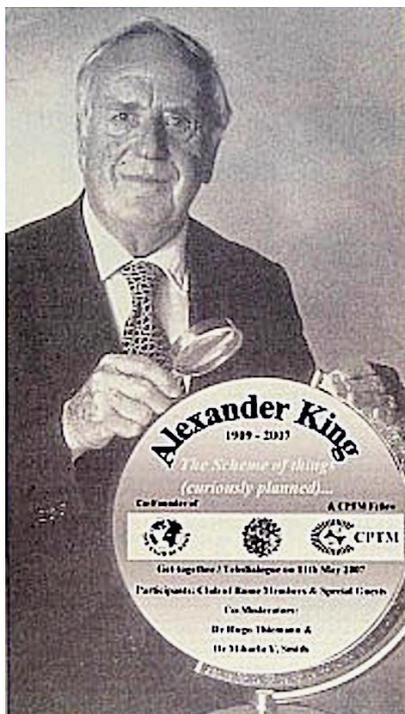
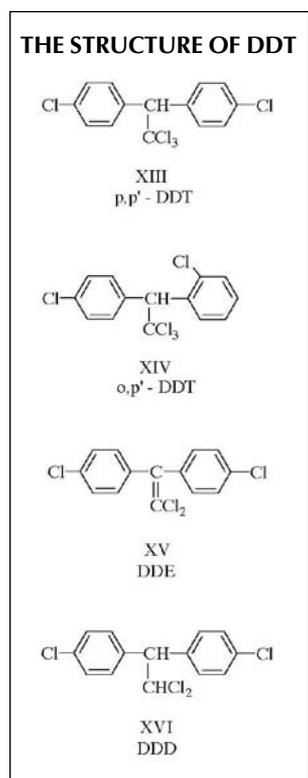
compound defined by the chemical schematic (the correct abbreviation of its name is p,p'-DDT), the technical DDT used to eradicate insects contains also about 20 percent of the isomer with a different position of one of chlorine atoms (XIII). This isomer, known as o,p'-DDT, was introduced into the environment along with p,p'-DDT.

That is not the whole story yet, because in the environment, p,p'-DDT very easily splits off a molecule of HCl and is transformed to the unsaturated compound DDE (XIV).⁴⁷ Another reaction, involving the substitution of one chlorine atom with hydrogen produces DDD (XV).⁴⁸

Unchanged p,p-DDT occurs in the environment together with o,p'-DDT, DDE, and DDD. There are present also small amounts of o,p'-DDT derivatives similar to DDE and DDD. The DDT and related compounds found in the environment are represented summarily by the formula Σ DDT or simply as DDTs...

Human Experiments with DDT

Symptoms indicating that something is terribly wrong in environmental sciences are severe and numerous, but perhaps none is as striking and ominous



Club of Rome Alexander King, co-founder of the Malthusian Club of Rome, acknowledged that although he had supported DDT use during the war, he later regretted his decision, because malaria eradication by DDT increased population.

as the fact that an article was published in 2004 in which DDT is accused of having been the cause of the poliomyelitis (child paralysis) epidemic of 1942-1962.⁴⁹ The article appeared on the Internet and will probably have more impact than the publications in refereed scientific journals because more readers browse in the Internet than among library shelves. There is the hazard that the most stupid lie about DDT which was ever told will be repeated until it becomes another generally accepted fact. The article⁵⁰ mentions the paper by Biskind, who as far back as 1949 demonstrated quite exceptional ignorance.⁵¹

We have already quoted Biskind in Chapter 4. The reappearance of Biskind in the scientific literature 55 years later indicates that among the environmentalists there are scientists who understand nothing and are probably unable to learn anything.

The ubiquity in human tissues and the frequently encountered high or very high concentrations of DDT were of considerable concern in the early days of DDT

and were used by ecological organizations to bring public concerns to the level of hysteria. Let's see, then, what scientific literature has to say in the matter of DDT and human health.

The effects of DDT and its metabolites on human organism have been carefully watched since the first applications of that insecticide in fields and forests. Because of the enormous volume of information collected so far, an exhaustive review would fill a rather sizable volume. Despite restrictions imposed by the small size of this book, all care was taken to include the papers which claim that DDT is harmless as well as those which describe harmful effects.

