

Statement before Sub-Committee on Pesticides of the California Legislature.

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Gentlemen:

It is a privilege to appear before you in order to present ideas and experiences relative to the impact of the long continued use of pesticides in the United States. My statement will cover the field of ecology as well as specific toxic effects on human beings. I was requested to testify by the National Health Federation. Although I am not a member of this organization and disagree with some of their criticisms of organized medicine, I believe their concern in most other areas is fully justified.

CURRICULUM VITAE

I graduated from the College of Physicians & Surgeons of Columbia U^{UNIVERSITY} in 1930. My internship included two years at Presbyterian and two years at Bellevue Hospital in New York. Whereas I originally combined the specialty of otolaryngology and allergy for many years, 90%^{PER CENT} of my practice was devoted to allergy and is now exclusively in that area. I am a member of the American Medical Association and numerous other professional societies including Fellowship in the American College of Allergists, the International Association of Allergists and the International College of Applied Nutrition. I am at present Editor-in-Chief of The Journal Of Applied Nutrition as well as being a member of the Board of Directors of the Association of American Physicians and Surgeons. The application of applied nutrition to medical practice has played a most important part in my approach to medical problems in the last 25 years. As long ago as 1952, I wrote an article on the effect of insecticides on human beings. This was published in Modern Nutrition, the monthly magazine of The American Nutrition Society. Although I am the author of medical papers on allergy and nutrition I have not submitted manuscripts to medical journals in the field of insecticide toxicity or allergy because of the difficulty of proving the relationship between cause and effect. This is partly due to the fact, that in the past, tests for chlorinated hydrocarbons were relatively unreliable, and funds available for food analysis were limited.

As an allergist, I am well aware that certain individuals may react with bizarre symptoms and serious illnesses to contact with minute amounts of chemicals and proteins, which have no effect whatsoever on those who are not allergic. Some of these people react as though they had received an overdose of this substance: they are hypersensitive. Others respond by the development of hives, eczema, hay fever, asthma, or even shock. Such reactions indicate allergy rather than hypersensitivity. Both types of response may occur from contact with pesticide formulations. Allergy and hypersensitivity reactions should not be confused.

ECOLOGY

The relationships between soil, plant, animal and man are of vital importance. They have been covered extensively by a number of writers. One of the most important recent books on this subject under consideration today, is Rachel Carson's "Silent Spring." Without consideration of the effect of widespread usage of the newer insecticides on the relationship between soil, soil microorganisms, plants, animals and man, the topic under discussion can never be understood.

Since 1945 we have been spreading over vast areas of the United States - and more recently throught the world - a cloud of toxic insecticides which have never before been encountered by either insect life, plant life, animal or man. The chlorinated hydrocarbons have a fantastically long life. They are soluble in fats, but are insoluble in water. When once applied to soil, some of these have been shown to persist in toxic amounts for as long as 8 years. I am speaking primarily of DDT, chlordane, aldrin, dieldrin, and other more recent derivitives. They all have the common characteristic of being extremely resistant to breakdown in soil as well as in animal or human fat.

It has been finally realized that when such chemicals are applied to forage crops such as alfalfa that any residue remaining on this forage crop when consumed by animals may be biologically magnified in some instances up to 100 times the amount present on or in the original food. Most of these chlorinated hydrocarbons will appear in milk if there is enough residue on the forage crop fed to dairy cows. Fantastic buildups have been reported in various forms of wild life which live within the drainage areas of forests sprayed with DDT for control of insect pests. Such concentrations were completely unexpected. As a result, many fish in our drainage areas are disappearing. Birds, both large and small, are suffering decimation. In turn, animal predators that depend on birds, eggs and smaller animal life for their food, are suffering the same fate. The buildup in their fat is fantastic. The mortality of their young is what might be expected.

Since humans are dependent upon vegetable crops and animals raised for human consumption, any residue of chlorinated hydrocarbons in their tissues will be transmitted to the consumer. We are what we eat. Poisons in our food must somehow be detoxicated if illness is to be avoided.

