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Michigan Dept. of Natural Resources

*Eaglet and an egg which never hatched, photographed in an eyrie on the Muskegon River in Michigan, April, 1965. The chipped, flaky condition of the egg was ascribed by wildlife ecologists to residues of DDT—a "chemical compound of extinction," as it was called by Professor Joseph J. Hickey of the University of Wisconsin.*



# DDT on Trial:

## The Wisconsin Hearing, 1968-1969

By Thomas R. Dunlap

GROUPS seeking the preservation of America's natural resources and wilderness areas or the abatement of pollution now routinely resort to court action. This approach, however, is a quite recent development. Prior to 1970, environmental suits were rare, and environmental law, now a thriving legal specialty, hardly existed.<sup>1</sup> One of the first instances—and one of the most important—in which the modern brand of environmentalists sought to use judicial or quasi-judicial processes in an environmental cause was against the chemical pesticide DDT, which by the late 1960's had become one of their primary targets. For the environmental-

**AUTHOR'S NOTE:** I would like to thank my colleagues at Virginia Polytechnic Institute and State University, Susan Laura Miller and Neil Larry Shumsky, for their advice and criticism, and Henry Steck, Department of Political Science, State University of New York-Cortland, for criticizing an earlier and much abbreviated draft of this paper, which was presented at the 1977 meeting of the Organization of American Historians. The hearing record is contained in the Department of Natural Resources' transcript, "In the matter of the CNRA of Wisconsin, Inc., *et al.* for a Declaratory Ruling on DDT, 3-DR-1" (unpublished transcript, Wisconsin Department of Natural Resources, 1969). Accounts of the hearing are Harmon Henkin, Martin Merta, and James Staples, *The Environment, the Establishment, and the Law* (Boston, 1971), and Orie L. Loucks, "The Trial of DDT in Wisconsin," in John Harte and Robert H. Socolow, eds., *The Patient Earth* (New York, 1972). Yannacone's conclusions about the hearing and some parts of the transcript also appear in Victor J. Yannacone and Bernard S. Cohen, *Environmental Rights and Remedies* (Rochester, New York, 1971).

ists, DDT was a symbol of human thoughtlessness and biotic degradation. Moreover, in their opinion, a mass of scientific evidence made DDT vulnerable and justified their attempt to have it banned.

As little as ten years before, this situation would have seemed unlikely, for DDT (from its technical name, dichloro-diphenyl-trichloroethane) had revolutionized insect control worldwide, saving thousands of human lives and untold millions of tons of foodstuffs. The chemical was first synthesized in 1874; its insecticidal properties were discovered in 1939 by a team of investigators working for the Geigy Chemical Company of Switzerland. In 1948 the head of the team, Paul Muller, received a Nobel Prize in chemistry for this discovery. During World War II the Allies pressed DDT into service to protect troops and civilian populations from the insect vectors of disease, and by 1945, when the chemical first became available for non-military use, production exceeded two million pounds per month. Potent and inexpensive, DDT quickly displaced older pesticides, opening up new avenues for the chemical control of insect pests.

<sup>1</sup> Joseph L. Sax to George C. Bales (recommending the Environmental Defense Fund for the John and Alice Tyler Ecology Award), September 3, 1973, copy from Joseph L. Sax; Luther J. Carter, "Environmental Law (I): Maturing Field for Lawyers and Scientists," in *Science*, 179: 1205-1209 (March 23, 1973); and "Environmental Law (II): A Strategic Weapon Against Degradation?" *ibid.*, 179: 1310-1311 (March 30, 1973).

By the early 1950's, production had topped one hundred million pounds per year.<sup>2</sup>

During the 1950's a series of events made medical scientists and wildlife biologists increasingly skeptical about the safeness of DDT to man and the environment. Though there were no cases of poisoning, tests by the Food and Drug Administration as early as 1950 showed that DDT in very low doses affected rats' livers, and that virtually the entire American population was storing the chemical in body fat.<sup>3</sup> More evidence gradually came to light. Scientists found DDT residues far from the point of application and in ecosystems (including oceans) which had never been treated. DDT was also much more persistent than had originally been thought. Under some environmental conditions, up to half of it might be recovered after a decade. In the late 1950's scientists investigating the death of large numbers of Western grebes at Clear Lake, California, concluded that DDD—a close relative of DDT—was concentrated through food chains, and reached dangerous levels in species at the end of the line. By the time Rachel Carson published *Silent Spring* in 1962, wildlife biologists had also begun to suspect that DDT was implicated in the widespread reproductive failure of several birds of prey, including the bald eagle. Research dur-

ing the 1960's increased these suspicions, and by the end of the decade many scientists were convinced that the physical and chemical properties of DDT, linked with its newly discovered effects on mammals, made it a dangerous environmental pollutant.<sup>4</sup>

Environmentalists, too, became aware of these findings and were convinced that something should be done. They sought a forum in which to convince the public of their cause and to halt the use of persistent pesticides. A key event in the campaign against DDT was a hearing held in Madison, Wisconsin, between December, 1968, and May, 1969, on a petition to the Wisconsin Department of Natural Resources. Here, for the first time, environmentalists presented, in an open forum, before an impartial arbiter, the scientific evidence they believed proved that DDT was a danger to natural biological systems. What began as a ten-day hearing, brought under an obscure section of the Wisconsin statutes, ballooned into a national trial of DDT. It propelled the Environmental Defense Fund, the group which presented the case, to national prominence, helped bring about a ban on DDT in the state, and contributed to the national campaign against persistent pesticides. The dramatic demonstration of the advantages of such a forum for presenting a case to the public and getting action also helped spur the development of environmental litigation.

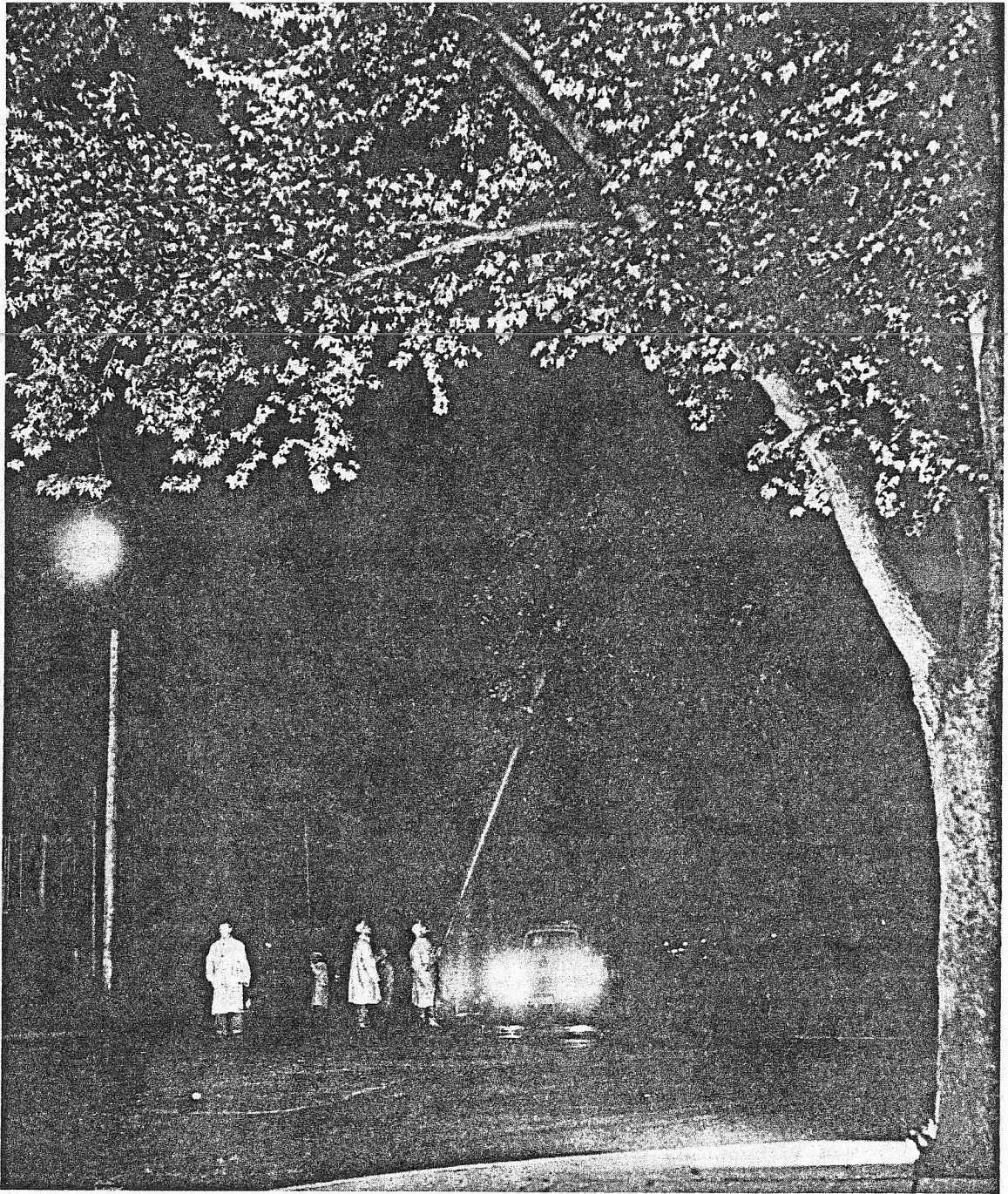
<sup>2</sup>Othmar Zeidler, "Verbindung von Chloral mit Brom- und Chlorbenzol," in "Untersuchen über die Synthetische Darstellung von aromatischen Verbindung durch Wasserentziehung," *Berichte der Deutschen Chemischen Gesellschaft zu Berlin*, 8: 1180-1181 (1874); P. Lauger, H. Martin, and P. Muller, "Über Konstitution und toxische Wirkung von naturalischen und synthetischen insekzentotenden Stoffen," in *Helvetica Chimica Acta*, 27: 892 (June, 1945); U.S. Office of Scientific Research and Development, Committee on Medical Research, *Advances in Military Medicine, Volume II* (Boston, 1948); U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service, *The Pesticide Situation* (Washington, D.C., annual). The formal name for DDT is 1,1,1 trichloro 2,2 bis (parachlorophenyl) ethane.

