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## Insecticides Today and Tomorrow

By W. CODA MARTIN, M.D.

Speech Made At The 1957 National N. F. A. Convention

Last year at the annual convention of Natural Food Associates in Terre Haute, Indiana, I gave a report on the health of the nation. In this report, I will discuss the increase in degenerative diseases in the U. S. today and especially the problem of physical and mental deterioration of the young men of selective service age—and what influence insecticides may have on the future increase of these diseases.

From World War I in 1918, to the Korean War in 1950, a period of 32 years, there was an increase of rejections from 21.3% to 52%. This is an increase of 30.7% or approximately 1% per year. Even this marked increase of rejections is not a true picture of the health of the youth today as the physical standards for draftees in 1918 were very high, while in 1950 they were markedly lowered as the essential manpower could be obtained only by reducing the physical standards with respects to some defects and psychiatric conditions.

If this appalling speed of degeneration continues at the rate of 1% per year for our young people, then, within 25 years, and that is a short period of time, 75% of the youth of the nation will be physically or mentally unfit for active military service. These figures are hard to believe, but they are statistical facts obtained from the Selective Service reports. In fact, the time element may be shorter than we think, because, at a certain point, the degeneration may increase by geometric progression. In other words, it begins to act like a snowball.

Only the statistics for young men are used for two reasons:

1. They are the only accurate statistics available for the state of deterioration of the

health of the nation.

2. Only those of reproductive age are biologically important for projecting the health of future generations. A nation must look to its youth for survival.

What is the most critical disease in this degenerative picture besides mental diseases and heart disease? The report of the American Cancer Society is well known to everyone. They say that one person out of four will develop cancer before they die—25% of the population. A grand total of 40,000,000 people. Today, cancer is no longer a disease of the older people. It is becoming an ever-increasing health problem of young people. This increase in cancer is not confined to the U. S. The W. H. O. reports that cancer ranks as the second cause of death in most highly developed countries. Cancer is rapidly approaching the epidemic proportions of the "Black Plague" of the Middle Ages. This is in spite of all our technological and scientific knowledge in the year 1957.

What is the relationship of these harrowing mortality and morbidity figures and the subject of insecticides? I am well aware that the study of degenerative disease is a complex matter and that there are numerous known and unknown factors involved in their development in the human body. One major factor—malnutrition—has been discussed here on this program on many occasions. But this and many other factors are all long range educational programs. Other factors will require long periods of basic research to establish their relationship to the cause of degenerative disease.

But there has been something new added to the long list of etiological

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factors of degenerative diseases. This new factor is man-made and under human control. Thus it can be eliminated by an order from the Department of Health, Education and Welfare, and through the powers of the U. S. Public Health Service. These agencies were established to protect the health of the nation and they are given power to invoke, in case of epidemics, emergency laws to control the epidemic and protect the health of the people. Man-made and man-applied substances can be immediately controlled if so desired.

Previously, we have thought of epidemics in the form of an invading organism carried by specific vectors or caused by lax sanitary conditions. Today, we are faced by a different form of epidemic—a slow, progressive, internal deterioration of the tissues and cells of the body. The old methods of detection and control are not applicable to the present situation.

For such a situation as we are faced with today regarding the degenerative diseases, there must be a new approach with open minds, and not biased by political or economic reasons. I particularly stress the latter because the insecticide chemicals are sold under the name of economic poisons.

What is this new and man-made, etiological factor that has been added to our already weakened and deteriorated bodies? About 1945, the chlorinated hydrocarbons (DDT and its derivatives) were added to the pesticide scene of agriculture. This triggered the synthetic chemical pesticide production which reached the figure of 42 million tons, total farm chemical sales in 1956. The sale price to the farmer reached \$290 million in 1956 (*Chemical Week*, Oct. 27, 1956).

By 1975, approximately 20 years from now, the chemical industry expects the sales of pesticides to reach an estimated \$1 billion.

There is expected to be an increase of farm acreage from a 1950 level of 1.184 billion acres to an estimated 1.280 billion acres by 1970 or an increase of about 1% in the same period of time. The chemical industry expects a 284% increase in the use of chemical pesticides from 1954 to 1975 in spite of the fact that there will be an increase of less than 1% in farm acreage. In other words, this 284% increase in pesticides will have to be used on only 1% increase in land acreage. By that time, we will be knee high in chemicals on our farms.