Pesticides have been used for many years. These included arsenic lead, fluorides, thiocyanates, nicotine, pyrethions, and rotenone. While their concentration in some orchards and fields have built up to a toxic level, these insecticides could be washed off fruits and vegetables by any conscientious housewife who wished to be sure that her food was free of such residues. This is no longer true. The newer pesticides, particularly the chlorinated hydrocarbons, penetrate into the peel of fruits and into the fibre of vegetables, whereas any excess surface concentration of insecticides may be removed by washing, ~~the original application~~ can not be removed in this manner. This is particularly true of insecticides applied in kerosene oil or its derivatives.

a portion of the residue

NEED FOR PESTICIDES

It is interesting to consider why pesticides are needed. It is only logical to assume that all vegetable and fruit crops are subject to attack by a variety of parasites. Many of the publications of Departments of Agriculture from the various states and from the United States intimate that soil quality has little effect on plant resistance to insect pests. It is very difficult to understand why authorities should continue to think along these lines. There is plenty of evidence showing that poor soil produces poor plants. There is also plenty of evidence to show that plants raised on poor soil, deficient in various nutrients such as phosphorus or calcium, will reflect the condition of this soil.

Dr. William A. Albrecht, Chairman of the Department of Soils, University of Missouri, has repeatedly published many articles showing that soils leached of mineral nutrients and organic components cannot support crops of high nutritive value. For example, the protein of midwest wheat has decreased gradually and this decrease has been accompanied by an increase in carbohydrate and sugar. May not such grains and vegetables be more attractive and also more susceptible to insect attack?

Control studies, particularly the Haughley experiment in England, reveal that when soil is adequately supplied with organic matter in the form of composted manure, soil microbes will release from the soil the amounts of nitrogen, phosphorus, calcium and trace elements needed by growing plants at the optimum biologic time and in optimum amounts. In other words, this is much more effective as far as growth of plants is concerned than supplying phosphorus, calcium, nitrogen and other nutrients in concentrated form at a time when man believes crops must have them.

The fact that "so-called" organic farming has something in its favor has been proven time and time again by experiments. Rows of certain legumes have been grown in composted soil between other rows planted in ordinary ground plus commercial fertilizers. The results were dramatic, whereas the rows of plants in composted ground showed perhaps 80 to 90% resistance to insect pests, adjacent rows of the same vegetable grown in ordinary soil, were practically destroyed.

Effect of Pesticides on Human Beings:

From my experience I am convinced that the newer insecticides are harmful to many people. Let us consider various factors.

(a) We are dealing with a multiplicity of chemicals foreign to human biochemistry. We are not only exposed to the cumulative effects of small amounts of insecticide residues, but to other substances such as carcinogens, hepatotoxins and chemicals of unknown toxicity which appear in most of our foods. We are being subjected to a barrage of chemicals in our air, water and food as well as other surroundings. It has been shown that individuals or animals exposed to one chemical - at let us say, one-tenth of the toxic dose, will show no reaction. If however, 5 chemicals

at one-tenth the toxic dose are combined, we may find that the poor experimental animal suffers the full effect as though he had had a toxic dose of one of the chemicals. In other words there is a summation effect which may be much more than what may be expected considering the toxic dose of each chemical. Once a person has become sensitized to one of the petrochemicals and these include aspirin, tar, aniline dyes, chlorinated hydrocarbons, many preservatives used in our food, illuminating gas, and other substances heretofore unsuspected, this person is doomed to a life of recurrent or chronic illness. Complete avoidance of these chemicals in our modern economy is impossible.

The average individual, or even physician, cannot possibly conceive of the fact⁹ that such allergic individuals may suffer symptoms varying from those of a mild cold to complete collapse, when exposed to freshly tarred roads, the odor of illuminating gas, or exposure to insecticide formulations used in the fields, at home, in stores or as residues on foods.

Enzymes:

What is happening to these individuals can only be understood if we think in terms of enzymes and poisons. The continuation of life depends upon efficient metabolism in millions of tiny body cells, -- so minute that only a microscope can reveal them to the eye. Nevertheless, each cell is a veritable chemical laboratory for the synthesis of proteins and other necessary substances. The intake and use of amino acids, carbohydrates, fats and minerals must be balanced by elimination of waste products and the detoxication of unwanted and unknown chemicals. It is probable that hundreds or even thousands of chemical reactions proceed simultaneously in each body cell. These reactions can be carried on only by enzymes -- organic catalysts composed of protein, vitamins and trace minerals that increase remarkably the speed of such reactions and permit them to occur at body temperature. Without them life, as we know it, would be impossible.