Let's begin with cases of death after ingesting solutions of DDT:

1945: A one-and-one-half-year-old child drank ca. 30 ml of DDT in naphtha and died after a few hours.⁵²

1946: Suicide by drinking an unknown amount of DDT solution in naphtha.⁵³

 Suicide by drinking ca. 50 ml of DDT solution in methylcyclohexanone.⁵⁴

 Death upon drinking a 6 percent solution of DDT in naphtha.⁵⁵

 Deadly poisoning by inhalation of DDT vapors.⁵⁶

 Death after staying in a room sprayed with a 6 percent DDT solution in naphtha.⁵⁶ This death was probably caused by a strong allergic reaction. Protection from mosquitoes by spraying walls with DDT is safe for humans.

1947: Death upon drinking 120 ml of a 5 percent solution of DDT, solvent unknown.⁵⁷

No cases were reported after 1947 except for a mention on the Internet of the death in 1994 of a child after ingestion of DDT solution in kerosene.⁵⁸

The deaths in all of the above listed cases was probably due



Prints and Photographs Division, Library of Congress.

A special tractor developed in wartime for DDT spraying of food crops to control insects and increase yields. There was no reported damage to human health from the proper use of DDT.

to the solvent rather than to DDT. Cases of death after ingestion of DDT without solvent are not known.

During the first years of DDT history, there were many cases of poisoning without death. The descriptions of non-controlled poisoning episodes are of rather little scientific value but make a quite interesting reading and are quoted here to bring back the characteristic for those times' carelessness in handling chemicals:

1945: A technician stirred a mixture of DDT and acetone with his bare hands. The technician became ill with symptoms of insomnia and weakness. The symptoms disappeared after one year.⁵⁹

1946: A cook at a British army unit baked a cake using flour accidentally contaminated with DDT. Twenty-five soldiers who ate the cake suffered from vomiting and dizziness.⁶⁰

1946: A group of prisoners of war was poisoned upon eating cakes contaminated with DDT. The poisoning was serious and required hospitalization.⁶¹

1946: A worker employed in the preparation of solutions for use against mosquitoes stirred DDT in diesel oil with bare hands. After several weeks the worker suffered headache, weakness, vomiting, and a high temperature.⁶³

1947: In Göttingen, Germany, a Dr. H. Velbinger investigated the toxicity of DDT on himself and two other persons, who let themselves be persuaded to participate in the investigation. The experiments involved swallowing increasing doses of DDT. After the first dose of 250 milligrams and the second one of 500 mg taken four weeks later, there were no visible effects. The dose of 750 mg produced nausea. Three weeks later, the participants received a dose of 1,000 mg and the nausea increased. The last and largest dose of 1,500 mg was given under medical control in a hospital. The 1,500-mg dose produced tremors,

vomiting, and vertigo.

There is no need to continue the description of that heroic experiment, probably one of the last human experiments in the history of medicine.⁶⁴

Other Human Experiments

Demonstrating on oneself the lack of toxicity of DDT was not uncommon during the heated discussion which preceded the DDT ban. Thus, Professor K. Mellanby, a well-known participant and director of several programs of research on insecticides, used to swallow sizable doses of DDT during his popular lectures to demonstrate its benign nature. Professor Mellanby says that he never noted any harmful effects.⁶⁵

A similar example was provided by Professor Gordon Edwards, who, during his many lectures, used to swallow a tablespoon of DDT and who enjoyed a good health even at the age of 80.⁶⁶

Such heroic experiments are of little scientific value, but making them widely known might perhaps help to convince the public that DDT is not a dangerous substance.

The biggest ever experiments with DDT on human subjects were described by Hayes in 1956 and 1971. The experiments were carried out on several dozen prisoners from



Courtesy of Gordon Edwards

Entomologist J. Gordon Edwards for years demonstrated the non-toxicity of DDT by ingesting a spoonful of DDT at his university lectures.

American jails who agreed to take part in that experiment. It is not even possible to imagine the fury of the media if somebody proposed to conduct such experiments at present!