I feel that we should stop for a minute before we plunge into this

sea of chemicals and re-appraise the present day situation to determine if this marked increase in the use of pesticides on our farms is necessary or will it be an extra economic burden on the farmer, as well as an increased health hazard for the public who must consume the farm produce as their only source of food supply. The question may be asked—Is the use of these economic poisons necessary for survival or is it slow national suicide? But first, let us review the chemical problem as it stands today—10 years after the introduction of the chlorinated hydrocarbon and organic phosphorous compounds. (Parathion group.) Have they produced the desired results in controlling insects? In spite of the annual use of 42 million tons of pesticides, at a cost to the farmer of \$290 million per year, the annual crop loss to insects in the U. S. is still more than three billion dollars, according to federal and state studies. This staggering loss occurs despite the best control methods available to the farmer today.

It is apparent then that crop loss to insects has not been controlled with these new insecticides. But what else has happened? One of the big problems with DDT as well as other chlorinated insecticides, is that, in this 10-year period, the insects have built up a resistance to them. Because of this, it has been necessary to use a more poisonous and toxic phosphorous-containing insecticide, known as Parathion. This pesticide has a similar chemical formula to the army's highly secret nerve gas. One drop on the skin, will kill a person in 30 seconds. Parathion compounds are only a partial answer to the insecticide problem, as certain insects are already becoming resistant to even these more highly toxic chemicals. Altogether there are more than 180 chemical pesticides being produced and used today on our agricultural farms.

I believe the following statement from a meeting of the Executive Board of the World Health Organization in June, 1956, will give us a clear and concise answer to this question of whether insects are being controlled:

"The conclusion was that the development of resistance of insect vectors to insecticides has become a serious public health problem. 32 countries have reported insect resistance to DDT and other new insecticides. About 35 species of insects, including various types of malaria bearing mosquitoes show immunity to DDT in some areas of Greece, Lebanon, Indonesia, Saudi Arabia, Panama and Mississippi. Body lice,

vectors of typhus, can no longer be controlled with DDT in Korea, and five other countries report that satisfactory control is becoming difficult. Fleas, responsible for plague, are manifesting resistance in certain parts of South America. But, worse still, a strain of mosquitoes that spread Yellow Fever has shown itself extremely resistant to DDT in Trinidad. The destruction of flies with DDT and other chemicals is no longer possible in almost all countries where these materials have been used in recent years. The new insecticides that have become available in the last three years are too few, too limited in efficiency and too toxic."

A. D. Hess, Logan Field Station, of the U. S. P. H. Communicable Disease Center, Logan, Utah, (reported in *Scope, Weekly*, June 20, 1956) has come to the same conclusion. He declared that the insect problem in the U. S. is mounting because of the increase of breeding potentials and because of the development of insecticide resistance. (*Science News Letter* Aug. 27, 1955). Also, according to researchers at the University of California, they have discovered that the use of insecticides may kill off the beneficial insects and allow pests to come back in more devastating numbers.

Reports too numerous to mention, show that blanket spraying of insecticides from the air and on the ground destroys many beneficial insects and animals, such as bees, birds, fish, etc.

Walter P. Nickell, a naturalist of the Cranbrook Institute of Science (Birmingham, Mich., June 7, 1956) stated that not enough is known about the long range effects of DDT and other insecticides. They kill the beneficial insects, even the soil bacteria and, in general, upset the balance of nature. He further stated that the results are not very pleasant to contemplate. We may even find the use of DDT more destructive of human life than the hydrogen bomb.

Here we have a unanimous agreement, which is most unusual, that the use of these insecticides has not only failed to produce the desired results, but has placed us in a very precarious position of having developed stronger and more resistant insects and, at the same time, having destroyed many of Nature's beneficial and protective insects thus upsetting Nature's balance and leaving us at the mercy of these newer and more dangerous insects.

What has happened to these millions of tons of chemical insecticides that are sprayed on our farmlands? Do they disintegrate and disappear—

or are they accumulating in the soil? If so, when will they reach the saturation point? A study in 1955, by the Entomology Research Branch of U. S. D. A., Yakima, Wash., gives us a clue to where we can find most of these insecticides used on the farms during the past 10 years.

Examination of the soil revealed that three and one half years after treating the soil approximately 50% of the DDT, 14% of the B. H. C. and Lindane, 15% of the aldrin were found in the surface 6 inches of the soil. The results of this study showed that DDT has the most harmful and most persistent effects of the several insecticides added to the soil. Similar tests were made in Illinois, New Jersey and Georgia, with equivalent results: showing that the accumulation of these insecticides in the soil is national in scope. Also, the study showed that DDT applications from 24 pounds per acre and up were highly toxic to certain types of beans and delayed growth and affected the stand of rye in all the five years of the experiment. Their conclusion was that the persistence of DDT indicates that this insecticide might become a problem with continued use.