Enzymes are composed of amino acids, vitamins and minerals such as zinc, copper, manganese, iron and magnesium. Some are essential for the transfer of oxygen to the tissues and may be poisoned by such chemicals as cyanide, which unites with the iron in the enzyme molecules to produce rapid tissue asphyxiation. It is logical to assume that other chemicals may act similarly but on a lesser scale.

The action of enzymes may be reversibly slowed by chemicals such as anesthetics, sedatives and drugs with selective action on specific parts of the nervous system. The value of these is obvious. However, in our advanced civilization we encounter hundreds of chemicals in air, water and food that may have an adverse effect on cellular chemistry. To mention only a few there are smog, fluorides, extenders, softeners, bleaches, preservatives, coal tar dyes, detergents, insecticides, et cetera. Some are known to be toxic to animals; hundreds are untested.

NUTRITIONAL DEFICIENCY

Cellular health depends upon an intake of nutrients adequate for enzyme function, plus avoidance of stress factors insofar as that is possible. In our present civilization the widespread consumption of highly processed foods must be a significant factor leading gradually to a diminution of metabolic efficiency in the average individual. We know perfectly well, according to the studies of Weston A. Price, as reported in his classical book "Nutrition and Physical Degeneration" that natives in all parts of the world when not exposed to the white man's diet were comparatively healthy. Tooth decay was almost nonexistent. This rapidly appeared once natives contacted the white man and adopted his diet. I recommend this book to each member of this committee and to anyone else who is not aware of the progressive physical degeneration affecting our citizens.

In our modern way of life the housewife depends to a considerable extent on what she can obtain in the grocery store. She is constantly being besieged with new short cuts which save time spent in the kitchen. All these short cuts depend upon more refinements of food. It may be considered axiomatic that the more highly processed a food becomes, the less nutritious it is. The statement of men like Dr. Fredrick Stare of Harvard to the contrary cannot contravene logic.

It is a fact that at least 50 percent of the calories ingested by the average American these days consist of empty ones. Such foods include white sugar and white flour. It must be more than coincidence that the rapid increase in degenerative diseases illustrated by high blood pressure, coronary thrombosis, arthritis and cancer accompany increasing nutritional deficiency. They also parallel increased exposure to petrochemicals. It is logic to assume that allergy and hypersensitivity reflect disturbed enzyme function, that precedes tissue changes recognizable as disease.

Changed Aspects of Disease:

When I first started practice in 1935 I was faced with the common cold, sinusitis, otitis media and mastoiditis along with occasional intestinal upsets. At rare intervals a true epidemic of influenza might be expected. Lobar pneumonia was fairly common. These conditions were in addition to various allergic complaints such as hay fever, eczema, asthma, and other allergic manifestations.

In the past fifteen years physicians have been increasingly faced with recurrent waves of "so-called virus infections." These consist of symptoms of upper respiratory infection and gastrointestinal upsets including nausea, vomiting and diarrhea, most of which are not accompanied by fever. The administration of antibiotics, in the experience of most physicians fails to stop the symptoms, unless secondary infection is present. I suspect that many of these attacks are due not to viruses but to contact with insecticide residues, affecting people who have become hypersensitive to the chlorinated hydrocarbons and perhaps the organic phosphates. More research is necessary to determine this relationship.