In the experiments conducted by Hayes, the human subjects received daily doses of 35 mg of DDT for almost two years, and some were observed for several years after the last dose. Hayes states that no harmful effects were found by medical examination.^{67, 68}

A human experiment was conducted also by Morgan and Roan in 1971. In their experiment, the volunteers received 10 or 20 mg of DDT daily for a period of 183 days. Hematological and biochemical examination did not reveal any irregularities.⁶⁹

Long-term Experimental Evidence

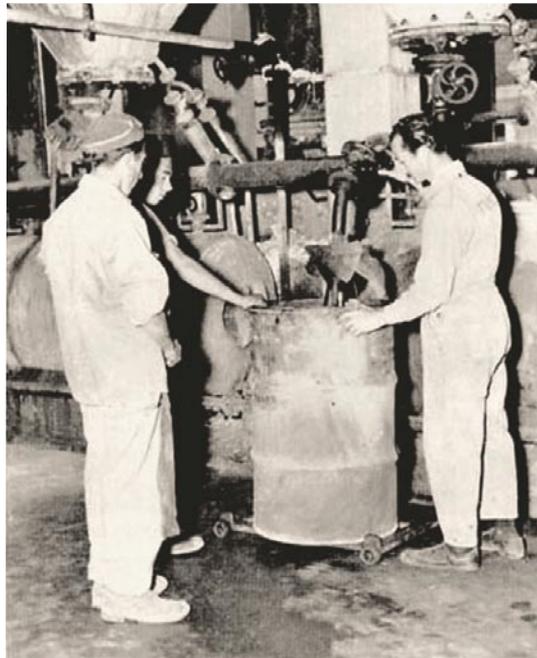
In the discussions of the dangerous nature of DDT it is always stressed that diseases may appear many years after exposure. The environmentalists are not satisfied with the five-years observation

by Hayes, but should find satisfactory the results obtained by Cocco et al., who in 1997 examined the health of persons who 50 years earlier participated in mosquito eradication programs in Sardinia, and had prolonged contact with sprayed DDT.⁷⁰



U.S. Army

The Army used repeated aerial spraying of DDT in Italy to control mosquitoes and prevent malaria. One 1997 study examined the health of 5,193 residents of Sardinia who had prolonged contact with DDT spraying during the war, including some 2,908 persons with high exposure. Fifty years later, there was no difference between the health of these people and other Sardinia residents.



U.S. Army

Drums of a 5 percent solution of DDT being mixed with kerosene or diesel oil for use by the Army in Italy.



IIISD

An ugly United Nations Environment Program poster, which proclaims in six languages, "Persistent Organic Pollutants: A serious threat to human health and the environment."

Cocco et al. examined 5,193 participants of the anti-mosquito campaign including 2,908 persons with high exposure. There was no difference between the expected and the officially registered number of deaths. This result shows that the general health of persons highly exposed to DDT is not different from the health of other people living in Sardinia.

Cocco et al. state that the persons exposed to DDT displayed an increased frequency of liver cancers. It is difficult to understand why they included such statement, because in the next sentence they say that the increased number of cancers is meaningless because similar numbers were found in control group. The authors apparently did not understand, and did not care at all, that just one slight mention of cancer is enough for the environmentalists to register a paper as evidence that DDT is carcinogenic.

The strongest evidence that DDT is a benign substance is provided by the gigantic experiment in which all humanity has participated

since DDT appeared in the environment. The experiment started 60 years ago and the number of participants at present is over 6 billion. Every human being takes part in this experiment, because everybody contains DDT in his or her tissues. For more than one-half century, the scientists scrupulously looked for evidence of harmful effects and failed to find even one disease caused by DDT. What's more, human life span increased very significantly during the presence of DDT. If DDT were as dangerous as some claim it to be, one should not expect people to live longer.

All arguments for the benign nature of DDT extend automatically to its metabolite DDE, because from the beginning the environment contains more DDE than DDT.

Some Alleged Non-lethal Effects of DDT

The facts described in here should convince everybody that DDT is not harmful to humans. The environmentalists are not convinced, however, because they never do agree with facts which prove that something is harmless.

Due to their efforts, and contrary to the facts, the literature is overflowing with papers claiming that DDT is a dangerous substance. Some of such papers have to be discussed here despite their low scientific value, because their omission would be met with accusation of non-objectivity in the selection of the presented material.

The most proper place to discuss the DDT hazards to human health are the chapters on cancer. Here we shall be concerned only with examples of papers dealing with some alleged effects of DDT other than cancer.