<sup>3</sup>Edwin P. Laug, Arthur O. Nelson, O. Garth Fitzhugh, and Frieda M. Kunze, "Liver Cells Alteration and DDT Storage in the Fat of the Rat Induced by Dietary Levels of 1 to 50 ppm DDT," in *Journal of Pharmacology and Experimental Therapeutics*, 98: 268-273 (March, 1950); Edwin P. Laug, Frieda M. Kunze, and C. S. Prickett, "Occurrence of DDT in Human Fat and Milk," in *A.M.A. Archives of Industrial Hygiene and Occupational Medicine*, 3: 245-246 (March, 1951).

THAT Madison was the scene of this confrontation between the defenders of DDT and the environmentalists was an accident, the result of circumstances rather than planning. In 1967 a group of people, most of them from Long Island, New York, had started the Environmental Defense Fund to use legal action in fighting environ-

<sup>4</sup>E. G. Hunt and A. I. Bischoff, "Inimical Effects on Wildlife of Periodic DDD Applications to Clear Lake," in *California Fish and Game*, 46: 91-106 (January, 1960); Robert Rudd, *Pesticides and the Living Landscape* (Madison, Wisconsin, 1964); interview with Joseph J. Hickey, July 16, 1973, Madison, Wisconsin; George W. Woodwell to Thomas R. Dunlap, April 4, 28, 1977. DDD, for the chemically minded, is 1,1 dichloro - 2,2 bis (parachlorophenyl) ethane.





Milwaukee Journal photo

*Nighttime spraying of elm trees with DDT, Milwaukee, ca. 1967.*

mental degradation.<sup>5</sup> They had first come together to stop a local application of DDT, and the members wanted to continue work against the chemical. For the first year of its existence, the EDF sought a case in which it could present its evidence in open court. One

<sup>5</sup>Until after the Wisconsin hearing, the Environmental Defense Fund had a board of ten trustees who comprised the entire membership. This account of

of the members offered to raise money for such an action in Michigan, his home state, where EDF tried, and failed, to find a suitable action. In several instances the defendants—towns using DDT for Dutch elm disease sprays—agreed not to use the chemical, giving

EDF activities is based on interviews with Victor J. Yannacone, Jr., December 21, 1973, and March 17, 1977, Patchogue, New York; with Charles F. Wurster,

EDF a victory but denying it a chance to present its evidence. In another case, involving dieldrin, another insecticide, the EDF had great difficulty establishing its right to bring the case to court and in finding a court with jurisdiction over the matter.<sup>6</sup>

In October, 1968, EDF came to Wisconsin at the urging of a local conservation group, the Citizens' Natural Resources Association of Wisconsin, to represent the CNRA in an action it had brought to stop the use of DDT in Milwaukee County.<sup>7</sup> The hearing, before Maurice Van Susteren, the chief hearing examiner of the Department of Natural Resources, was a fiasco. The city of Milwaukee and Buckley Tree Service, the defendants, agreed that they would not use DDT and that there was no contract between them for such spraying. Van Susteren promptly dismissed the case and rejected the request of Victor Yannacone, EDF's counsel, for a chance to prepare an amended complaint. The issue, Van Susteren said, was moot.<sup>8</sup>

Van Susteren was curious, however, why

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Jr., December 21, 1973, Stony Brook, New York; with Carol Yannacone, May 31, 1977, Patchogue, New York; and on correspondence with Wurster, the Yannacones, and other directors of the EDF, namely George M. Woodwell, Anthony S. Taormina, Dennis Puleston, and Arthur P. Cooley. This correspondence is in my possession. Other information comes from the papers of Roland Clement, vice-president of the National Audubon Society and liaison between that organization and the EDF, and my interview with Clement on June 2, 1977, in New York.

<sup>6</sup> Wurster, Yannacone (1973), and Carol Yannacone interviews. Roland C. Clement, memo on Environmental Defense Fund, October 6, 1967, with additions through November 3, 1967; a copy is in the Clement files at the Audubon Society. EDF v. Michigan Department of Agriculture, the Incorporated Cities of Fremont, Muskegon, Breenville, Rockford, East Lansing, Lansing, East Grand Rapids, Holland, and the Incorporated Village of Spring Lake, all in the State of Michigan, U.S. District Court for the Western District of Michigan, Southern Division, no. 5760, November 3, 1967. EDF v. B. Dale Ball, Director, Dean Lovitt, Chief, Plant Industry Division, Donald White, Regional Supervisor, Plant Industry Division, Michigan Department of Agriculture, Civil Action No. 68-C-289, U.S. District Court, Eastern District of Wisconsin, October 9, 1968. This is the dieldrin case, brought a second time in Wisconsin. *Detroit Free Press*, and *Kalamazoo Gazette*, both November 4, 1967. Newspaper clippings and transcripts are from the files of Victor Yannacone.

<sup>7</sup> Yannacone interviews (1973); interviews with Mrs. Owen Otto, Milwaukee conservationist, February 18, November 19, 1974, Milwaukee, Wisconsin.

the winners of the suit were so dejected. He confronted Yannacone, who explained that the EDF wanted a forum in which to present the scientific evidence against DDT and to get a judgment. If that was the case, Judge Van Susteren told him, he should use a different approach. Section 227.06 of the Wisconsin statutes allowed citizens to ask any state agency for a declaratory ruling on the applicability of a law enforced by that department to any particular situation or set of facts. The EDF could, he said, ask the Department of Natural Resources for a declaratory ruling on whether DDT was or was not a water pollutant under Wisconsin water-quality standards. The DNR, which had the responsibility for enforcing the standards, would hold a hearing and permit interested parties to present their evidence.<sup>9</sup>

These provisions were ideal. Since a hearing on a declaratory ruling was designed to clarify administrative rules and procedures in the absence of a formal legal dispute, the EDF would not have to confine itself to any particular use of the chemical. It could, in effect, sue DDT, discussing the effects of the residues in the environment, regardless of how they got there. The hearing also provided a formal procedure for presenting evidence, allowing the orderly development of an extended argument, and an examination of the other side's case. First the petitioners—the parties bringing the action—had a chance to present their evidence. Then the intervenors—those who entered an appearance in opposition to the petition—presented theirs. Finally, the petitioners presented their redirect case to rebut the intervenors' testimony. Neutral parties could also take part, entering appearances "as interests may appear," and explaining facts relevant to the investigation. Legal procedures were followed. Witnesses were under oath, had to be qualified to pre-

<sup>8</sup> "Hearing on complaint filed 23 September 1968 with the Department of Natural Resources under Section 144.537, Statutes, alleging DDT is a biocide." Filed by Fredrick M. Baumgartner, George C. Becker, Louise W. Erickson, Roy O. Gromme, Harold G. Kruse, and Russell A. Rill. The transcript is in the collection of Walter E. Scott, retired assistant to the secretary, Wisconsin Department of Natural Resources.

