

Q. And what do you do? Do you ask them what they are doing and what the results are to date?

A. We not only review their current progress in many cases, but we also try to inquire from them what their interpretation and significance of the material that they have in use is in light of the previous year's work. We even request in many cases what suggestions they think should be taken relative to our position in rectifying a situation that appears to be a harmful one. (1083)

Q. Is it a fair statement, Doctor, to say that in view of your present position and responsibility, that any action of the State of New York with respect to insecticides and pesticides comes across your desk for evaluation?

A. A great deal of it does, yes. I wouldn't want to say all of it. Some of it goes around me, that I do know. But usually, if it is of significance there is a telephone call.

Q. Now, come around then, Doctor, to some of the testimony of the other witnesses. Do you remember that Dr. Wurster, when he was discussing about his paper---- \* \* \* which he made a study of in Norwich and Hanover, that he was using some percentages. Do you have some observations on that method?

A. Well, yes, I do.

Q. Would you please state them? (1084)

A. Percentages in general are what I call a rubber yardstick. In other words, if you say a 70% reduction when the total population was 10, this is a reduction of 7 individuals. In relation to that, if it is a total population of 1,000, and you have a 70% reduction, it might be 300 that remains. If it is 1,000, the proportionate figure is involved.

Now the point that I would like to make here is that the 70% reduction means nothing unless you have the total.

THE COURT: Unless you have the total figure?

THE WITNESS: Yes, unless you have the total figure.

THE COURT: All right. Go ahead. I can understand that.

Q. Would you be inclined to question an evaluation based on a percentage rather than numbers if the numbers were available?

A. I would, yes.

MR. YANNACONE: Your Honor, I am going to object now, unless he is talking about Dr. Wurster's statement particularly. A general statement like that is not proper. I would like to state that for the record. (1085)

THE COURT: All right. Stick to Dr. Wurster's statement.

Q. Doctor, I would like to ask you if you can state to the Court some of the problems or regulations particularly with respect to the regulations at a county level?

A. Well, let me start at the top and work down.

MR. YANNACONE: Your Honor, I am going to formally object in view of counsel's testimony, in view of counsel's statement.

THE COURT: I don't follow you, Mr. Corwin. In what respect? What kind of regulation? We have all kinds of regulations?

MR. CORWIN: I know. We are talking now about banning or control or whether it is going to be legislative or administrative. There has been some testimony on the part of the plaintiffs with respect to that angle of the case, and I would just like to have him comment on what he knows about it. (1086)

THE COURT: All right. I'll go along with you. The Plaintiff did ask for opinion testimony as to whether it should be judicial or legislative action. You may follow through.

MR. YANNACONE: Your Honor, the plaintiff never said anything about that. Counsel has always asked this on direct examination.

THE COURT: You brought it up and counsel started to object. You asked your last witness this.

MR. YANNACONE: Dr. Bast?

THE COURT: You asked your last witness whether he had an opinion as to whether or not it should be judicial or legislative controls. Half of his answer was out, and an objection was taken. He couldn't answer the balance of it.

MR. YANNACONE: Your Honor, I submit, I am sorry, but I believe that is incorrect. An examination of the record will show that on direct examination, Dr. Bast was asked at least twice, and in my notes it shows three times, whether controls should be by the Legislature or by the judiciary. He testified about the Legislature, and I attempted to cross-examine him on it. Now, this is not our testimony, and I submit this witness is not qualified to answer that question. (1087)

MR. CORWIN: I submit, Your Honor, the question is most relevant to the inquiry before the Court.

THE COURT: Counsel, you ask the question, and then you make your objection. Go ahead, counsel.

Q. What are the problems with regulation, Doctor?

A. Well, to begin with, in our responsibility in making recommendations of materials to use, be it for mosquito control or in agriculture, there are regulations which we have to abide by. One of my responsibilities is to make sure that our recommendations are within, for example, the legal limits as prescribed by the Food and Drug Administration, by the U. S. Department of Agriculture, and within the limits of the New York State Agriculture & Markets, Conservation, Health Department, and all of the other parties involved. We have an extremely difficult time under our present circumstances of keeping abreast and maintaining on a state-wide basis information to responsible people about what these regulations are, how they can live within them, and how they can abide by them. (1088)

My observation here would be that if we start regulating in each county of the 55 counties of New York State, start setting up and regulating pesticides in their own right, that this will become almost an impossible situation. In cases of this sort, it has been my observation that when people don't know or they aren't informed or you don't have a flow of information, that then they do as they darn well please and frequently it leads to misuse and actually disrespect for the overall program because of the impracticability to live with this situation.

Now, it matters not to me whether it be judicial, legislative or what. But I think that we really are all interested in the same thing, and that in so doing, we should certainly consider what this mechanism is that will fit into our scheme of things. We should consider how we can do it, and how we can make it effective. This would be my observation. (1089)

THE COURT: Now, counsel, I think three witnesses testified to exactly the same thing. I heard three witnesses testify to exactly the same thing. I may be wrong as to that, but that is my recollection. Now, go ahead.

That is, they had rather insensitive techniques to determine residues. The material had not been used long enough in the environment so that you were getting an accumulation so that you could note its biological responses, and it was only recently, with the development of the gas chromatograph or the continued use in a particular area that you started to get the accumulated effects that we are concerned with.