In 1970, there appeared a paper on the association of DDD and DDE with abortions. The title suggests that there is an association, but a table included in that paper shows that there is none. In the last sentence the authors say:

"Exposure to DDT during pregnancy does not belong to the essential abortion-stimulating factors."⁷¹

Unfortunately, those scientists who read only the titles of



© P. Virot/WHO

While the environmentalists continue the war against DDT, hundreds of thousands of people become ill and disabled from malaria each year. Here a malaria patient in Ethiopia.

the papers they quote will think that publication⁷² brings a proof that DDT induces abortion.

The authors of a paper entitled "Pesticide Levels in the Blood of Mothers and Newborn Infants" say that they are unable to rule out a causative link between DDT levels in umbilical cord blood and premature births.⁷³ But they were also unable to demonstrate the existence of such a link.

Very radical conclusions are found in a 1981 paper on "Chloroorganic Pesticides in Blood Samples Taken in Cases of Abortions and Premature As Well As Normal Births." The authors state simply that DDT is an antagonist of pregnancy.⁷⁴ That conclusion is negated by the fact that from the beginning of DDT use, several billion healthy children were born, and an increased frequency of abortions was not noticed.

The authors of a very recent paper on DDT and abortion claim that DDE increases the frequency of premature births and decreases the size of newborns.⁷⁵ That paper was criticized because of errors in the interpretation of results.⁷⁶

... The litany of similar papers could be continued ad infinitum. Without discussing such publications in detail, I want to assure the reader that papers on non-lethal effects of DDT are generally of very little ecological relevance, and none of them demonstrates that DDT is dangerous...

DDT and Human Cancer

The first signal that DDT should be considered a human carcinogen appeared in 1969⁷⁷ and the official proclamation that DDT is "possibly carcinogenic" to humans was issued in 1991 by the International Agency for Research on Cancer.⁷⁸ During the next decade numerous papers were published with the purpose of finding out whether DDT is or is not a human carcinogen. Traditionally, most of these papers refer to the carcinogenicity of DDT but what is being studied is the carcinogenicity of DDE because DDE is the only member of the DDT family still present in tissues at relevant concentrations. Some papers on carcinogenicity refer only to DDE without even mentioning DDT.

The question of cancer induction can be answered only by means of epidemiological studies which are based on comparisons of tumor frequency in exposed persons and in the general population. The degree of exposure is inferred from tissue con-



ARS/USDA

A U.S. Department of Agriculture poster issued in 1947 promoting the use of DDT to control household pests. Despite the environmentalist belief that DDT has harmed human beings, after 60 or more years and much epidemiological research, there is no scientific evidence to show human harm.

centrations of the presumed carcinogenic agent. Up to now, the epidemiology has failed to provide evidence that DDT or its metabolites are carcinogenic in humans. This is illustrated by the following examples of recent results:

1. No association was found between DDE concentration in adipose tissue and cancers of the testicles and prostate.⁷⁹

2. No link was found between non-Hodgkin's lymphoma and DDT,⁸⁰ although such association was claimed in earlier papers.

3. Examination of 3,579 workers with long-term exposure to DDT at a chemical plant failed to find an increased number of cancers.⁸¹

4. Serum concentrations of DDE are not associated with endometrial cancer risk in the United States.⁸²

There are also papers claiming a positive association of DDT with cancer, but the number of such papers is not large and many of them were criticized. In one of such papers, Garabrant et al. report that exposure to DDT increases the risk of cancer of the pancreas.⁸³ The authors arrived at that conclusion by observation of workers at a chemical plant for about a dozen years. The authors admit that their study is not conclusive, because of the small number of detected cancers and because the workers were employed in the production of several different chemicals, not only DDT.

The Garabrant paper was criticized by other scientists⁸³ and is a quite typical example of the poor quality of many studies on the carcinogenicity of environmental contaminants. Other examples of poor quality will follow.

Very strong evidence against the carcinogenicity of DDE is presented in a recent paper where cancer mortality in the Uni-



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A baby with advanced malaria at Garki General Hospital in Abuja, Nigeria. Environmentalists argue that the "risks" of DDT use outweigh the benefits. Meanwhile 90 percent of malaria deaths in Africa are children under five and malaria kills one child in Africa every 30 seconds.