<sup>9</sup> Interview with Maurice Van Susteren, June 6, 1973, Madison, Wisconsin; Otto interview; Yannacone interview (1973).



sent expert testimony, and were subject to cross-examination. Basic rules of evidence applied, though the examiner had considerable latitude in deciding what was relevant to the inquiry. At the end, there would be a verdict based upon the scientific testimony. While a ruling that DDT was a water pollutant would not ban the chemical, it would provide the basis for further legal action and seriously set back the defenders of DDT.

**T**HE environmentalists moved swiftly. On October 28, less than three weeks after the Milwaukee hearing, the CNRA petitioned the Department of Natural Resources for a declaratory ruling on DDT, asking that the chemical be declared a highly toxic, persistent substance whose existence in the biosphere constituted pollution and which should be restricted so that it would not contaminate the environment. Van Susteren scheduled the hearing for December 2 in Madison, and appointed himself to hear the case. He allowed ten days for arguments by the petitioners, who were represented by the EDF, and by any intervenors who might wish to appear in opposition.<sup>10</sup>

The environmentalists were fortunate to have Van Susteren on the case. He was interested in the subject, had some scientific background (he had been a pre-med major at the University of Wisconsin), and made a conscientious effort to keep up with the issues raised during the hearing. He also sought to bring out the issues and evidence in the case and have them tested by cross-examination. He allowed both sides considerable latitude in

<sup>10</sup> Maurice Van Susteren, "Examiner's Summary of Evidence and Proposed Ruling," in "In the Matter of the CNRA of Wisconsin, Inc., et al. for a Declaratory Ruling on DDT, 3-DR-1" (unpublished transcript, Wisconsin Department of Natural Resources, 1969). Transcript of the hearing cited below as "Wisconsin DDT Hearing" was prepared by the DNR, and the copy I used was from the collection of Maurice Van Susteren. Interview with Maurice Van Susteren, undated. During the preparation of my dissertation, Van Susteren spent several evenings going over the events of the hearing and the legal issues. Comments and observations he made at these meetings were not usually dated. Dated interviews with all sources were either tape recorded or, if written notes were used, the subject received a copy for correction.



Madison Capital Times

*Maurice Van Susteren, chief hearing examiner during the Wisconsin DDT hearing.*

presenting their cases, avoiding narrow definitions of relevance but keeping the hearing focused on the issue. He permitted vigorous cross-examination but managed to keep the counsel under control (though counsel for the intervenors complained later that Van Susteren had allowed Yannacone to badger their witnesses).<sup>11</sup> Van Susteren's commitment to a full exposition of the case was one of the reasons the environmentalists were able to make good use of the forum they had obtained under the declaratory ruling procedure.

One of the advantages of fighting environmental degradation through legal action rather than public education quickly became obvious. The prospect of putting DDT on

<sup>11</sup> Interview with Louis A. McLean, November 5, 1973, Northfield, Illinois. Interview with Willard Stafford, August 22, 1973. Stafford, perhaps because he was on the losing side, was reluctant to dwell on the subject. When I called him for an interview he said: "The DDT hearing! You don't want to talk about the DDT hearing. That's history!" Despite an explanation that this was precisely why I was interested, Stafford was noncommittal.

trial brought the EDF a great deal of financial support. Local conservationists raised \$25,000 for legal expenses before the hearing began, and, when the proceedings stretched well beyond the initial ten-day period, collected another \$25,000. Volunteers in Madison contributed both time and money, providing food, housing, and transportation for Yannacone and for Charles F. Wurster, the EDF's chief scientist on the project, as well as for a large number of out-of-town witnesses. Several faculty members of the University of Wisconsin-Madison offered to testify and to help organize the case, while others and their graduate students organized and staffed a scientific reference service for the EDF.<sup>12</sup>

The EDF had no difficulty finding scientists to testify. In 1962 Rachel Carson received little open support from scientists, and later campaigns against DDT had not fared much better. The EDF, however, had far more volunteers than it could accommodate, even in the lengthy hearing. Many of the scientists who aided the EDF did so because they saw in the hearing a chance to get the action which they had not been able to rouse through public education. Some, however, participated because the hearing promised them an opportunity to present evidence and voice their misgivings about DDT without appearing to enter controversial public debate—something which the scientific community discourages. In Madison, scientists could appear without violating this canon. They would not be advocates of a cause but rather impartial experts helping the hearing examiner to reach an informed judgment. Two important witnesses came as official representatives of the Department of the Interior—Kenneth Macek, a fisheries biologist, and Lucille Stickel, pesticides research co-ordinator at Patuxent Wildlife Research Center. Neither could, nor would, have appeared as a speaker at an anti-DDT rally.

The hearing also helped the EDF recruit scientists who were not connected with the environmental movement and had not done research on DDT but whose scientific expertise was useful to prove certain points. The

format, the neutrality, and the role of expert witness allowed scientists to participate without identifying themselves with either side. For example, at one point the EDF needed competent testimony about the standards of evidence used to prove a compound safe for humans. It found Dr. Theodore Goodfriend, a pharmacologist at the University of Wisconsin School of Medicine. Goodfriend was not involved in the case against DDT; he merely testified about the general criteria used to establish safety. Yannacone asked questions; Goodfriend gave the obvious (to a pharmacologist) answers.<sup>13</sup>

Money and experts were essential to the EDF's effort, but they did not guarantee success. The environmentalists had to convince the examiner by the weight of evidence that DDT in the amounts found in the environment posed a hazard to human health or to wildlife. To do this they had to organize a coherent case and find scientists to testify on each point. When the intervenors presented evidence, the petitioners had to mount an effective rebuttal. In addition, they had to convince the public that DDT was harmful. They sought a public verdict as well as a legal one.<sup>14</sup>

THE most conspicuous figure in the hearing was Victor Yannacone, the EDF's counsel. As the man responsible for bringing out the EDF's case through direct examination of its witnesses, and for tearing down the intervenors' case through cross-examination, he was in the limelight every day, and he enjoyed it. Aggressive and flamboyant, he badgered witnesses, declaimed for the benefit of the court, and made sure that the newspaper reporters got a story each day. Yannacone was a skillful showman who kept the case before the public, but he was much more: he was an excellent lawyer. He

<sup>13</sup> Interview with Theodore Goodfriend, July 9, 1973, Madison, Wisconsin.

<sup>14</sup> The participants in the EDF effort disagree on the extent to which the organization wished to try the case in the court. Yannacone (1977) said that he wished to try the case before the public. Wurster (personal communication, December, 1976) denied that this was any part of the EDF's plan.