(1079)

Now, to show you that this concern was not merely the result specifically of the gas chromatograph or of Rachel Carson and the public interest in the problems, there were a considerable number in the profession who were aware of some of these problems prior to Rachel Carson. They were concerned about them:

The point that I might make would be that we had a meeting in our department in 1957 with the conservation groups who are responsible both U.S. and New York State. At that time we requested them to quit using DDT for gypsy moth control. We were particularly concerned about it in relation to marginal hazards which borders pastoral forages and agricultural lands, because we had evidence to show that it was accumulating in the milk. We were getting it in the butterfat, and we also had evidence of some other biological effects

(1080)

In fact, they did not do anything about this until 1963 or 1964. Now, this is not to say again that they were incorrect. They are charged by the state with a certain responsibility. They had to weigh certain considerations and make a judgment in relation to their charged responsibilities. So the point I would like to make here is that although oftentimes we may have evidence or techniques that these frequently are not readily adaptable at the snap of one's finger, it takes training programs, and it takes adequate supplies of substitute materials, availability, and all sorts of problems that enter into the complexity of this decision. I think I have said enough about complexity. \* \* \*

Q. Doctor, just preliminary to some additional questions that I should like to ask you, I would like to go back to the beginning again and ask you for the record whether you are familiar with the literature on the subject generally?

MR. YANNACONE: What subject, Your Honor?

A. It is my business to be familiar with the literature in the broad area. Obviously, it is impossible to keep up with every piece, but I try to keep myself well informed.

Q. Do you remember Dr. Wurster's talk about the method by which papers were presented to and accepted by publications? He said that it went through a screening or censoring process, is that right?

(1082)

A. Yes. As a matter of fact, I have screened many of the science papers that relate to toxicology, especially pesticides. I have screened them for the Journal of Agricultural and Food Chemistry and also the Journal of Economic Entomology.

Q. You mentioned something about a lag. What do you do to keep abreast of the situation in view of the lag in the literature between study and publication?

A. Well, I try to make it a point of keeping in contact with the various research agencies that are responsible across the board--agriculture, conservation, fish and wildlife, the gamut, so to speak.

Now, often you have the argument that while every material should be specific, if we did this--and I think there are over 1,500 reported economic insects of significance; that there are an equal number of fungi, I am sure; that there are a number of weeds, 1000 or so; that there are nematodes, and the gamut--that this would in essence amount to having 3,000 or 4,000 different chemicals. Well, most of us recognize that at the present time sometimes one material has an effect on the other.

In essence then, before we got to use these things, we would have a situation in which we would have to try each new specific material.

THE COURT: To get the side effects?

THE WITNESS: Right, to get the side effects. This would become

a completely impossible situation.

THE COURT: Yes, I understand that.

THE WITNESS: Now, in the medical profession, they recognize the

same process. They take the calculated-risk approach the same as we do.

The pertinent point here, I believe, is that we should be continually

alert to the development of problems. We should try to investigate them when they

arise and take appropriate action as is necessary to cope with the situation. (1076)

If it means eliminating the material, then this is what we should do. I have

no quarrel with this at all.

However, I think from a practical point of view, if the individual

feels that we are going to end up with a specific material for each job, he is

never going to see it. I don't believe. It is a noble idea, and I am in favor of

it as an ideal. However, from the practicality of such a situation, I do not think

we are going to be able to succeed. This is my opinion, understand.

THE COURT: And I agree with you.

THE WITNESS: In addition, I think we have also mentioned, as we

proceeded along, that the pesticides should also not have a deleterious or harm-

ful effect against the plant, it shouldn't burn the plant in some manner or other.

So this becomes of some significance, and wherever possible we also hope (1077)

that it won't be harmful to beneficial insects. All of these things have to be

taken into consideration as well as the broader aspect of our total environment

in making these decisions.

Now, there is just one other significant point that is not neces-

sarily tied directly with the complexity, but it is a factor in our knowledge of

the situation, and it is very important. Here we have been talking about very

small quantities of pesticides, DDT specifically, which we have been able to

measure. Our ability to measure these small quantities is really a very big

technological breakthrough. In fact, one of the food and drug chemists has

compared this to twice the accomplishment of our man-in-space and rocket

program, the people who hit the moon.

Now, prior to 1962, when this gas chromatographic technique

became available, we frequently were up against the situation of having to (1078)

consider materials where the sensitivity of them might be in the neighborhood

of .5 parts per million or .2 ppm. If we couldn't find this quantity present,

this was frequently assumed to be 0.

Now, back in the mid '40's, three and four years after DDT

came into the picture, there are numerous cases in the literature where wild-

life people have stated that DDT in their belief was not harmful. Based on the

evidence that they had at that time, they were perfectly within their rights.

Now, as part of my responsibility and my job for a number of years, in fact, since about 1948, when I started in toxicology, and when I started in the position of toxicologist in 1950 or thereabouts, my primary interest became insecticide residues both in the soil and on crops--the metabolites of some of these materials as they break down. In fact, actually from about 1953 to 1955 I supervised one of our pesticide residue laboratories. I was responsible for and helped design our present pesticide residue laboratory and incidentally, we have two of these. There is one at the experimental station at Geneva and one at Ithaca, but my basic interest has been applied more or less directly to agriculture and food directly.