IISD

Participants in the December 2000 meeting of the Stockholm Convention in Johannesburg joining the Greenpeace demonstration against POPs.

ed States was examined in relation to prolonged exposure to DDE.⁸⁵ The authors examined the association of the DDE levels in adipose tissue with mortality rates for multiple myeloma, non-Hodgkin's lymphoma, and cancers of the breast, corpus uteri, liver, and pancreas, and they observed no association. Thus, the results of this study exclude DDE as the causative agent of most cancers. . . .

Should We Be Concerned about Industrial Estrogens?

. . . The present discussion of the harmful effects of endocrine disrupters will be limited to a few topics only. The subject is so huge and includes so many different topics that an exhaustive coverage would require a large book.

Some very simple considerations suffice to dispel the notion that synthetic estrogens may be harmful to humans. First of all there is the matter of plant estrogens (phytoestrogens). Many plants and plant products in our daily diet contain significant concentrations of phytoestrogens which are perfectly able to do as much harm as the synthetic ones, but the ecologists do not warn us against eating bread, cabbage, potatoes, or apples. They argue that phytoestrogens must not be compared with synthetic estrogens because they are rapidly destroyed in animal and human bodies while estrogens like DDTs, PCBs, and dioxins are persistent and accumulate in tissues.

That argument is useless, however, because phytoestrogens are consumed with every meal and their amounts in tissues are constantly replenished. The distinct biological effects of soybean estrogen indicate that phytoestrogens can and should be compared with synthetic organochlorine estrogens. After all, organochlorine disrupters of the human endocrine system were never shown to disrupt the human menstrual cycle, as do phytoestrogens from soybeans.

We are eating much larger amounts of phytoestrogens than of synthetic endocrine disrupters because our diet contains vanishingly small concentrations of industrial contaminants, while the concentrations of phytoestrogens are quite large.

Some plants contain estrogens at levels of several dozen to several hundred ppm.⁸⁶ Despite their large consumption, the harmful effects of phytoestrogens are observed only on very rare occasions. It is known, for example, that excessive consumption of soybeans may disturb the menstruation cycle but nobody issues warnings against consumption of soybean products. The lack of harm due to phytoestrogens indicates that we should not be afraid of the minute amounts of industrial estrogens in our food.

Any disruptive activity of DDTs, PCBs, and dioxins is precluded by the fact that their concentrations in human and animal tissues are below levels necessary for biological action to appear. For example, *o,p'*-DDT, the most potent estrogen of the DDT family, is estrogenic at

concentrations of at least 1 ppm which is very much above *o,p'*-DDT level in human tissues.⁸⁷ The affinity of organochlorines to cellular estrogen receptors is at least a thousand times lower than the affinity of mammalian estrogens. Low affinities and low tissue levels of organochlorine disrupters make it impossible for them to compete successfully with natural estrogens. . . .

It is evident that concerns about the carcinogenicity of organochlorine pesticides, and other environmental estrogens are unfounded; and similarly unfounded are concerns about human fertility. One should be aware, however, that environmentalist organizations think differently and continue to spread the scare of environmental estrogens.

The sensitivity of the general public to threats of cancer is ruthlessly exploited by environmentalist organizations to gain popularity and financial support. It is difficult to defend the public against such threats, because the media usually refuse to publish opinions which contradict the false environmental beliefs. Truth is to be found in scientific journals, but these are read only by selected few.

Footnotes

1. Decision 18/32 of the UNEP Governing Council: Persistent Organic Pollutants. <http://www.chem.unep.ch/pops/indxhtmls/gc1832en.html>
2. U.N. Conference approves POPs convention in Stockholm, <http://www.ourstolenfuture.org>
3. The "dirty dozen" U.N. treaty to be signed in Stockholm this week, <http://www.commondreams.org>
4. J. Kaiser and M. Enserink, 2000. *Science*, Vol. 290, p. 2053.
5. J. Thornton, 2000. *Pandora's Poison*, (Cambridge, Mass.: MIT Press).
6. P.E. Ehrlich and A.H. Ehrlich, 1996. *Betrayal of Science and Reason. How Anti-Environmental Rhetoric Threatens Our Future* (Washington, D.C.: Island Press)
7. B. Hileman, 1999. *Chem. Eng. News*, Sept. 20, p. 41.
8. D.R. Roberts, S. Manguin, and J. Mouchet, 2000. *Lancet*, Vol. 356, p. 330.
9. D.R. Roberts, L.L. Laughlin, P. Hsueh, and L.J. Legters, 1997. *Emerging Infectious Diseases*, Vol. 3, p. 295.
10. L. Wickenden, 1955. *Our Daily Poison* (New York: Bartholomew House Inc.).
11. R. Carson, 1962. *Silent Spring* (Boston: Houghton Mifflin Co.).