<sup>12</sup> Interviews with Hugh H. Iltis, June 19, 1973; Joseph J. Hickey, July 16, 1973; William Reeder, September 13, 1973. All these interviews were in Madison, Wisconsin.



had a quick mind and assimilated the essential points of an argument with a speed that surprised the scientists who were briefing him.<sup>15</sup> In court he could use arguments skillfully, either to make the environmentalists' point or to mount an attack on a hostile witness. In addition, he was committed to both the environmental cause and to a good fight. He was not daunted by the odds nor particularly bothered by the lack of precedent for environmental law. The law, he felt, had to meet social needs. If there was a social need to be met, there must be a legal way to meet it. The lawyer's job was to find the way or, if there was none, to "invent it."<sup>16</sup>

Behind the scenes Charles Wurster, one of the founders of the EDF and head of its Scientists' Advisory Committee, managed the case. He testified early in the hearing, presenting the outline of the EDF's argument. His most important contributions were outside the hearing room; though less conspicuous than Yannacone, he was equally essential. During the academic year which the hearing occupied, Wurster, a marine biologist at the State University of New York—Stony Brook, devoted all his free time to the case. He was the expert on DDT and the EDF's scientist for this project. He laid out the parts of the argument, found witnesses to testify on each, convinced them to come, and served together with Yannacone as permanent staff in Madison. It was Wurster who did the dogged detail work, solved day-to-day problems, smoothed over personal differences, and reduced friction in the coalition that carried on the fight.<sup>17</sup>

By late November, 1968, he had outlined the EDF's case and found witnesses for each part. There were five major contentions that the environmentalists wished to prove. First, that there was an ecosystem—an interrelated system of air, water, soil, and biological organisms. Second, that DDT unavoidably—because

<sup>15</sup> Speech of Charles F. Wurster to conservationists, autumn, 1968, in the board room of the Milwaukee Public Museum. Mrs. Owen Otto of Milwaukee furnished a tape recording.

<sup>16</sup> Yannacone interview (1973).

<sup>17</sup> Otto interviews; Yannacone interview (1973); Reeder interview. Reeder was one of the faculty members who assisted the Environmental Defense Fund; he organized the scientific reference service the EDF used during the hearing.



Madison Capital Times

*Victor J. Yannacone, counsel for the Environmental Defense Fund.*

of its physical and chemical properties—contaminated the entire ecosystem when released into it at any point. Third, that residues of DDT had adverse effects on wildlife. Fourth, that they were a potential hazard for humans; their safety was not established. Finally, the EDF argued that it was possible to replace DDT with safer insect controls.<sup>18</sup> In their first presentation the petitioners concentrated on proving the first three points—the existence of the ecosystem, the properties of DDT which made it dangerous, and the effects which the chemical had on sensitive wildlife species. In

<sup>18</sup> Charles F. Wurster, memo to prospective witnesses, November 22, 1968; Wurster and Yannacone (1973) interviews. The memo is from the papers of Victor Yannacone.

THE symbolic and public importance of the hearing was apparent on its first day. The crowd was so large that the first sessions were held in the chambers of the State Assembly. Local newspapers, which had paid Senator Gaylord Nelson scant attention when he had spoken in Congress against DDT, gave his testimony as the first witness banner headlines. One paper used red ink. Even the *New York Times* commented on Nelson's appearance in an editorial, "DDT on Trial."<sup>23</sup>

The EDF took care to hold public attention and to ensure that the papers presented a complete, accurate story. Victor Yannacone, in particular, was determined to try the case before the public as well as the hearing examiner. He provided interviews and information for the press; each day some interesting testimony was produced well before the Madison *Capital Times*' midday deadline. The EDF opened its strategy sessions to selected reporters, asking only that they respect confidences. Charles Wurster also talked to reporters, and the scientists checked stories and headlines for accuracy.<sup>24</sup>

The EDF began by setting forth its opponents' case, establishing "something to shoot at."<sup>25</sup> Yannacone called, adversely, the counsel in opposition to the petition, Louis McLean. After a few questions on McLean's background, primarily to establish his connection with the chemical industry, Yannacone produced an article which McLean had published in *Bioscience*, a semi-scientific, popular magazine. In it McLean had said that people who were opposed to the use of pesticides were either misinformed, cranks, or mentally unbalanced. "The anti-pesticide leader," he had written, "can almost always be identified by the numerous variant views he holds about regular foods, chlorination and fluoridation of water, vaccination, public health programs, food additives, medicine, science, and the

business community."<sup>26</sup> Yannacone asked if McLean really believed these statements. The purpose of the ploy was not simply to place the lawyer on the defensive, but to suggest that it was the defenders of DDT, not the chemical's opponents, who resorted to irrelevant arguments and personal attacks.

The environmentalists next called Ellsworth H. Fisher, professor of entomology at the University of Wisconsin-Madison and coordinator of pesticide-use education. Fisher, who appeared only under threat of subpoena, was so unco-operative that Yannacone considered having him declared a hostile witness so that he could cross-examine him. Despite Fisher's attitude, however, Yannacone established that the agencies in charge of registering pesticides relied upon manufacturers' studies of effectiveness and safety, confined their tests to studies of acute poisoning, and did not require any tests of chronic effects of pesticide residues on man and wildlife. There was no way for another agency or for the public to initiate a review of the registration of a pesticide; it had to be done by and within the U.S. Department of Agriculture.<sup>27</sup>

Two botanists from the University of Wisconsin-Madison, Hugh H. Iltis and Orie Loucks, then discussed the Wisconsin regional ecosystem, setting the stage for the EDF's first major witness, Charles Wurster, who gave an outline of the scientific argument and discussed specific examples of environmental damage. DDT, he said, possessed a combination of properties which made it uncontrollable once released into the environment. It was extremely persistent, degrading only slowly under environmental conditions. It was also mobile; applied anywhere in an ecosystem, it spread through the system. Because the chemical was soluble in fat but almost completely insoluble in water, it accumulated in the fat tissues of organisms in the contaminated environment, and natural food chains then concentrated the material. Each trophic level (plants, for example, were the lowest level)

<sup>23</sup> Gaylord Nelson in "Wisconsin DDT Hearing," 12-31; *New York Times*, December 1, 1968, IV, 10: 1; *Capital Times* (Madison, Wisconsin), December 2, 1968.

<sup>24</sup> Yannacone interview (1977); interview with Whitney Gould, *Capital Times* reporter, July 6, 1973, Madison, Wisconsin.

<sup>25</sup> Charles F. Wurster, "DDT Goes on Trial in Madison," in *Bioscience*, 19: 809 (September, 1969).

<sup>26</sup> Louis A. McLean in "Wisconsin DDT Hearing," 26-43. The article in question (Exhibit 1) was "Pesticides and the Environment," in *Bioscience*, 17: 613-617 (September, 1967).

<sup>27</sup> E. H. Fisher in "Wisconsin DDT Hearing," 107-205; interview with E. H. Fisher, April 15, 1974, Madison, Wisconsin.



accumulated the substance and passed the burden to the next level (herbivorous animals would be the second level). Species such as the Bermuda petrel, which were at the end of long or particularly contaminated food chains, might be in serious danger even though they never approached areas where DDT was used.<sup>28</sup>

McLean kept Wurster on the stand for a day and a half of cross-examination. Lacking scientific advisors, McLean had to fall back on the successful defenses which the industry had used in publicly arguing the case for DDT. He stressed the need for pesticides and the benefits derived from their use. He questioned Wurster's expertise in assessing this need and raised the argument that only those who applied the chemicals in the field were competent to discuss their effects and benefits.<sup>29</sup>

The EDF quickly attacked the distinction McLean had drawn between the "practical" entomologists and their "impractical" opponents. Robert van den Bosch, the next witness, was an entomologist from the University of California-Berkeley. He had been responsible for recommending spraying schedules and pesticides to protect California field crops for over a decade, and strongly supported the EDF's contention that DDT was harmful and that it was possible to replace it with better, safer means of control. He also reinforced the points about federal control which Yannacone had elicited in examining Fisher. The agencies funding research on DDT, he said, had largely ignored its effects on non-target species. "No ecological thought has gone [*sic*] into these materials originally. Essentially, none is going in now. And this is the basic root of the problem."<sup>30</sup>

Van den Bosch's testimony brought the petitioners more favorable publicity. One newspaper said, "Scientific Convert Warns State on DDT," another, "Ex-DDT Backer Says He Wouldn't Approve it Now." The second paper went on to quote van den Bosch's statements that entomologists had "created a monster" through DDT and that they had seized on the chemical while "totally ignorant



Photo by Gene Coffman

Professor Hugh H. Iltis, University of Wisconsin botanist.

of the genetic and ecological implications of its use."<sup>31</sup>

The EDF devoted the rest of its direct-case presentation to establishing DDT's effects upon organisms in the Wisconsin regional ecosystem. Its witnesses testified that DDT was accumulating in the ecosystem, that residues could affect various organisms, and that residues were damaging susceptible species in the wild. They provided the details which filled out Wurster's general statement and established the legal case. The scientists came from a variety of disciplines and had done several kinds of studies; indeed, the most striking feature of the case was the broad interdisciplinary effort involved.