Now, when I assumed these present responsibilities, it seemed necessary that I acquaint myself with these broader responsibilities. One of the things that we did was to write all the state conservation departments in the United States in an effort to try to determine whether or not they had reported cases of significant changes in the levels of wildlife that are present. This was an effort to determine on a number of hunting, fishing and stocking programs in the broad gamut if possibly after essentially twenty years of DDT and these other materials, whether they attributed any significant trends to pesticides. There was not a single case that came back to our attention which would indicate that there was anything but a few localized problems.

Now, in addition to this----

MR. YANNACONE: Excuse me, your Honor, but this is information that came back from the state conservation departments of the various states?

THE WITNESS: This is correct. They sent me information, and what I was trying to determine for myself was guidance so that I could evaluate uses, and so forth, as to what materials were having little or no effect and which ones were of concern. That was the idea then. We realized we had to do whatever we had to do to cope with the situation.

We also have had frequent contacts with fourteen forest and wildlife research stations in the United States Department of the Interior. We have had personal contact with people like W. D. Stickie who is the staff biologist at Patuxet Laboratories, and we have made every effort that we could to make ourselves aware of pertinent information. We have done this particularly with professionals since these people are paid for the job they are doing. They have a responsibility which they are obligated to meet, and they are frequently set up with sufficient experimental facilities so that they can do the job as it has to be done. We have also done this to overcome the year or two years that we had in the lag of our literature, and I am sure you have the same thing in the legal point of view.

Now, some other points that add to the complexity that have to be considered are, for example, the fact that pesticides, at least in agriculture are generally not just applied by themselves. Frequently they are applied with a fungicide or some other material. Therefore, they must be compatible, that is, they must not harm one another and have a chemical effect upon one another that would not be favorable.

We also hope, at least from an agricultural point of view, that the material will have an effect on more than one insect. There is a total insect complex frequently present, and we hope that it will control more than one of these, because if it doesn't that means an additional application.

(1074)

(1073)

(1072)

(1071)

THE COURT: Let me ask you this, Doctor, and this is more out of curiosity than anything else: You know, and I know, and we all know that there is a certain amount of pilferage by children. They go over the fence and grab the cherries, grab the peaches, and grab whatever fruit may be growing on the trees. This may be done two days or three days after you spray. The fact that they are not ripe for the eating means nothing. They will grab it and put it in their mouth and eat it.

My question to you, Doctor, is what is the total effect of that. That is what worries me. (1067)

THE WITNESS: I think you are worrying me at this point.  
 THE COURT: Good, I'm glad to hear it.  
 THE WITNESS: In most instances, and I dare say in all instances, however, the Food and Drug Administration, if they were worried about the toxicity of this material--and they are well aware of this type of problem, and it was weighed in their consideration--that they would not permit it to be used. They would not permit these types of materials, and I for one would be definite opposed to it.

THE COURT: I am glad to hear that. But it was a problem with me.  
 THE WITNESS: Yes, I can understand it.  
 THE WITNESS: Which is very understandable, Your Honor. \* \* \*  
 Well, I investigated, and we have concluded that by using DDT (1068) to our best ability and formulations, things of this sort, we might very well reduce both the total quantity required to be used as well as the quantity being released and available in our total environment. So, again, this is an area where I would be reluctant to say we should just ban the material.

I think technically we have a lot of information. It has not been applied primarily because the pressures in this direction have not been great enough to cause people to justify their action.  
 Now, another point that was mentioned on persistence, and I don't want to dwell on this subject, but it does seem to be important or it wouldn't have been brought up in the first place. We have already mentioned that the form in which the material is used does have an effect on the length of time that it remains. For example, if we take a half-pound of technical DDT, and we dig a hole 18 inches deep and buried it, all in one lump, and we pile the stuff back on it and put a post in there, if you go back in ten years later, you are going to find DDT there.

Now, this is not to say that you are going to find the same amount that you immediately applied. In fact, the evidence in general seems to indicate that it is broken down. A figure that is frequently used is 30%. I think in the example that we are talking about here, that it would be somewhat less than that because it is in a lump. Microorganisms and then pheasants would be unable to get at a sufficient surface area of the material to have an effect among them. However, if we took, for example, a half-pound of technical DDT and applied it over a surface area, such as a farm land or a marsh or something of that sort, considerably less than a half-pound is going to end up actually in the water, or the soil. You do have these other effects coming into play, that is the ultraviolet, the effects of temperature on breakdown, the effect of other organisms on the material itself. You will have some mechanical action, some of which will cause it to fall directly to the ground and underneath the plant. You will have some of it picked up and perhaps distributed by the wind. This may account for some of the material that is in that total environment. The degree of this sort of thing becomes in many cases speculative matter. (1070)

the schedule through the season to end up with levels of DDT on the apple which were less than 3-1/2 parts per million. In fact, most of the time they were running less than 3 ppm.

THE COURT: Let me ask you this, Doctor: Let us assume

that you have the last spraying before harvest, and then comes harvest time.

You have the residue.

THE WITNESS: Right.

THE COURT: You take that apple off, and you send it to market.

THE WITNESS: Right.

THE COURT: The ordinary person, and I'll say the great majority

of the people just pick the apple up and put it between their teeth and grab a bite

out of it.

THE WITNESS: That's right. It's perfectly safe.

THE COURT: You say that residue is perfectly safe?

THE WITNESS: Time and again surveys by the Food and Drug Ad-

ministration and by our own state people have indicated, for example, and I'll

cite a case: The Consumer Market back studies which are made by Food and

Drug across the whole United States to determine the average intake of a

healthy growing boy about eighteen or so, who is supposed to have a hollow

leg and eat more than anybody else----

THE COURT: The only trouble with that, Doctor, is that he

outlives the older man who is doing the experiment.