CASE REPORTS

One of my first patients was GK. ^{Twelve} Twenty years ago he purchased an old home. On the grounds were two old citrus trees badly afflicted with scale. Therefore he requested that one of his patients, a pesticide operator, spray these trees to get rid of the scale. Since he was just becoming aware of the potential dangers of such compounds he later asked his wife to telephone the pesticide operator in order to find out what compounds he planned to use. Unfortunately, he was on the road. She went out to shop just before he arrived. The operator, being of a generous nature, and having half a tankful of benzene hexachloride proceeded to spray all the trees and shrubs around the house. The strong musty odor of BHC was overwhelming and persisted for several weeks. GK was afflicted within 24 hours by a fantastically unresponsive attack of what may be described as "a virus." He had a blocked nose, watery nasal discharge, malaise, diarrhea, and a voice sounding as though his head were immersed in a barrel. In desperation, he finally took penicillin, erythromycin, and sulfadiazine. None of these antibiotics had any effect. Irrigation of his sinuses was no help. The final conclusion seemed inescapable that the symptoms must have been due to the insecticide. Since then he has found that repeated contact with chlorinated hydrocarbon insecticides reproduces the same symptoms. Liver function tests after the original exposure, showed evidence of damage.

2. T.F. an adult male school teacher was seen complaining of hoarseness, sore throat and malaise approaching prostration, of four days duration. Examination revealed a red pharynx and partial paralysis of one vocal cord. Chest x-ray was negative. Questioning revealed that, being on vacation, he had been spending much time reading on his patio. For a week before his illness he had repeatedly used an aerosol bomb to destroy flies and mosquitoes. This pesticide preparation contained DDT and methoxychlor. Liver function tests were abnormal. Recovery was prolonged but complete. While his illness could have been caused by a virus, the insecticide came under strong suspicion.

3. Miss E.M. a 30 year old New York secretary consulted me because of almost daily headaches of 2 months duration. Because there was some relief on weekends and definite improvement during her trip to California, some factor associated with her employment was suspected as causative. Close questioning brought out the fact that a Lindane wall vaporizer kept going during working hours, had been installed shortly before the onset of her headaches. She persuaded her employer to discontinue the use of this insecticide. Her headaches disappeared and interestingly enough, so did the prolonged "cold" from which her boss had been suffering for two months. Neither one could be persuaded to submit to re-exposure in order to clinch the diagnosis.

4. C.B., age 36, a former secretary of mine was always full of energy and a tireless worker. Suddenly she developed marked fatigue, shooting pains in the back of the neck and down the arms as well as loss of appetite. Her history included the use of a DDT spray on her bedsprings and mattress several times weekly for three weeks. Liver function tests were abnormal.

Case Reports (cont'd)

She was advised to thoroughly clean her bed and bedroom and to discontinue the pesticide. Supportive treatment with vitamin supplements and phenobarbital was followed by recovery. The same symptoms occurred twice more before she became convinced that use of the pesticide might be related to her illness.

5. Mr. & Mrs. H.S., who were in their forties, both complained of headaches. In a search for the cause, it was learned that chlordane powder was used in their kitchen for control of ants and cockroaches. After the kitchen was thoroughly scrubbed, painted, and the floor waxed, their headaches disappeared. Two recurrences were traced to chlordane powder used outside the house, when windows were open, by their gardener - who had been forbidden to use it in the vicinity of the house. This is an example of illness from chlordane per se, since no carrier vehicle was involved.

DISCUSSION and SUMMARY

We are living in an environment which is increasingly contaminated by chemicals completely foreign to the biochemical experiences of our bodies. These include a multitude of synthetic substances now present in the air we breathe, the water we drink, the food we consume and everything we otherwise contact. Even though these may exist in relatively minute amounts, they are potent poisons. Whether or not our bodies are capable of detoxicating them is a matter of conjecture. Only the future can tell. Pesticides are an important class of these chemicals.

The universal applications of the newer pesticides has upset ^{The} ~~this~~ balance of nature. These insecticides have destroyed not only the insect pests at which they were aimed, but their predators as well. The emergence of resistant insect hordes has sparked the search for newer and more powerful chemicals. It has finally become obvious to scientists and citizens alike, that this road leads only to destruction.

Through the use of pesticides we are killing, not only friendly insects, but ~~most~~ other important forms of wildlife that help to preserve the balance of nature. These include ~~constacea~~, fish, birds, and small as well as larger mammals. Dogs and cats were affected by the ill-advised program for control of the fire ~~ant~~ in Alabama; livestock also suffered. Our food animals are contaminated by eating sprayed food and by the application of toxic sprays for the control of insect pests. In addition they are castrated by means of hormones, ~~cretins~~ by drugs designed to destroy thyroid function and treated with antibiotics -- all calculated to induce weight gain on less feed. Since this means waterlogged tissues - no wonder our fowl and meat are becoming tasteless.

made cretins

Our vegetables and grains, raised on poor soil, lacking in organic matter, are supported by the application of commercial fertilizers. In California crops are produced in rapid rotation without permitting the land to rest and lie fallow. As a result, our markets provide mouth-watering lettuce and other vegetables that satisfy the eye, but lack distinctive flavor.