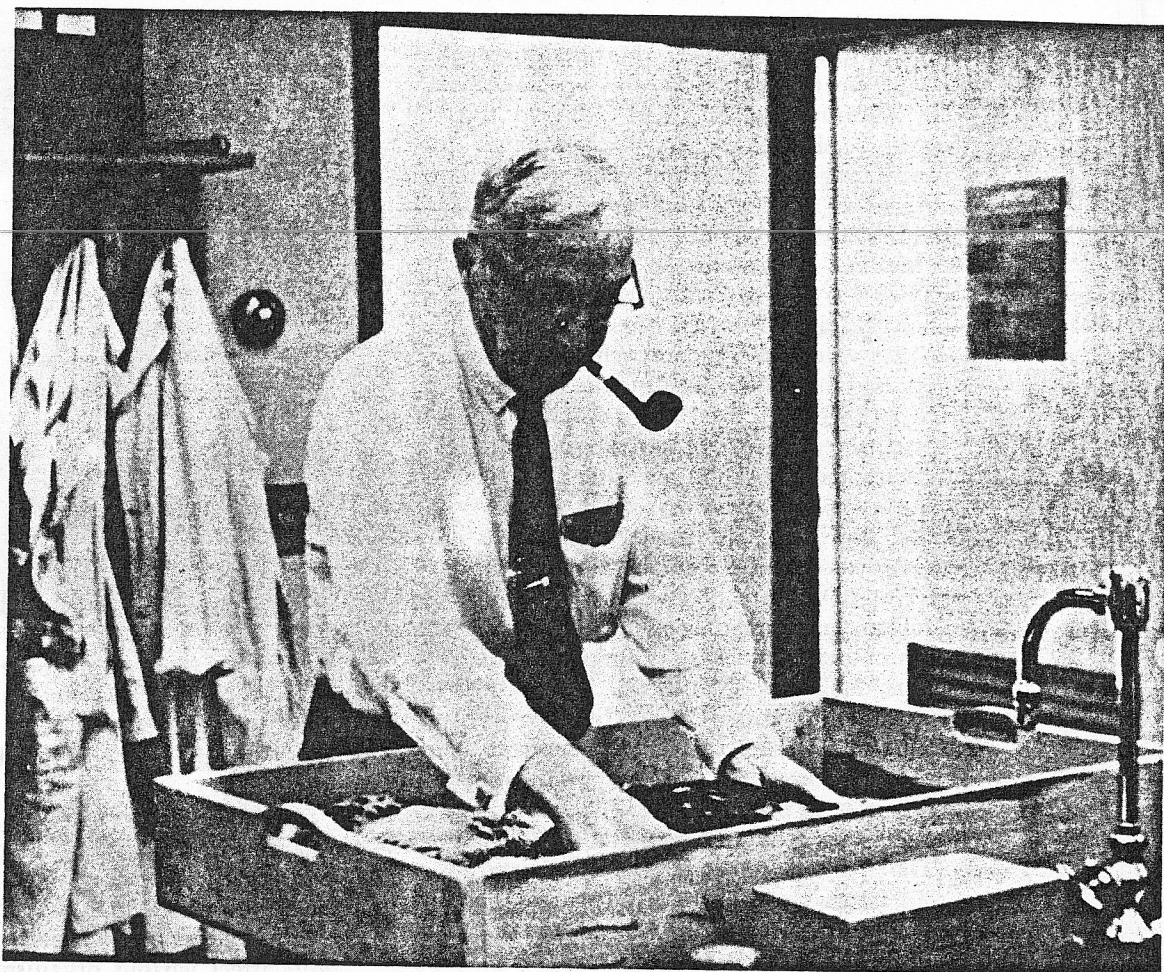
THE effects of DDT on several species of birds of prey was a particularly important part of the environmentalists' argument, one of the most telling examples they cited of the chemical's action in the ecosystem. The environmentalists believed that DDT broke down into a closely

<sup>28</sup> Hugh H. Iltis in "Wisconsin DDT Hearing," 80-107; Orie Loucks, *ibid.*, 206-219.

<sup>29</sup> Charles F. Wurster, *ibid.*, 219-588.

<sup>30</sup> Robert van den Bosch, *ibid.*, 595.

<sup>31</sup> *Milwaukee Journal*, December 7, 1968; *Capital Times*, December 6, 1968.



Courtesy Susan Nehls

*Professor Joseph J. Hickey, University of Wisconsin wildlife ecologist.*

related compound, DDE. Natural food chains concentrated this DDE, and, in predator species at the end of food chains, especially birds, the chemical reached levels high enough to upset the birds' metabolism. Changes in metabolism affected the shells of their eggs. Though none of the individual birds showed symptoms of DDT poisoning, the entire population, scientists said, suffered reproductive failure because their thin-shelled eggs broke in the nest or dehydrated before embryos could develop.<sup>32</sup>

<sup>32</sup> The culprit in this case was, the scientists asserted, the most common metabolite of DDT, namely DDE [1,1 dichloro-2,2 bis (parachlorophenyl) ethylene]. DDE stimulated the microsomal fragment of the liver to produce nonspecific hydroxylating enzymes. The high concentration of the enzymes in the bird's bloodstream

The EDF began with testimony that bioconcentration of residues was occurring in the state. It called to the stand Joseph J. Hickey, professor of wildlife management at the University of Wisconsin-Madison. Hickey testified that his studies of Lake Michigan had shown that each level in the lake's food chains had a higher concentration of DDT and its metabolites than the one below it.<sup>33</sup> Then two witnesses appeared to testify about the pharmacological effects of DDT and DDE on

lowered the concentration of steroids, including the sex steroids. Since the estrogen level controlled the mobilization of calcium for the formation of the eggshell, the result of high DDE in the diet was a thin eggshell.

<sup>33</sup> Joseph J. Hickey in "Wisconsin DDT Hearing," 622-630; Robert Risebrough, *ibid.*, 651-719.





Photo by Gordon Menzie

*Robert W. Risebrough, research ecologist in the University of California and a witness at the Wisconsin DDT hearing, is pictured examining the nest of a brown pelican atop a cliff on the California coast in March, 1969. Brown pelicans, like birds of prey and other animals at the end of food chains, suffer reproductive failures from DDT contamination.*

birds—Robert Risebrough, a molecular biologist from the University of California—Berkeley, and Richard Welch, a biochemical pharmacologist who worked for Burroughs Wellcome Laboratories.

Risebrough was a key witness. He testified about two subjects: the biochemical mechanism through which DDE was believed to act on avian reproductive systems, and the analytical work which had determined the level of DDT in animal tissues. Both were extremely important. The analytical results were needed to show the high levels of DDE found in the wild. The pharmacological work and the pharmacological explanation would account for phenomena including the thin-shelled eggs. Studies of DDE's effects on metabolism were also important in showing that the chemical's action was not confined to the central nervous system. That there were other effects cast doubt on the intervenors' contention that there was no danger to man because there were no symptoms of clinical poisoning (central nervous system effects) from environmental levels of the chemical. No one had looked for this other type of action and, as Risebrough pointed out, "there was no mechanism in the establishment of [pesticide residue] tolerance levels to consider this enzyme-induced phenomenon in people."<sup>34</sup>

After Risebrough's testimony Van Susteren adjourned the hearing for the Christmas holiday. When it resumed in January, the EDF brought to the stand Kenneth Macek, a fisheries biologist who testified about DDT's effects on brook trout, and then Welch, who reinforced Risebrough's testimony on the enzymatic effects of DDT. Welch had worked with laboratory animals and testified that the pesticide lowered hormone levels in rats. One of the hormones affected was testosterone, and Victor Yannacone, trying to impress on the public the possibility of DDT's danger to man, asked Welch if testosterone in rats was the same compound as testosterone (the male sex hormone) in humans. Welch said that it was.<sup>35</sup> The *Capital Times* headed the story "Scientist Warns of DDT Peril to Sex Life," and the *Wisconsin State Journal*, Madison's morning

paper, told its readers that "Scientist Fears DDT Can Cause Sex Change." The *New York Times* was no more restrained: "DDT Termed Peril to the Sex Organs."<sup>36</sup>