THE WITNESS: Well, this isn't the problem really. And so that,

they measured the quantity of insecticides--and we will stick with DDT, Your

Honor, since it is the subject of our conversation \* \* \*

They measured the quantity of DDT on the vegetables, the fruit

the eggs, and the milk which are to be consumed. The result of their 1965

study, I believe--and these may not be accurate, but they will be within the ball

park--they found that less than 1% of the quantity of the tolerance permitted

was on these sample products.

THE COURT: Irrespective of the time between the spray and

the harvest? (1065)

THE WITNESS: No, I didn't say that now. We are talking about

the harvested crop as it appears in the supermarket. This would include some

people who didn't pay attention to the proper interval as suggested and required

by law as well as those who did. Now, the quantity found there was less than

1% of the total permitted under FDA tolerances.

Now, if you will bear with me a moment, most of these products

are trimmed and cooked. It has been demonstrated time and time again in our

cooking of meats, vegetables, and things of this sort that the DDT is still

further broken down.

THE COURT: Doctor, may I just finish my point?

THE WITNESS: I was just about to say that after cooking and the

trimming of these fruits and vegetables, that the intake quantity of the average

individual based on these studies is probably less than one-tenth of a percent of (1066)

the quantity permitted by Food and Drug. Now, they don't say this, but if you

carry it out a little bit further, you can convince yourself.

In fact, I think that you will find my statement is a rather

conservative one.

In other words, an example might be, a rather poor one perhaps, but an example might be that of an ostrich with its head in the sand and because it can't see, it is all right. There is nothing there. The point is that with some of these materials, we just haven't got the technology as yet. We haven't had the chance for accumulation of knowledge. We haven't had the chance for some of these things to show up in our environment.

I would submit that perhaps it would be a better approach to look at the DDT in a very truthful manner and recognize what the problems are, what the shortcomings are, and what we can do with this material to utilize its many advantages, which I think is generally conceded.

THE COURT: Do you have any suggestions?

THE WITNESS: Well, there are some suggestions. I can make them off the top of my head, and we have actually been reviewing some of these things from our own point of view. But again, in many instances, what we have really been doing is using sort of a sledge hammer effect.

In other words, we may have a tack to drive, but we have been using a sledge hammer to do it.

I submit, your Honor, this material is highly effective. It has been rather spectacular as a matter of fact. We may have used much more DDT to accomplish the job than might be necessary if we had practiced some of the finesse that we actually have available in proper formulation.

THE COURT: You mean read the box?

THE WITNESS: I am not inferring that at all. The point I would make is this: We have a lot of technology available that could be used, and in a product like DDT that has never been done. One of the reasons has been that it has never been economically feasible, the economics of the total situation would not permit it because there was not a concerted effort in a direction to reduce, for example, the quantity of DDT, and to use the minimal quantity that would do the job to the best of our ability.

A practical example that I worked on personally might demonstrate my point. Believe me, it could be taken much further than the example I am using. Back in 1953, we were aware that the Food and Drug Administration might reduce the tolerance of 7 parts per million to 3 ppm on apples. It was obvious that under the manner in which we have been using it, as recommended by our schedules and by our research, that we could not live with a 3-1/2 ppm tolerance. We would have either to go back and switch our materials or do something. But I became interested in trying to reduce or to see what we could do to increase the activity of DDT and decrease its residual effectiveness, thereby reducing the amount of residue on the apple.

Now, we were able to take DDT, heat it up so that it became liquid, and covered the surface of the particles that are normally used to dilute the DDT in a wettable powder, for example, Your Honor. So that, in essence, what we were doing was covering each particle of inert material, maybe two-thirds, with a thin layer of DDT.

Now, in so doing, we found that we could, for example, use three-quarters of the amount of DDT of what we would normally have to use to get the same effect in relation to toxicity. We were able to maintain a residual effectiveness that was essentially adequate for the purpose that we were aiming at, and this was in the area of twelve to fourteen days. We were able by following

(1062)

(1061)

(1060)

(1059)



(1055) we will accept that they are equally persistent, at least, to DDT. I think that general information would have to indicate that they are probably more of a hazard to our total environment than DDT is perhaps.

Therefore, when we start talking about eliminating DDT, from my point of view, in my responsibility, we try to say, "okay, now. Which of these are the worst materials? Which are of the greatest total hazard to us?"

And we try to reduce those which are worst first.

Now, at the present time, DDT, according to my evaluation-- and I may be wrong, and I'm sure that there are people on both sides of the fence--but in my judgment DDT in relation to our total environmental system is less of a hazard than some of these other materials that we are talking about.

Now, we have also categorically indicated that phosphates and carbamates are offered as alternatives, and that they are not persistent.

(1056)

This is getting into dangerous territory again.

THE COURT: Why?

THE WITNESS: Because for one thing, the knowledge that we have

about these materials is relatively limited to the total knowledge that we have about DDT, for one thing. Another significant point is that because these materials are somewhat newer, we frequently have not had the breakthrough in analytical techniques to detect the smaller quantities that we are frequently referring to with DDT here. So maybe we don't know anything about it.

Now, the other point is that I think it is in California, in the Citrus orchards, where parathion has been used frequently and over several years.