What is the chemical scientist's answer to this situation? A 284% increase in the use of these and more toxic insecticides in the next few years. Sounds very much like the talk of Tweedle Dum and Tweedle Dee.

The main point of this paper is to show what influence the extensive use of these highly toxic chemical insecticides has on the future health of the human being. In the final analysis, we are the recipients of these sprays, either by direct spraying, by inhalation, or by ingestion from contaminated food.

It is an accepted fact and confirmed by the U. S. Public Health Service that all foods purchased from the open market today carry a high residue of many of these insecticides, as they are sprayed approximately once a week during the growing season with one or more of these chemicals. In fact, the mass poisoning of the human race has been legalized by a Congressional law. They have set up what is known as tolerance levels for each of the many chemical insecticide sprays. For instance, 7 PPM of DDT is allowed on every article of food consumed. Each other insecticide has its own tolerance level. When the law was passed the tolerance level was estimated on the use of only one insecticide on each article of food. A recent report from the U. S. Public Health Service states that when two or more chemicals are

on one item of food, which is the usual case today, the toxic effect is increased and therefore, they are considering a re-appraisal of today's tolerance levels. Unfortunately, it takes several years to get Congressional action to change a law that is on the statute books. In the meantime, the population will be subjected to this increased amount of toxic chemicals. These legal tolerance levels for insecticides on plants do not give a true picture of the amount of insecticides consumed on foods. Many foods contain higher amounts of these chemicals and cannot be adequately checked with the present facilities of the F. D. A. For instance, recent private analysis reveals that eggs contain 50 PPM or more of DDT, cheese 150 PPM, bread 100 PPM, stewed dried fruits 69 PPM, lard and butter may be as high as 2000 PPM.

Is there a human tolerance level of DDT and other insecticides? It is no secret that the tolerance levels of DDT on foods for human consumption should be zero.

A report from the *Food and Drug Officials* (Bulletin of the Association of Food and Drug officials of the U. S.—Vol. XIV, No. 3, July, 1950) states: "DDT is stored at a level 6-28 times the dietary intake. There is no floor of dietary concentration below which the storage of DDT does not occur."

Dr. A. J. Lehman of the Federal Food and Drug Administration (U. S. Government Printing Office, 1951) stated: "In my opinion, Chlordane is one of the most toxic insecticides we have to deal with. I would hesitate to eat food that had any chlordane on it whatsoever."

In a more recent report from the U. S. Public Health Service, it was shown that volunteer prisoners were fed the equivalent of 200 times the usual amount of DDT found in our foods today and the body storage of DDT increased from what is today considered a normal level of 7-11 PPM to 234-340 PPM in 18 months. The conclusion was, that as these men did not reveal any physical or chemical pathology at the end of 18 months, that the consumption of DDT was not a health hazard.

This short range study of 18 months did not take into consideration the fact that today babies begin to ingest DDT from birth from the mother's milk and later from cow's milk and other foods. The baby will continue this intake three times a day for as long as he lives.

The fact is, that it has been shown in tests on small animals that it is not always the short range large dose of insecticides but repeated small doses until toxic levels accumulate that is so dangerous. It is not likely

that a person will get a lethal dose of chemicals from the food, but he does get repeated daily small amounts. What long range influence does this have on human health? It has been demonstrated that DDT concentrations of 3-30 PPM inhibit rat heart cytochrome oxidase and interferes with the process of phosphorylation. (J. A. M. A., March, 1951). Storage of a toxicant in the fat of parenchymal cells is essentially storage in the cell itself where such important enzymatic processes as oxidation, phosphorylation and cholesterol synthesis takes place. In simple terms these insecticide chemicals are stored in this fat tissue and do interfere with the normal oxygen supply to the cells of the body.

What influence does the interference of these important enzyme reactions have on our health? Health research today is focused on the cell. It is recognized that normal intra-cellular chemistry is the most important factor in a healthy body. Normal health is a delicate balance between various cellular stimulators and inhibitors. Anything that disturbs this balance will produce ill health and possibly some form of degenerative disease.

Dr. Henry Goldblatt (Cedars of Lebanon Hospital, Los Angeles, Cal., April, 1953) found that by intermittently depriving a piece of rat's heart tissue in a test tube, of oxygen, the cells were gradually transformed until they acquired all the microscopic features of malignant cells.

Other clinical and experimental tests have shown that any interference with the oxidation to the cells will cause them to die and thus produce pathology of the tissues or will interfere with the normal function of certain organs or glands of the body. This deterioration of the tissue cells results in degenerative diseases of various types as seen in people today—as well as the development of cancer.