Hickey then returned to the stand to discuss his and others' observations on birds which had been affected by DDE. There had been, he said, drastic and abrupt declines in the reproductive success of several large birds of prey, including the golden eagle and the peregrine falcon, declines which had become apparent to ornithologists in the late 1950's, when eyries (nests) were abandoned. Several years of intense scientific work in both Europe and America made it clear that the culprit was DDE. "In my judgment," Hickey said, "DDE is a chemical compound of extinction."<sup>37</sup>

He recapitulated the evidence that had led ornithologists to this conclusion: the abrupt onset of the population declines immediately after the introduction of DDT, the confinement of the declines to a few species at the top of food chains, the suspicious correlation of reproductive failures with high levels of DDT in adults, eggs, and nestlings, and the discovery of the biochemical effects of DDE. The case of the peregrine falcon was particularly instructive. Populations of this species, usually quite stable, dropped abruptly in the early 1960's, and observers in both Europe and America reported widespread reproductive failure. Studies of eggshells from private and museum collections showed an abrupt and statistically significant drop in thickness and weight on both continents in 1947, and analyses showed that both birds and eggs were contaminated with DDT and DDE. The large nonbreeding population, Hickey testified, had concealed the dimensions of the reproductive failure until this surplus of birds had run low and the falcons' eyries, some of which had been occupied for hundreds of years, fell vacant.<sup>38</sup>

The testimony of Hickey, Risebrough, and Welch did not show that DDT or DDE were causing the damage; field studies established only a strong correlation between the resi-

<sup>34</sup> Risebrough, *ibid.*, 679.

<sup>35</sup> Welch's testimony established more evidence for the mechanism given in footnote 32.

<sup>36</sup> *Capital Times*, January 14, 1969; *Wisconsin State Journal* (Madison, Wisconsin), January 15, 1969; *New York Times*, January 15, 1969.

<sup>37</sup> Hickey in "Wisconsin DDT Hearing," 1212.

<sup>38</sup> *Ibid.*, 1141-1213.





Madison Capital Times

*Walter Scott of the Wisconsin Department of Natural Resources is shown with the transcript of the DDT hearing, which weighed forty pounds and ran to 4,499 pages.*

dues and the damage, while pharmacological work indicated only a mechanism by which the compound might be responsible for the problems observers had found in the wild. The witness who the hearing examiner felt

“nailed down” the connection between chlorinated hydrocarbon pesticides and thin eggshells was Lucille F. Stickel, pesticides research co-ordinator at the Patuxent Wildlife Research Center of the Department of the In-

terior.<sup>39</sup> Stickel had directed a set of feeding experiments to test the hypothesis that DDT caused reproductive failure in birds. The laboratory used kestrels (American sparrow-hawks), a species closely related to the peregrine falcon, because it was unable to raise the peregrine in captivity. It also tested two species of common waterfowl, mallard and black ducks. Test groups were fed a diet containing small concentrations of DDT, and their eggs and reproductive success compared with those of control birds on a DDT-free diet. The results, Stickel said, showed that DDT caused thin-shelled eggs and reproductive failure in at least two groups of birds.<sup>40</sup>

**B**Y January 17, when the environmentalists finished their first presentation, it was clear that the public was on their side. Early in December the Science Students' Union at the University of Wisconsin distributed a leaflet, "The People vs. DDT," and a group called the DDT Commandos marched on the capitol, carrying signs: "Ban the Bug Bomb" and "Liberate the Ecosystem." There were more serious indications. Citing the impact of public opinion, the state board of agriculture issued a statement that it was ceasing to recommend DDT for Dutch elm disease control, an action which local groups had sought for years. The results of a newspaper poll in early January showed strong interest in a ban on DDT, and in February the sponsors of a bill to ban DDT found enthusiastic support.<sup>41</sup>

"So far," one Wisconsin farmer complained in January, "the hearings had been rather dominated by a couple of anti-establishment lawyers from New York and a bearded from Berkeley."<sup>42</sup> The defenders of DDT hoped

to change that, to present a case which would convince the public and the examiner that DDT was harmless. Again, the industry's previous defense of DDT dictated its strategy and choice of witnesses. Chemical industry spokesmen contended that scientific studies had shown that DDT was safe for man, and that continuing investigation of persons exposed to high levels would reveal any chronic effects before they became serious problems. With regard to the problems of environmental contamination and effects of wildlife, the defenders argued that analytical results showing widespread contamination were mistaken and that the decline in raptor populations was due not to DDT but to other causes.

Van Susteren granted the intervenors a continuance to prepare their case after the environmentalists finished the direct presentation. When the hearings resumed in late April, 1969, the NACA immediately brought to the stand Dr. Wayland J. Hayes, Jr., professor of toxicology at Vanderbilt University and former chief of the Toxicology Section, Technical Branch, Communicable Disease Center, U.S. Public Health Service.

Hayes was a key witness; the studies done under his direction were the only extensive body of evidence on the effects of human exposure to DDT or of ingesting large doses of the chemical over an extended period. Poised, confident, and with the prestige of degrees, awards, and extensive publications, Hayes was an impressive figure as well as a scientific expert. He had frequently testified about DDT's safety record, and the NACA counted heavily on his testimony to show that the chemical was safe for man and to reassure the public that the government's scientists were watching the situation carefully.

Willard Stafford, who had taken over direc-

<sup>39</sup> The expression is Van Susteren's, used during undated interview.

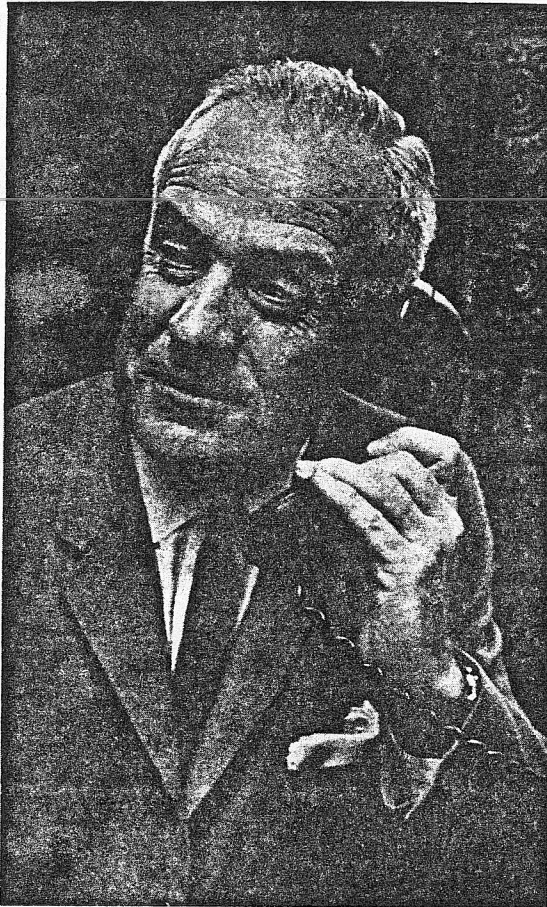
<sup>40</sup> Lucille Stickel in "Wisconsin DDT Hearing," 1221.

<sup>41</sup> Science Students' Union (University of Wisconsin-Madison), Conservation Research and Action Project, "People vs. DDT" (mimeographed sheet, undated, distributed about December 11, 1968); *Wisconsin State Journal*, December 13, 1968; *Milwaukee Journal*, December 13, 1968; *Capital Times*, January 6, 1969; Wisconsin Department of Agriculture and the University of Wisconsin, "Dutch Elm Disease Control Recommendations for 1961" (one-page, unsigned, mimeographed statement). Copies of documents from the collection of

Walter Scott. Material on bills to ban DDT in Wisconsin is from Legislative Council Staff (State of Wisconsin), "Regulation of DDT and Other Pesticides: Recent Developments in Wisconsin" (Research Bulletin 5), 3; Assembly Bill 163 (1969), introduced February 5, 1969; drafting file for Assembly Bill 163; H. Rupert Theobald, chief, Legislative Reference Bureau, to Thomas R. Dunlap, August 2, 1977. Documents on legal matters are in the files of the Legislative Reference Bureau, State Capitol, Madison, Wisconsin.