There has at least been one case of evidence offered to indicate that parathion has been in the soil and recovered for a period of two years.

(1057) So that if we go to the carbamates, which we tend to think of again as relatively safe--and the difficulty we have here is that we are

making our judgment in terms of just one carbamate, sevin, which happens to break down into non-toxic forms to most of the biological life as we are

considering it--however, there are other carbamate materials which do break down in some instances to more toxic breakdown products and which are even more persistent than some of the materials which we are talking about here.

So your Honor, just to categorically say some of these things, I believe we are really getting into dangerous territory. I am not trying to dis-

credit anyone here. I am merely trying to point out the terrific complexity involved in the number of facets that have to be considered before making

some of these judgments.

THE COURT: Which requires weighing the good and

(1058)

weighing the bad?

THE WITNESS: Right, right. Now, we have already mentioned

with DDT that we have had about 20 years of experience with this material.

Actually, we have had more information on DDT than any other modern pesticide. This morning there was pointed out some of the materials which we were talking about as alternative materials. We have relatively little in-

formation available as to those materials.

Now, it does not seem to me to be a scientifically-sound app-

roach to automatically throw out something upon which there has been a great deal of information accumulated for something that we know practically

nothing about.

THE WITNESS: Now, in conjunction with this matter of persis- (1051)

tence, we should also point out that the factor of the manner in which the material is administered also enters on the problem of the total effect both to the beneficial and to the non-beneficial forms.

For example, this varies if you go from a wettable powder to an emulsifiable concentrate, to a material in an oil solution, to the use of a granular formulation. All of these enter into its accumulation. It enters into the matter of where the material is released. It enters into the matter of where the pesticide ends up.

THE COURT: Where it winds up?

THE WITNESS: Right. So that, again, to categorically state it is

all bad, I think is taking some general liberties.

THE COURT: I don't think we have any testimony that says it is

all bad. I think the majority of the testimony has been--and I can be wrong-- (1052)

that it is comparatively good or bad without eliminating either the good or the bad.

MR. CORWIN: They said that any or all of it is bad, Your Honor.

That is the tenor of the Plaintiff's position.

THE COURT: They didn't say that. \* \* \*

What I understood him to say is that bad is bad.

MR. CORWIN: He also said what is bad is that if you are using any

of it, and that is bad in the first place.

THE COURT: You are reading something into it too. You are

interpreting some of the philosophy on the subject. Their final determination

is that if it is bad, it is not a question of how bad; it is bad and should be

stopped. MR. CORWIN: They don't make any distinction between the (1053)

amount the Suffolk County Commission uses and all the rest of the use in the

whole world.

THE COURT: I won't go into that.

MR. YANNACONE: Your Honor----

THE COURT: Sit down, sit down. Go ahead.

Let my friend here teach me some more.

MR. CORWIN: Thank you judge.

THE COURT: Are you all through with this gentleman?

MR. CORWIN: No, no. I was just going to sit down, Your Honor.

He is wearing me out.

Q. Please continue.

A. Now, I would like to point out that when we are talking about

persistence here, that it is conceivable that there are other materials which

are perhaps more persistent than DDT and which may be a greater threat to our (1054)

total environment, which these people are also interested in, I am sure; that in

addition to weighing some of these other facts, it also has to be taken into account

in some of these other areas.

For example, insecticides which are chlorinated hydrocarbons,

like dieldrin, eldrin, heptachlor, toxaphene----

MR. YANNACONE: Endrin?

THE WITNESS: I would rather leave endrin out. I will agree endrin

is a chlorinated hydrocarbon, but its persistency is in a little bit different category,

and I would rather not lump it with this.

MR. YANNACONE: Lindane?

THE WITNESS: I will exclude lindane in this discussion also, if you

will bear with me.

Now, the materials that we have named here are highly persistent

materials. Most of them, I don't think we would have any question, but what

In general, we would have to say, and a good example in this case, effect on the mosquito larvae which continue to be there, mainly because it has settled out. It has become absorbed in organic matter, and it is not readily available.

(1047)

MR. YANNACONE: Your Honor, before we go much further on that line, is that his opinion or is he attempting to state a fact?  
THE COURT: It is his opinion, I assume. He considers it a fact. You might not consider it a fact. But certainly, if I give you my opinion on something, I consider that to be so.

MR. YANNACONE: That is not what I mean, Your Honor, I don't want to interrupt the witness, but I think he just said that DDT isn't available because it doesn't kill mosquito larvae.  
Do you say that as a fact or is that part of your opinion?

THE WITNESS: Well, I think it is a well-known fact, and this is (1048)

just an example, since it is relevant to the case. It is evident now that more and more DDT has to be applied to kill the insects, so my assumption is they weren't being killed. Therefore, more has to be added. I am assuming proper use in this case. So that, if the mosquitoes continue to live and were found in this area, and assuming that they are not resistant, then this would be evidence that the material, although it is there, is not available to act. Actually, in some work that we have of our own, we have been able to demonstrate that under very turbid conditions, when you have a heavy run-off or agitation of this material, that the water samples then increase in the quantity of DDT that can be found. While this turbidity disappears, which is a result of the material settling to the bottom again, the quantity of DDT in the water again drops off almost in a corresponding degree.

