

- NATVIG, L. R. 1948. Contributions to the knowledge of Fennoscandian mosquitoes. *Calicini*. 567 pp. Oslo.
- STABLER, R. M. 1952. Parasitism of mosquito larvae by mermithids (Nematoda). *J. Parasit.* 38(2):130-132.
- STAGE, H. H., GJULLIN, C. M. AND YATES, W. W. 1952. Mosquitoes of the Northwestern States. *U. S. Dept. Agr. Handbook No. 46*, 95 pp.
- WIGGLESWORTH, V. B. 1933. The adaptation of mosquito larvae to salt water. *J. Exp. Biol.* 10(1):27-37.

## THE PESTICIDES INDUSTRY

A. L. GALLOWAY

Tobacco By-Products and Chemical Corporation

I certainly appreciate this opportunity to appear before the American Mosquito Control Association to present some of the pesticide industry's views on behalf of the National Agricultural Chemicals Association.

As the control of insects increases in complexity the difficulty in deriving the most from research activities proportionately increases. Whether the pests affect the health of man directly or destroy his food and fiber crops, modern pest control has become a vast field of endeavor on the part of agriculturalists and public health officials whose work is so integrated that much is lost if either group of workers ignores the progress in the related fields.

The control of mosquitoes and the tremendous reduction in diseases carried by these insects is a modern phenomenon. Without the coordinated program on a national and international scale I feel certain that only a meager portion of such endeavors could have been attained. The coordination brought about through such meetings as this has incalculable value in the progress of any program of pest control.

The two fields of agricultural pest control and public health programs have expanded concurrently and out of the same industrial hopper come the products used in protecting man's health and his supply of food and fiber. The introduction of the organic chemicals brought about a complete revolution in the control of pests. I need not point out to you what this has

meant toward raising the standard of living for the peoples of many of the free countries of the world. Yet, you all realize that we have only started to recognize the potentialities of controlling man's biggest competitors. At the recent meeting of the National Agricultural Chemicals Association Dr. Charles E. Palm, President of the Entomological Society of America, pointed out that world unrest could possibly be alleviated through the use of pesticides to improve man's health and his food supply. He explained that poor health and empty stomachs are not conducive to a satisfied man. Such an outlook is worthy of endorsement.

You can reasonably ask, are these chemicals available in sufficient supply to cover any necessities to improve health standards and overcome agricultural pest problems of the world. The United States pesticides industry alone has facilities for the manufacture of sufficient chemicals for public health programs throughout the free world and can furnish these materials if sufficient advance notice is given to allow for their production.

During the past two years, at the instigation of several federal agencies, our industry made a tremendous expansion of its facilities for the production of organic chemicals. In addition, many of our companies have established foreign plants for the production of basic chemicals and for formulating these into finished products.

Many other countries have been supplying and will continue to supply much of

the needed materials for public health and agricultural programs. The coordination of international health and agricultural programs has aided materially in establishing the demand for these materials in various parts of the world. The international meetings of societies and sponsorship of international conclaves by the United Nations have aided in coordinating much of the information that is needed by the pesticides industry to distribute its products properly.

At the present time the National Agricultural Chemicals Association through its Committee on Exports is conducting a study of those government agencies which have information on the export of pesticides.

We are attempting to clarify the inter-relationship of these particular agencies and their responsibility for the export of pesticides. Along with this compilation of United States government agencies concerned with pesticides, the Committee is including those international sources of information regarding chemicals used in the promotion of public health programs and in world agricultural production. When this study has been completed, the information will be made available to such organizations as yours here, and to other interested groups.

Under the United Nations auspices money has been made available from the United Nations International Children's Emergency Fund to build plants for the production of DDT in Egypt, Pakistan, Ceylon, and India. The World Health Organization will supply the technical assistance necessary to begin their operations. Once these manufacturing facilities are in production the ownership of them is to pass to the state. The merits of this type of state-operated and controlled manufacturing facilities are yet to be determined.

There have been many problems faced by the industry which have been attendant on the introduction of organic pesticides and the subsequent expanding of the field of pest control. One of the problems in which you are interested is restrictive leg-

islation affecting the marketing and use of pesticides. During this year over 150 state bills have been introduced into the state legislatures affecting the distribution and use of products at the state level. These bills involve permits for use; restrictive labor requirements; excessive fees for marketing products within a state; excessive research requirements; and residue tolerances.

On the federal level the same situation now exists. Early this year Representative James J. Delaney of New York introduced a bill to amend the Food, Drug, and Cosmetic Act along the lines of the Delaney Committee majority report of last year. This is Bill number H.R. 2245.

On March 26, Representative A. L. Miller of Nebraska introduced a second bill called "The Pesticides Residue Amendment to the Federal Food, Drug, and Cosmetic Act", H.R. 4277. Senator George D. Aiken of Vermont introduced Senate Bill number 1542 which is exactly the same as the bill introduced by Representative Miller.

This new federal legislation is the outgrowth of the Delaney Committee hearings on the use of chemicals in the production of food and in the preparation of foods and cosmetics. The new legislation does not in any way affect the Federal Insecticide Act. The legislation grew out of a fear, by some, that the general public was not fully protected against pesticidal residues in foods. But it affects the marketing and use of all pesticides—including those used in public health programs—so you will probably be interested in this proposed legislation.

We believe that the new legislation introduced by Representative Miller and Senator Aiken, should be vigorously endorsed by all manufacturers of pesticides, organizations concerned with agricultural production, with public health programs and by research agencies and the land grant colleges. Contrarily, all of these groups should oppose the Delaney Bill, H.R. 2245, which was introduced in the House earlier this year.