<sup>42</sup> Robert Tracy to the editor, *Janesville Daily Gazette*, January 29, 1969. The clipping is from the Walter Scott collection.





Madison Capital Times

*Willard S. Stafford of Madison, counsel for the chemical industry and its spokesmen.*

tion of the intervenors' case from McLean, put Hayes's qualifications on the record and then led him through a description of his studies about DDT's effects on man. Hayes gave the chemical a clean bill of health. He had conducted studies of workers in DDT-manufacturing plants, men with up to nineteen years exposure. Though they had much higher levels of DDT in their fat than the general population, they had no symptoms of DDT poisoning or of any pathology traceable to the chemical. Convict volunteers, fed massive doses of DDT, had concentrations in their blood fifty to one hundred times as high as most people but also showed no pathology which could be attributed to their exposure.<sup>43</sup>

<sup>43</sup> Wayland J. Hayes in "Wisconsin DDT Hearing," 1392-1397.

Stafford then questioned Hayes about the effects of environmental levels of DDT. The Food and Drug Administration, he said, had just seized ten tons of coho salmon from Lake Michigan, fish contaminated with up to nineteen parts per million of DDT. Hayes did not think that the fish represented a health hazard. He pointed out that one would have to live on such fish for nineteen years to get a dose equivalent to that received by the factory workers, and the men had shown no ill effects. What about the possible estrogenic effects of the chemical? Hayes replied that even massive doses of DDT in rats had produced only temporary effects. After leading Hayes through this survey, Stafford again asked if Hayes thought DDT was safe for the general population over a lifetime. Yes, said Hayes, it was; his studies proved it.<sup>44</sup>

**T**HE environmentalists had to rebut Hayes's testimony, particularly his sweeping conclusion that DDT was safe for the general population over a lifetime. It was not essential for their case, which rested largely on the effects of DDT upon wildlife, but it could seriously affect the larger issue. Most people would be far more concerned about DDT if they thought there was a chance that it might harm them than if it affected only wildlife. If, through Hayes's testimony, the intervenors defused the emotional issue of public health, they might leave the EDF a hollow victory—a judgment against DDT in Wisconsin but no public pressure for national action.

Yannacone's cross-examination did not attack Hayes's evidence directly, and the environmentalists did not dispute the medical studies of the effects of DDT on the test groups. Rather, they questioned the conclusion that these studies proved DDT was safe. Yannacone pointed to limitations in the work, contending that the subjects were not representative of the population and that the examinations were not adequate to ferret out all of DDT's effects. Healthy, adult males comprised the test groups; there were no old or sick people, no women or infants among the population studied. Physical examinations

<sup>44</sup> *Ibid.*, 1411-1423.



Courtesy Hugh H. Iltis

*Wisconsin DDT hearing, May 14, 1969, in the Hill Farms State Office Building, Madison. Left to right are: William Reeder, University of Wisconsin; Robert Risebrough, University of California; Robert McConnell, public intervenor; Lorrie Otto, Milwaukee; Maurice Van Susteren, public examiner; Samuel Rotrosen, president of Montrose Chemical.*

had been limited to gross neurological symptoms, the kind induced by large doses. Yannacone read aloud a long list of blood tests, asking Hayes if he had conducted them on his volunteers. Had he looked for changes in hormone levels? What about the possibility of mutagenic or enzymatic effects? Even very low levels of DDT interfered with biochemical functions in the body; had Hayes taken this into account? What about the detoxification of DDT in the liver, particularly in infants, whose liver function was not fully developed?<sup>45</sup>

Hayes had not performed such tests. Given his assumptions about the expected nature of DDT's effects in the body, and the applicable standards of industrial health (standards shared by much of the medical community), such tests were not necessary. Yannacone's

examination was designed to cast doubt on those standards by appealing to another set held by another group of medical scientists. The debate over standards, which went back to the 1920's with the first questions about pesticide residues on fruit, concerned the definitions of "effects" and the possibility of danger from exposure. Crudely put, one group believed that the burden of proof lay on those who would ban a chemical from use, that doses which did not produce clinical symptoms of poisoning were safe, and that the best way to ascertain the effects on humans was by studying groups of people exposed to higher-than-normal concentrations. The other group contended that the burden of proof of safety lay on the user, that the public should be protected as much as possible from any trace of "poisons," and that the best measure of safety was extrapolation from animal tests,

<sup>45</sup> *Ibid.*, 1450-1508.



preferably conducted on experimental groups over their lifetime.<sup>46</sup>

During the cross-examination of Wayland Hayes, Harry Hays, the director of pesticide registration in the U.S. Department of Agriculture, entered an appearance "as interests may appear" to describe the process of pesticide registration under federal law. He presented the USDA's position that it was regulating pesticides effectively. Hays, however, was a poor witness (McLean said later he was "the world's worst")—easily led, quickly flustered, and short-tempered. He made a bad impression, and under cross-examination admitted that the Department of Agriculture did not evaluate pesticides; it only reviewed the information submitted by the manufacturers. Nor did it require complete tests of a pesticide's effects. Not until 1968, he said, had the USDA asked applicants to test their products for toxicity to wildlife.<sup>47</sup>

The situation also gave Yannacone a chance to attack the USDA's procedures. The department, he said, was responsive neither to public concern nor to new scientific information. He pointed out that, in response to a lawsuit by the Environmental Defense Fund, the secretary of agriculture had claimed that his agency's procedures were not subject to judicial review. The department had also refused to show Wisconsin's Senator Gaylord Nelson the data for the registration of DDT as a pesticide. Yannacone forced Hays to admit that his department had no routine for using new scientific information to re-evaluate the registration of a pesticide already in use.

After this setback, the intervenors resumed their case. It should have constituted a coherent rebuttal to the petitioners' scientific evidence, but, lacking funds and scientific advice, the lawyers could do little more than present a succession of unrelated witnesses. Two economic entomologists and an exterminator testified about the benefits of DDT and the need to retain it (an issue outside the scope of the hearing). Two chemists, Francis Coon of the Wisconsin Alumni Research

Foundation and Paul E. Porter of the Shell Development Company, testified about the problems involved in chemical analysis for DDT residues. Coon, who had done the analyses for Hickey's studies of the Lake Michigan ecosystem, gave a confusing explanation of the problems of vapor phase chromatography, but admitted upon cross-examination that his laboratory had no difficulty identifying the traces left by DDE. Porter, questioned about the petitioners' analytical work by Waiss, the NACA's lawyer, replied that both the Wisconsin Alumni Research Foundation and Robert Risebrough had excellent reputations. Yannacone declined to cross-examine Porter; he simply thanked him for appearing to testify.<sup>48</sup>

Several other witnesses added little. Frank Chermis, who testified about eggshells, admitted under cross-examination that he was not qualified to discuss the biochemical processes of eggshell formation. William Gusey, chief wildlife specialist for the agricultural chemical division of Shell Oil Company, admitted under questioning by the examiner that he was not in research and that the papers Waiss was questioning him about were not in his field. Samuel Rotrosen, head of the Montrose Chemical Company of California, one of the last manufacturers of DDT, could contribute little to the scientific case.<sup>49</sup>

THE environmentalists did not rely entirely upon cross-examination to put their opponents on the defensive, though this was clearly their major weapon. During the intervenors' presentation the EDF also maneuvered the introduction of a surprise witness, Goran Lofroth, a Swedish scientist who had conducted a review of DDT's toxicity to humans for the Swedish National Research

<sup>46</sup> The intervenors' case begins on page 1452 of the transcript, with the witnesses beginning on the following pages: Chapman, entomologist, 1744; Bailey Pepper, entomologist, 2362; Francis B. Coon, analytical chemist, 2040; Paul E. Porter, analytical chemist, 2202. Yannacone's remark to Porter appears on page 2240.