(1049)

So that, again, I would not infer here by any manner or means that because it is in this organic matter and not generally available to all water forms, that there are not some fauna which may live in this certain area of the marsh and which would come in contact with it and conceivably, if they are sensitive to materials of this sort, it would be toxic. Now, the inference that I got yesterday, for example, was that in presenting this data, the next subject introduced was the LD50's to a whole bunch of other forms, and some of these were lower than the quantity found. So the inference was that immediately these are as toxic to them. They will be wiped out. I have not seen any data to show that this actually would exist under such conditions.  
But I bring this out only again, because it is a part of the complexity of this whole total picture. For us to just simply off the top of our heads say it is safe or unsafe or this or that or the other, we are taking some liberties, I think, from a scientific point of view.

THE COURT: Well, you are in substance, I think, repeating what the plaintiffs claim. It has its good points, and it has its bad points. However, as I understand it--and I can be wrong--the bad points overcome the good part.

THE WITNESS: Well, this has to come in the total balance.

THE COURT: That's right.  
THE WITNESS: The total balance is dependent upon the judgment of other values in relation to our total public.

THE COURT: We call it the preponderance of the creditable evidence. You might call it that, but we call it the evidence--period.

THE WITNESS: When you say the same dosage, I would have to say in the same animal, but let me answer your question this way: Frequently methoxychlor has to be administered in larger doses than DDT to give the same effect.

Now, Your Honor, there are cases where methoxychlor is actually more toxic than DDT. An example would be the Mexican bean beetle. It is metabolized in the system, so that with methoxychlor, you do not have a build up of the methoxychlor in the system, nor do you have the accumulation of metabolites. When it is metabolized, these things are readily eliminated from the system through normal or natural processes.

(1043)

In other words, to clarify the position of persistence up to this point, so far as I am concerned, it is really the biodegradability or ability of the material to be broken down into non-toxic forms that we are really concerned with so far as our environment enters into the problem. Now, we have also argued about or presented evidence in one way or another that if you put DDT or spray DDT today, that you will find DDT ten years hence. I will take exception to this on a categorical basis, because we would have to say first that it depends on the method of application to the area in which it is applied as to whether it persists or whether the material could be found or not. The other point that is significant here is that when we say we can still find DDT, what quantities are we talking about?

(1044)

In other words, nobody has said anything in court, that I have heard, that would indicate what levels are considered significant or insignificant. In fact, perhaps there is no one who can really answer that question with a degree based on actual experimental evidence. We would have to make a calculated guess or something.

THE COURT:

Well, as I understand it, the very minimal quantities, a quantity incapable of even being seen, would be sufficient to do the job of injuring anyone of the group--and I don't know which one.

THE WITNESS:

Well, I would have to challenge that statement and the opinion, because if it is given this broadly, there is certainly many instances where this is not true, and they would have to be specific, I am sure.

THE COURT:

Well, aside from the solubility or alkalinity, what would destroy the length of time of its capability to do harm, if any?

(1045)

THE WITNESS:

Well, there are many factors involved in our environment which would come into play. We have the effect of ultraviolet light, which has been demonstrated. You have the effect of temperatures and the degree of volatility. You have the matter of absorption on other organic matter.

For example, in some of these instances, a material may be found to be present in our very critical analytical methods. But often, from the point of view of their availability to other biological systems, this is extremely limited. A practical example that might get my point across, would be, for example, when we are trying to control insects in muck soils, muck organic soils. It becomes necessary to double and treble the dosages that are applied, because of the high absorptivity rates and the tying up of the pesticide by the soil molecules themselves, and also by the organic matter. So that unless you have a system that is particularly directed to the metabolic, which derives its feed from the soil by extraction of the organic matter from it, then this would become significant.

(1046)

However, we cannot assume that because it happens to the earth-worm, that this happens to all our forms in the ecosystem. It do not believe this. This would be an improper judgment.

Now when DDT is found in substances, such as were mentioned in Exhibit 10 here of Dr. Woodwell, there is no denying that this material is there. The question arises then as to what availability does this material have to the other bio-systems that are involved in our environment.

In fact, on alfalfa and clover, which cows feed on and where we have to control the alfalfa weevil, there is a tolerance of 100 parts per million. This can be fed to the cow actually the next day after it is treated, and that is so in this case because the carbamate is broken down into harmless compounds so far as the cow is concerned. It also does not appear in the milk, nor does it accumulate within the metabolic system of the animal.

(1038)

These were a couple of points that also contributed to this total picture of complexity. There is another area that needs to be entered into a little bit in trying to evaluate this total picture, and that is the matter of dose. Now, we have from time to time gotten the impression that regardless of the dose or the exposure of an individual, and particularly with DDT, that this is bad. Actually, there are many, many instances both with pesticides and with medicines where doses which are generally considered as sublethal actually have beneficial effects both on people and other forms of life.

(1039)

So that to say categorically that there are no benefits, it is as improper as to say that there are no bad effects, because in truth both actually exist. To illustrate a point again that might be readily understood, and I don't believe it is practiced in medicine any longer, but it is well known that strychnine used to be given some years back as a treatment for heart attacks. You could double or triple the dosage, and it was a fatal dose. The same sort of a situation exists in many, many instances, and this probably is not a good analogy from the point of view of wildlife and the problem which we are more or less directing our interest to here, but there is data to indicate that with a material like DDT--and this may need further confirmation--that the levels of DDT cause less storage of another insecticide dieldrin than what would normally occur if dieldrin was in that environment. If we turn the tables, we find that dieldrin does not or at least has not been shown, to my knowledge, to have this effect in relation to DDT.