This new legislation, we feel confident,

adequately protects the public health and at the same time protects the manufacturer of the pesticides, the growers, and handlers of commodities on which pesticides are used.

1. It recognizes that the problems involved in the use of pesticides on food are vastly different from those involved in the use of intentional chemical additives. Accordingly, the proposal sets up a separate section in the Federal Food, Drug, and Cosmetic Act relating specifically to pesticides.

2. It recognizes that the most appropriate manner of improving present pesticide controls is by improving the tolerance-setting procedure rather than along lines suggested in previous administration proposals. The proposal requires the prompt setting of tolerances for pesticides designed for food use upon the petition of the interested person or upon the initiation of the Federal Security Administrator. Specific time limits for administrative action are prescribed. Costly and cumbersome public hearings are avoided. The unrealistic requirement of establishing necessity for use by formal proof is replaced by a procedure whereby the usefulness of a pesticide is certified by the Secretary of Agriculture to the Federal Security Administrator.

3. Provision is made for advisory committees composed of qualified experts to advise and consult with the Federal Security Administrator in connection with tolerances. This avoids placing complete responsibility over highly technical questions of science in the province of one agency. The Federal Security Agency, Industry, and the National Research Council would all have a voice in the selection of any advisory committee set up to pass upon a proposed tolerance.

4. It provides for a method of court review whereby the findings of the Administrator in connection with a tolerance would be independently evaluated by the court instead of being the subject of the rubber stamp as is involved in numerous appeal procedures.

5. Provision is made for the integration of tolerances which may be issued as a

result of the 1950 hearings, for exempting pesticides for which a tolerance is not necessary from the tolerance procedure, for protecting and encouraging research, and for coordinating existing controls over pesticides under the Federal Insecticide, Fungicide and Rodenticide Act.

Both the federal and state laws which control the marketing and use of pesticides must be practicable in nature. If not, they restrict the introduction of new products and discourage basic research in the discovery of new chemicals which we so badly need to overcome much of the resistance to chemicals that insects are developing. You have already heard considerable comment concerning new products, one of the most recent of which is granular insecticides.

It has been quite definitely proven that under certain conditions, adverse for conventional dust and spray applications, granular insecticides have overcome several difficulties. But there are many questions to be answered concerning these products, offering a fertile field for research. A few of the points that need investigation are:

1. Optimum size range of granular base material;
2. Rate of release of toxicant;
3. Rate of disintegration of the granular material and its effect on the control of mosquito larvae and soil inhabiting insects;
4. Methods of formulation and their relation to control;
5. Studies on application equipment for granular insecticides.

There is insufficient time for me to go into the problem of adapting application equipment to the use of modern pest control chemicals and their complex formulations. I would like to mention, however, that there is a committee at work coordinating the application research activities of the chemical and machinery industries and the research groups of the land grant colleges and the U. S. Department of Agriculture. Our Association will be glad to furnish you information on this committee upon request.

There is one warning which I should

like to leave with you in regard to the use of pesticides, whether it be for the purpose of improving the general welfare of man through agricultural pest control, or through the control of insects transmitting diseases. We have been bombarded in the past with many adverse press stories regarding the hazard to public health caused by the application of these materials.

Everyone who is connected with the use of pesticides has a responsibility for the proper application of these materials. The records have proved that much of the criticism and a great deal of the hazard comes from improper use of these products. A great deal of the misuse of pesti-

cides can be overcome by reading the labels on the materials and following directions specifically. The continued adequate supply and wide choice of these materials depends in great part upon responsibility in their proper use.

As a representative of the National Agricultural Chemicals Association, I wish to extend to you an invitation to consult our Association about any situation or problem which you may have concerning the use of pesticides. Our industry is doing everything possible to promote the proper use of its products and offers its services to expand the use of pest control in agricultural and public health fields.

## MOTIVES BEHIND MOSQUITO FLIGHTS

MAURICE W. PROVOST

Biologist, Division of Entomology, Florida State Board of Health, Jacksonville

I'm sure if I were in the audience instead of here, I'd be asking why in the world does this man want to talk about motives, of all things, in mosquito flights. Let me tell you why, at the outset. We are working with migratory mosquitoes in Florida. We are learning many things about our salt marsh mosquitoes. But when asked about our findings, we frequently make ourselves difficult to understand—not because we talk in terms too technical or anything of the sort, but mainly because many features of migratory behavior which we take for granted, being continually concerned with them, appear differently to others. What I mean is that the very great differences between migratory flights and other mosquito flights which we are so accustomed to observing seem not to be equally appreciated by others. The best examples of this are questions asked about "flight range" of salt marsh mosquitoes—a matter which strikes us as meaning little when it is expected to mean something quite concrete. It's only because migratory flights differ from other flights chiefly in motivation that I'm led to talk of mo-

tives. We just want and need to understand one another more clearly.

When we speak of motives, we must put ourselves in the subject's boots. It's not easy to put yourself in a mosquito's position, but with a little imagination and perhaps a lot of daring, it can be done. Our guess is that a mosquito is always in one or the other of two opposite states: either it is at ease or it is uneasy. In us, being at ease or not depends on more than strictly biological conditions; but in mosquitoes purely biological factors can explain either their actions or their feelings. It is difficult for us to refrain from projecting our consciousness and our thinking into the behavior of an insect. Most of what we do, at least in our sober moments, has a purpose. No one would seriously claim an insect thinks, and no one could *prove* it is even conscious. Yet many do not hesitate to say that mosquitoes act with a purpose—that is, with a beforehand knowledge of what they are about to do. This is pure delusion; the insect is a living automaton.

By motives in mosquitoes, therefore, we