It is well to remember that the danger to health is a delayed action and it is the repeated daily small insults to the enzyme system over a period of many years which constitutes a distinct health hazard. This fact has been confirmed by the research on the influence of tobacco on the production of cancer of the lung. They found the danger of cancer increased rapidly after smoking for 20 to 30 years.

Dr. Otto Warburg also stressed the fact that the transition from a normal cell to a cancer cell, when there is an interference of oxygen supply may be over a period of years.

We, of the age of 50 years or more,

may survive and live out our three score and ten years assigned to us by the Bible—or the life expectancy of 67 years according to our present day vital statistics. But what of the child born today? What effect will this interference with the important oxidative enzyme system caused by insecticides from birth have on his future health and life expectancy?

We can no longer think of the long range effects of these insecticides on only the present generation: but we must think of their influence on the health of the future generations.

We have much experimental evidence in animals to show that any interference with the oxidative enzyme system of the foetus during the early embryonic stage of development will cause structural changes in the tissue and organs of the body, as well as a marked increase in congenital deformities.

What does this mean to future generations? The results of extensive studies at the Harvard School of Public Health indicate that maternal diseases and other critical stresses occurring at certain stages during pregnancy are responsible for a majority of congenital anomalies—oxygen deficiency to the cells as produced by the insecticides is a non-specific form of stress—also in 1947, it was shown by Ingalls that the lack of oxygen is a specific cause of congenital deformity. The congenital deformity of Mongolism occurs at the 8th week of embryonic development. We do not have such positive proof for the cause of mentally retarded children but this condition is accepted as a form of congenital deformity of the brain tissue. A recent report from the Foundation for Retarded Children states that there is a mentally retarded child born every 15 minutes in the U. S. today. It has been recently discovered that the brain of a mentally sick person uses a lower than normal amount of oxygen. (Science News Letter, Dec. 22, 1956.) Will the continued accumulation of the insecticides in the fatty tissue of mothers during pregnancy, which acts as an inhibitor to the oxygen supply to the cells, cause an increase in these congenital anomalies in the

future? An opinion based on the above facts must come to this conclusion. The chance of a similar prediction can be made for congenital cancer which is already on the increase—as well as cancer in young people. This procedure is what Dr. Philip Norman and James Rorty called “Unfitting the Unborn.”

These statements may seem to exaggerate our present health problems but I can assure you that there is an ever increasing amount of evidence to confirm this viewpoint.

But what does the future hold for us in the field of insecticides? As previously stated we can expect a 284% increase in the use of the present insecticides or their equivalent in the newer and more toxic substances in the next 10-20 years. There is no alternative—as the insects develop immunity to each insecticide, more toxic ones must be developed and utilized or the entire basis for the chemical approach to the insect problem will fail.

In the future we can expect the insecticide to be applied before the crop is even planted. A substance called “thimet” has been developed to coat the seeds so that it later enters the system of the plant when the seed begins to sprout. This is an organic phosphate chemical related to the army nerve gas—if an insect bites the plant, he is killed—What about the animal or human that eats the plant?

Endothal is another chemical of the future which is now commercially available for use as a defoliant. This chemical as well as Lindane has been shown to have mutagenic activity. This means that these chemicals interfere with normal cell division in the embryo and thus causes mutations. If so, the genetic results for man and plants may well be unpleasant or even catastrophic according to a report in a recent issue of the Journal of Heredity. (Cytological and Genetical effects of the defoliant Endothal. J. Heredity — July-Aug. 1956.) Thus the future outlook for insecticides appears to be more hazardous than has been anticipated.

The physical and mental strength of our nation is being lowered daily

by the effects of these insecticides on our body metabolism and there is reason to believe that the effects will be increased with their future use—Unless something is done to control the use of these insecticides on our foods before the deterioration of the nation's health reaches a point of no return, it may well be catastrophic. That time could be in the foreseeable future if the mass poisoning of the human population continues as outlined for the next 20 years.

So far in this report, I have given only a negative critical analysis of the problem. This alone is not sufficient. Criticism should be constructive and an alternate or better plan should be given.

The better plan, of course, is that recommended and applied by the members of the Natural Food Associates, and other groups of farmers that are using similar methods to transform their land into “Living Soil,” and growing plants free of harmful chemicals. Such soil produces quality food with the highest nutritional value which in turn improves the physical and mental status of the nation.

In certain instances when sprays are required, they should be non-cumulative and if possible non-toxic repellants. It is said that this ideal is not economically feasible—but the members of N.F.A. have shown this belief to be false. But this, we must understand and accept—Good health for future generations of our children is priceless!

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