(1040)

In other words, because there is DDT in the environment or in the system of an individual, this does not mean that it will cause less DDT to accumulate; but the opposite of this is true, and that is that DDT does under some circumstances, at least, cause less dieldrin to be accumulated in the in the organisms. So again, this is a part of the complexity of the whole problem that we have to continuously consider. Now, we have also talked about persistence. Persistence is a term which has been used rather liberally here--loosely perhaps, I should say--and I would hold that persistence or the length of residual effectiveness is not necessarily a harmful thing. For example, there is considerable evidence to indicate that methoxychlor persists on grass nearly as long as DDT will. The difference between methoxychlor and DDT, however, as far as it relates to the hazard to the environment, in my estimation, it is that methoxychlor is broken down by the metabolic systems of our different animals to non-toxic, non-cumulative materials, and I say this in relation to DDT. Now, obviously, when we say "non", we take liberty with the statement. On the other hand, DDT does upon intake of certain levels into warm-blooded bodies, (1041) at least, it does start accumulating in the system, and it is frequently stored in the fat and areas of similar nature. So that it does accumulate, and gradually there will be a timely breaking down of the material to DDE. Now, DDE in general is a rather non-toxic material. It is a controversial issue, mainly because, again it is a matter of degree, but mainly because it varies with animals, and it varies with plants. It is things of this sort. How about the relative affect to the nervous system? THE WITNESS: Well, so far as I know, the evidence would indicate that DDE has relatively little toxic effect to the nervous system.

(1042)

THE COURT: How about DDT? THE WITNESS: DDT is a nerve poison, and when it is released in sufficient quantity to the systems, it will inhibit the nervous system and cause tremors and things like that.

THE COURT: Will methoxychlor in the same dosage do the same thing?

However, when we got out of the laboratory and placed it on peach trees in bloom, we found that there was relatively no toxicity to the bees at all. The reason for this was that the dinitro material was sufficiently toxic to the plant, the cells of the plant itself, so that the anthers and the stigma were dried up, the petals would dry up, and these were actually more or less repellant to the bees. So the bees no longer visited them, and there was no toxicity problem.

Now, this is just another example. We talk about toxicity, but here is a case of a toxic compound which can be utilized to one's advantage.

(1033) THE COURT: Didn't that kill off all the blossoms?  
THE WITNESS: No. It was a timing situation where you waited for so many hours of favorable pollination weather, based on the assumption that the bees visited the flowers, had pollinated the percentage necessary to give you an adequate crop, and you went in then with the toxic material. This then prevented the balance of the bloom from setting. They used other materials that are somewhat safer than this at the present time.

Q. Does sevin have that same effect on bees?  
A. Well, there are two effects with sevin that are involved here that add to the complexity, and it is again toxicity.

THE COURT: I believe sevin is another pesticide that they use for bees primarily, is that right?  
THE WITNESS: It is a carbamate, and I don't want to argue with you, judge, but in this case sevin is quite toxic too. It is highly toxic.  
THE COURT: I say that kills off bees, is that right?  
THE WITNESS: Right. I perhaps misunderstood you. Your Honor, with sevin, there are two points here that are of interest and bear out the complexity of the situation.

Now, we try to avoid the use of sevin, a carbamate insecticide, on apples prior to bloom, because it reduces the set of McIntosh apples, and, therefore, where it is reduced, it is sometimes felt under critical seasons that the farmer does not get the set in the fruit that is required to give him a profitable return. With regard to bee toxicity, sevin is one of the most toxic materials that we have.

(1035) For example, last year and the year before, the State Department of Conservation had been using sevin for much of their gypsy moth spray work in the state. I understand the Plant Protection Division of the United States Department of Agriculture also uses the same material. But for the purposes of the state, at least, and the State Conservation Department, before applying sevin to areas to be sprayed for gypsy moths, they request the beekeepers in those areas to remove their bees to a minimum of at least two miles beyond the borders to be sprayed, because of the damage that might result to the bees. They also are in a position by creation of a special fund to indemnify bona fide losses to the beekeepers where injury results, even under these circumstances.

Now, this past year, we had a few cases of where we have had bee colonies damaged three miles from the area. This is not the result of drift of the material, but it is a fact that the bees do move. They are mobile. They go some distances, and they are moving in and out of an area, as well as trees, and they may get some effects, which is inevitable.

THE COURT: Doctor, you said that sevin is more toxic. Isn't it a fact that you can harvest your fruit in a shorter time with the use of sevin than you can with any other insecticide? I think it is a seven-day period.

THE WITNESS: Well, this adds to the complexity of this whole pesticide problem. The interval which you are now speaking of is an interval which has been set up by the Food and Drug Administration. It is based on the levels that are found present, for example, on apples in this case, and which can be met with a reasonable degree by people growing apples and at the same time well within the limit of safety as determined by the Food and Drug Administration.

(1037) Now, frequently there is a safety factor of about 100-fold, so that probably from a significant point of view, as far as the Food and Drug Administration is concerned, they would say, if they had established seven parts per million tolerance, they would probably also concede that they don't become really worried until the level exceeds 700 parts per million.

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Q. Doctor, I'm going to ask you a wide question, and I would like you

just to take off and comment generally upon it. In so doing, you may reply, if you wish to do so, to some of the testimony that has already been given. Will you state to the Court the reason for the opinion that you just gave?