12. J.G. Edwards, 1992. *21st Century*, Summer p. 41.
13. P. Lauger, H. Martin, and P. Moller, 1944. *Helv.*, Vol. 27, p. 892.
14. P. Moller, 1946. *Helv.*, Vol. 29, p. 1560.
15. T.F. West and G.A. Campbell, 1950. *DDT and Newer Persistent Insecticides* (London: Chapman & Hall Ltd.).
16. K. Mellanby, 1992. *The DDT Story* (British Crop Protection Council).
17. A.G. Smith, 2001. "DDT and Its Analogs" in *Handbook of Pesticide Toxicology*, R. Krieger, Ed., (Academic Press).
18. J. Thornton, *Pandora's Poison*
19. P.E. Ehrlich and A.H. Ehrlich, *Betrayal of Science and Reason. How Anti-Environmental Rhetoric Threatens Our Future*, Island Press, Washington D. C., 1996.
20. R. Tren and R. Bate, 2001. *Malaria and the DDT Story* (London: IEA).
21. K. Mellanby, *The DDT Story*.
22. R.Tren and R.Bate, *Malaria and the DDT Story*.
23. B.Gilley, 2001. *Far Eastern Economic Review*, Vol. 164, p. 50.
24. D.R. Roberts, S. Manguin, and J. Mouchet, 2000.
25. M.M. Ellis, B.A. Westfall, and M.D. Ellis, 1944. *Science*, Vol. 100, p. 477.
26. J.M. Ginsburg, 1945. *J. Econ. Entomol.*, Vol. 38, p. 274.
27. J.H. Draize, A.A. Nelson, and H.C. Calvery, 1944. *J. Pharmacol. Exp. Ther.*, Vol. 82, p. 159.
28. R.A.M. Case, 1945. *Brit. Med. J.*, p. 842.
29. G.Woodard, R.F. Ofner, and C.M. Montgomery, 1945. *Science*, Vol. 102, p. 177.
30. H.S. Telford, and J.E. Guthrie, 1945. *Science*, Vol. 102, p. 647.
31. W.B. Deichmann, 1972. *Arch. Toxicol.*, Vol. 29, No. 1.
32. E.P. Russell III, 1999. *Technology and Culture*, Vol. 40, p. 770.
33. T.F. West and G.A. Campbell, 1950. *DDT and Newer Persistent Insecticides* (London: Chapman & Hall Ltd.).
34. M.S. Biskind, 1949. *Am. J. Digestive Diseases*, Vol. 16, p. 79.
35. *Brit. Med. J.*, 1969. Editorial, p. 446.
36. E.M. Whelan, 1993. *Toxic Terror* (New York: Prometheus Books).
37. J.M. Whitten, 1966. *That We May Live* (Princeton: Van Nostrand Co. Inc.).
38. E.M. Whelan, *Toxic Terror*.
39. E.M. Whelan, *Toxic Terror*.
40. R.L. Ackerly, 1981. *Chemical Times and Trends* (October, Vol. 47).
41. R.L. Ackerly, 1982. *Chemical Times and Trends* (January, Vol. 48).
42. A. Wildavsky, 1995. *But Is It True? A Citizens Guide to Environmental Health and Safety Issues* (Cambridge, Mass.: Harvard University Press).
43. E.M. Whelan, *Toxic Terror*.
44. R. Tren and R. Bate, *Malaria and the DDT Story*.
45. J.G. Edwards, 1999. *EIR Science and Technology* (December 20).
46. E.M. Whelan, *Toxic Terror*, p. 100.
47. A.S. Tahori and W.M. Hoskins, 1953. *J. Econ. Entomol.*, Vol. 46, p. 829.
48. W.D. Guenzi and W.E. Beard, 1967. *Science*, Vol. 156, p. 1116.
49. Anon., "DDT Dosage During the Epidemic of 1942-62." <http://www.geocities.com/harpub/ddt138.htm>
50. *ibid*.