Our chickens are raised in cages. They are "scientifically fed" but have no access to soil, weeds, and grass which might provide the unknown nutritional factors necessary for health. Our friers are watery and tasteless. Our roasting chickens are stuffed with empty calories and many of them have cirrhotic livers. Most market eggs carry large amounts of the leukosis virus - one that produces leukemia in fowl. How nutritious are they?

Several years ago all trout fingerlings in State hatcheries throughout the country developed cancer of the liver. While the causative agent - to my knowledge - has not yet been isolated, it has been traced to a cottonseed meal fraction of fish food used in all the hatcheries. Whether the offender will be proven a chemical contaminant, or a hepatotoxin resulting from the growth of molds in the cottonseed meal, remains to be determined. At any rate, the lesson for us is obvious - We are what we eat! If human food should ever be contaminated by such a powerful carcinogen, it would take 10 or more years before cancer resulted. How many of us would be left to begin anew after eliminating the cause - if we ever discovered it?

Only last week, newspapers reported the death of about 10 percent of hatchery fish. No other information was supplied. What is it this time?

Some of the chemicals used in our foods - particularly the aniline dyes, have been found to induce cancer in animals, and have been taken off the approved list. More will undoubtedly be adjudged dangerous in the future. Unfortunately, in such instances the damage has already been done. Why do we still permit contamination of our foodstuffs by insecticide residues of unknown toxicity for human beings? Aminotriazole, aramite and DDT are known to be carcinogenic for animals. Others are an unknown quantity.

The situation is extremely complex. The blame can not be placed on any one group. However, there is now enough evidence concerning the serious hazard to world ecology and to human health by chemical contaminants, to warrant definitive planning. A crash program via logical steps is vital if we are to survive. Chemical hazards are potentially as serious, even though less dramatic, than the A Bomb.

SUGGESTIONS

I do not presume to be an authority in the legislative field and I do appreciate many of the difficulties involved. At any rate I will take the liberty of making suggestions. The health of the public must be protected.

If the use of insecticides were suddenly stopped, crop failure and hunger would be widespread. Perhaps the solution may, at least, partially lie in the following steps:

- (1) A fairly rapid cut back in the use of the newer, long-acting pesticides in favor of less harmful ones that do not penetrate crops and which may be removed by washing.
- (2) Increased grants by the Legislature to support research and field *Trials* of biologic pest control methods.
- (3) The allotment of increased funds to the California Department of Agriculture and other agencies to greatly increase inspection and the number of spot checks for excessive pesticide residues. This would reduce the amount of contaminated food reaching the public.
- (4) Passage of a California law forbidding the manufacture, sale, or advertising for indoor use of any pesticide formulation containing DDT, lencane, methoxychlor, chlordane, aldrin, dieldrin, parathion, TEPP, or other chemicals of similar toxicity.
- (5) Legislation banning the use of these chemicals in grocery stores and other public places.
- (6) Legislation limiting pesticide formulations for indoor use in California to those containing pyrethrins, allethrin, and rotenone in sesame oil or an inert propellant - excluding kerosene and other petroleum carriers.
- (7) Legislation providing funds for an Educational Campaign to alert the public to the health hazards of the newer insecticides, as well as volatile petroleum products such as kerosene, paint thinners, carbon tetrachloride, etc.
- (8) Legislation providing a ^{near} zero tolerance within 5 years for parathion and similar organic phosphates, as well as the chlorinated hydrocarbon pesticides.
- (9) The creation of a Legislative Committee to study the advantages and feasibility of composting city wastes for the production of organic fertilizers similar to "Milorganite." Our top soil can only be preserved by returning to it organic material that has been removed.

In closing I must apologize for not having the time to prepare a more compact report.

Respectfully submitted,