A. Well, to begin with, the whole problem is one of a very complex nature. Now, some of the testimony that I have heard would seem to indicate at times that it is a little bit like turning a water faucet on and turning it off, and it is this simple. This is not a simple problem in any way or means. When we say toxicity of a material, oftentimes the interpretation depends upon the individual to whom we are talking.

Now, we might first start out with the assumption that--and I think the Court will go along with me in this matter--for a pesticide or specifically an insecticide to be effective in the controlling of an insect, it has to be a poison at the level at which it is administered. Now, if it is going to be poisonous to an insect, one of the first assumptions most of us working in the profession would make would be that it is also toxic to other biological forms. This is just a rule of thumb that we go by.

THE COURT: A corollary?

THE WITNESS: Yes. However, Your Honor, there are great degrees

of toxicity, and perhaps I can by a few examples get my meaning across more clearly than going into technical details and things of this sort.

When I first started working as an extension specialist in fruit-insect control, we were still working with arsenate of lead, which was our primary insecticide, and this was before DDT was introduced. Frequently, applications were administered before the apples came into bloom. The beekeepers were greatly concerned because they had a great deal of toxicity killing the bees. Thus, this was an incompatible situation.

In other words, Your Honor, the apple grower needed a beekeeper, and the bee pollinated his apple tree before he could have fruit; but he was using a material which was also killing some of the bees.

Now, by going over the situation and with the selection of alternate materials, we were able to circumvent the need for using lead arsenate before bloom and still get the desired degree of control. We were fortunate at that time. It wasn't that people prior to this time were not aware of the problem of bee toxicity, but it was the lack of other suitable materials at that time. This happened at the time the dormant oils were developed, where they could be used, and they killed this complex.

Okay. So here is a case where the time at which the material is present might be an important factor as to the effect on a particular insect, a beneficial one in this case, the honey bee. It was circumvented.

Another development along about this time--and I am using these illustrations not for any particular reason, because it is simple enough and people understand it perhaps more readily--was the dinitrophenols, which is a very toxic material and has a much higher rating of toxicity, believe me, than DDT and some of the things that we have been talking about.

MR. YANNACONE: Excuse me, Your Honor, but toxicity to what? Do you mean humans?

THE WITNESS:

This would be to animal, plant, and human forms. Your Honor, we also had a law on the books, and it is still there, a legislative law, which stated that pesticides could not be applied to trees in bloom to reduce the need for hand thinning. In other words, here was a chemical method of thinning peaches while they were in bloom so that you didn't have to come in three weeks after bloom and hand pick or at some later date. At first there was great objection to the use of a dinitro material, because it was recognized that it is a highly toxic one and laboratory studies showed that this material was indeed extremely toxic to honey bees.

( 1032 )

( 1031 )

( 1030 )

( 1029 )

( 1028 )

Q. Doctor, may I ask you if you know Walter Dykstra?

A. Yes.

Q. Who is he, and how does he fit into this program.

A. Well, Walter Dykstra is a member of the Fish and Wildlife Division of the Department of Interior, that is, the U. S. Department of Interior. He is a professional who has been hired for a number of years in the interest of conservation. His particular field of responsibility deals with pesticides and the control of animals relative to total conservation. At the present time I believe he is an assistant director of that division.

MR. YANNACONE: Excuse me a minute, but did you say he is involved in

pesticide control of animals? (1024)

THE WITNESS: Let me see if I can perhaps tell you precisely what

should be said.

MR. YANNACONE: Your Honor, before he goes too much further along this line, may I ask what the relevance of this is or Mr. Dykstra's status in this

courtroom?

THE COURT: Wait till we have a little preliminary testimony,

counsel, and then if it is objectionable, I will sustain your objection. THE WITNESS: His area of responsibility is pesticides-animal control.

Q. You are aware of the fact that the other witnesses were apparently

familiar with the subject?

\* \* \*

Now Dr. Dewey, you have been in the courtroom during all the

testimony in this case, have you not?

A. Yes, I have.

Q. And are you familiar with what was said by the witnesses, and you

understand what they were talking about?

A. Well, I think I understand what they were talking about.

Q. Well, from what you heard about the usage of DDT by the Suffolk

(1026)

County Mosquito Control Commission, in considering all the factors about which there has been testimony and with respect to which you have some expertise, do you have an opinion as to whether the DDT used by the Suffolk County Mosquito Control Commission has a serious, substantial, permanent, and irreparable effect upon the natural life of Suffolk County.

THE COURT: As presently used.

Q. Well, as presently used, Your Honor, right now it isn't being used at all, but up to the time it has been.

THE COURT: All right. Up to the time it was used.

A. Let me ask you what you mean by irreparable, first.

THE COURT: I will give him that definition. Irreparable means

that it does a harm that is difficult to recover from or impossible to recover from. THE WITNESS: Well, if we take the term as meaning that they can-

(1027)

not recover from, then it would be my opinion that the use of the term up to this point has not caused irreparable damage.

Q. Let us go a little more into the word "irreparable". Now, with

respect to any given animal, if, as the result of the DDT this animal should die, the damage would be irreparable with respect to that animal, is that correct.

A. I would interpret it as that, yes. That's right.

Q. We are thinking about irreparable in the evolutionary sense, are we not?

A. I assume so. We acknowledge that there has been a death of individuals, and obviously these people are not going to be reincarnated or anything of this sort. However, from the point of view of populations and their complete elimination from a broad view, this has not happened.