51. M.S. Biskind, *Am. J. Digestive Diseases*.
52. W.R. Hill and C.R. Damiani, 1946. *New England J. Med.*, Vol. 235, p. 897.
53. J.W. Dini, 1998. *Plating Surface Finishing*, December, p. 74.
54. K. Biden-Steele and R.E. Stuckey, 1946. *Lancet*, Vol. 235.
55. J.W. Dini, 1998. *Plating Surface Finishing*.
56. F.M.G. Stammers and F.G.S. Whitfield, 1947. *Bull. Entomol. Res.*, Vol. 38, No. 1.
57. K.R. Hill, and G. Robinson, 1945. *Brit. Med. J.*, p. 846.
58. N.J. Smith, 1948. *JAMA*, Vol. 136, p. 469.
59. Anon., "DDT Dosage During the Epidemic of 1942-62."
60. V.B. Wiggleworth, 1945. *Brit. Med. J.*, p. 517.
61. R.A.M. Case, 1945. *Brit. Med. J.*, p. 842.
62. R.M. Garrett, 1947. *J. M. A. Alabama*, Vol. 17, p. 74.
63. J.M. Mackeras and R.F.K. West, 1946. *Med. J. Aust.*, Vol. 12, p. 401.
64. H.H. Velbinger, 1947. *Das Deutsche Gesundheitswesen*, Vol. 2, p. 355.
65. K. Mellanby, *The DDT Story*.
66. J.W. Dini, 1999. *Plating Surface Finishing*, July, p. 33.
67. W.J. Hayes, Jr., G. E. Quinby, K.C. Walker, J.W. Elliott, and W.M. Upholy, 1958. *Arch. Environ. Health*, Vol. 18, p. 398.
68. W.J. Hayes, Jr., W.E. Dale, and C.I. Pirkle, 1971. *Arch. Environ. Health*, Vol. 22, p. 119.
69. D.P. Morgan and C.C. Roan, 1971. *Arch. Environ. Health*, Vol. 22, p. 301.
70. P. Cocco, A. Blair, P. Congia, G. Saba, C. Flore, M.R. Ecça, and C. Palmas, 1997. *Arch. Environ. Health*, Vol. 52, p. 299.
71. J.A. OLeary, J.E. Davies, and M. Feldman, 1970. *Amer. J. Obstet. Gynec.*, Vol. 108, p. 1291.
72. *Ibid*.
73. R.S. Prociandy and S. Schvartsman, 1981. *Acta Paediatr. Scand.*, Vol. 70, p. 925.
74. M.C. Saxena, M.K.J. Siddiqui, T.D. Smith, and C.R.K. Murti, A.K. Bhargava, and D. Kuty, 1981. *J. Anal. Toxicol.*, Vol. 5, No. 6.
75. M.P. Longnecker, M.A. Klebanoff, H. Zhou, and J.W. Brock, 2001. *Lancet*, Vol. 358, p. 11.
76. P.N.M. Demacker, 2001. *Lancet*, Vol. 358, p. 1732.
77. J.L. Jacobson and S.W. Jacobson, 1993. *J. Great Lakes Res.*, Vol. 19, p. 776.
78. T. Key and G. Reeves, 1994. *Brit. Med. J.*, Vol. 308, p. 1520.
79. P. Cocco and J. Benichou, 1998. *Oncology*, Vol. 55, No. 334.
80. D. Baris, S.H. Zahm, K.P. Cantor, and A. Blair, 1998. *Occup. Environ. Med.*, Vol. 55, p. 522.
81. O. Wong, W. Brocker, H.V. Davis, and G.S. Nagle, 1984. *Brit. J. Ind. Med.*, Vol. 41, No. 15.
82. P. Cocco, N. Kazerouni, and S.H. Zahm, 2000. *Environ. Health Perspect.*, Vol. 108, No. 1.
83. D.H. Garabrant, J. Held, B. Langholz, J.M. Peters, and T.M. Mack, 1992. *J. Nat. Cancer Inst.*, Vol. 84, p. 764.
84. A.G. Smith, "DDT and Its Analogs," See Note 17.
85. See Note 82.
86. J. Miyamoto and W. Klein, 1998. *Pure Appl. Chem.*, Vol. 70, p. 1829.
87. *Ibid*.

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