<sup>48</sup> Chermis's testimony begins on 2198, and his admission about his experience in biochemistry is at 2199. Gusey's testimony begins on 2242; the exchange with the examiner is on 2296-2297. Rotrosen's testimony begins on 2467.

<sup>46</sup> James Whorton, *Before Silent Spring* (Princeton, 1975); Charles O. Jackson, *Food and Drug Legislation in the New Deal* (Princeton, 1970).

<sup>47</sup> Harry W. Hays in "Wisconsin DDT Hearing," 1516-1653.



Courtesy Mrs. James Watrous

*Three figures in the case against DDT, photographed in Madison in 1969: Goran Lofroth of Sweden, Charles Wurster of the Environmental Defense Fund, and Joseph D. Hassett, a professor of philosophy who assisted Victor Yannacone during the DDT hearing.*

Council. He was not, technically speaking, a witness for the petitioners at all. The Wisconsin public intervenor brought him in and Lofroth entered an appearance "as interests may appear." Wurster had found Lofroth, and the EDF had asked the public intervenor, Robert McConnell, to sponsor him, since it could not introduce a witness into the intervenors' presentation. Stafford objected vigorously, on the ground that the arrangements were a ruse. Yannacone, however, piously claimed the Lofroth was not the EDF's witness. Public Examiner Van Susteren decided that the scientist should be heard, but he allowed Stafford to cross-examine him as if he were an EDF witness.

Lofroth spoke about a sensitive subject—children—and provided the most dramatic testimony of the hearing, attracting more publicity than any other witness. Babies, he testified, were getting up to twice the daily maximum "safe" dose of DDT from their mothers' milk, concentrations within the range in which laboratory animals had shown effects. There was evidence that current levels were high enough to cause biochemical reactions and there was, he said, no way to predict the

consequences. More important, there was "no significant scientific evidence that DDT compound is safe for man with present exposure levels."<sup>50</sup>

The intervenors failed to damage the EDF's environmental argument, which left the petitioners free to devote the redirect case to developing selected topics and to educating the public further. They stressed two points—that DDT was a toxic chemical whose safety to man was not established, and that the chemical could easily and economically be replaced by other methods of control. The first witness was George J. Wallace, an ornithologist who had conducted extensive studies of birds poisoned by DDT. Then the EDF brought in Allan B. Steinbach, a research associate in biophysics and physiology at the Albert Einstein College of Medicine of Yeshiva University in New York. Steinbach testified about his work on the effects of DDT on nerve tissue. He had found no threshold level—that is, a concentration below which DDT did not show any effect on the nerve—nor was the damage he

<sup>50</sup> Lofroth in "Wisconsin DDT Hearing," 1976.



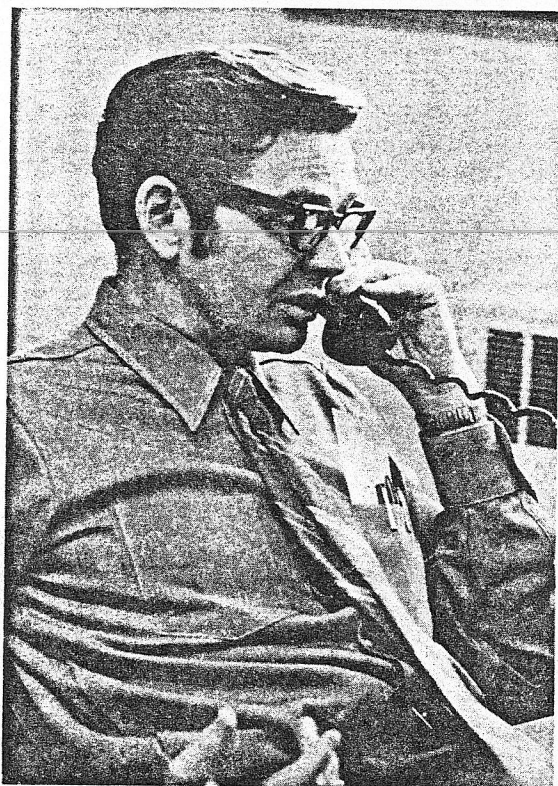


Photo by Gene Coffman

Professor Orié L. Loucks, University of Wisconsin botanist.

found reversible within the time period of the experiment (six hours). Yannacone then recalled Wayland J. Hayes for more questioning about his work, especially his conclusion that DDT was safe. The session concluded with the testimony of Dr. Theodore Goodfriend, a pharmacologist at the University of Wisconsin School of Medicine. Goodfriend said he did not think that DDT was "absolutely safe," citing various cases which raised doubts in his mind.<sup>51</sup>

The environmentalists also attacked the contention that DDT and other persistent pesticides were irreplaceable. Robert van den Bosch, who had used DDT for years and now opposed it, had already testified. Now the EDF brought in two other practicing economic entomologists. Both Paul DeBach and Donald Chant had wide experience with integrated controls—the use of a variety of methods, including chemicals as necessary—to keep down pest populations, and both had impressive professional credentials. They agreed that

persistent pesticides were not necessary and in some cases were actual hindrances to effective natural control.<sup>52</sup>

Orié Loucks, a biologist who had earlier testified about the Wisconsin regional ecosystem, ended the petitioners' presentation with a description of a systems analysis model of DDT's movement through the ecosystem. By this time it was obvious that the Environmental Defense Fund would not have to wait for a decision from the examiner and a state ban in Wisconsin in order to begin a national campaign against DDT. In April, just as the intervenors began their defense of DDT, Michigan was taking action to ban it. When the FDA condemned several tons of Lake Michigan coho salmon as unfit for human consumption, state officials feared the end of Michigan's lucrative sport and commercial fisheries and quickly initiated legal steps to ban DDT and to review the use of other persistent pesticides.<sup>53</sup> As the hearing ended in May, the Wisconsin Assembly was debating a bill to ban DDT, and other states were considering similar measures. Events had moved more quickly than the EDF had dared to hope they would, and, by the time Van Susteren decided in their favor a year later, the EDF and other environmental and conservation groups had already begun suits against the Department of Agriculture seeking to halt the use of DDT throughout the country.<sup>54</sup>

**I**T is evident that the EDF was in accord with public opinion; even

<sup>51</sup> Steinbach in "Wisconsin DDT Hearing," 2251-2599; Goodfriend, *ibid.*, 2665-2695. Further examination of Hayes appears on 2623-2664.

<sup>52</sup> DeBach, *ibid.*, 2695-2721; Chant, *ibid.*, 2722-2742.

<sup>53</sup> *Battle Creek Enquirer and News*, April 12, 1969; *State Journal* (Lansing, Michigan), April 17, 1969; Hal Higdon, "Obituary for DDT [in Michigan]," in *New York Times Magazine*, July 6, 1969, p. 6.

<sup>54</sup> *New York Times*, November 1, 1969, 30:6; November 13, 1969, 1:8; November 21, 1969, 1:14; January 8, 1970, 14:6; February 3, 1970, 53:2; December 30, 1969, 14:1; March 10, 1970, 42:3; May 5, 1970, 40:3; May 29, 1970, 8:3; June 1, 1970, 20:3; June 18, 1970, 35:1; June 30, 1970, 1:5; November 21, 1970, 18:3; January 8, 1971, 1:5; January 16, 1971, 59:3; March 19, 1971, 1:6; October 26, 1971, 28:1; June 15, 1972, 1:8. See also Environmental Protection Agency, *DDT: A Review of Scientific and Economic Aspects of the Decision to Ban Its Use as a Pesticide* (Washington, D.C., 1975).



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*Bald eagle returning to its eyrie, Peninsula State Park, Door County.*

the defenders of DDT admitted that the public battle had been lost. The hearing helped to stimulate and focus public attention, and arouse political interest. The most important immediate effect of the Wisconsin hearing, however, was on the Environmental Defense

Fund itself. In November, 1968, the EDF had been struggling to meet immediate expenses and carry on a few actions. (The members' standard joke was that they were really the Fundless Environmental Defenders.) By May, 1969, national publicity from the hearing had



brought in enough funds to cover the cost of the operation, and conservation groups from all over the country had requested the EDF's help. It could now sift cases, looking for important issues for which there were both evidence and financial support. The Ford Foundation and the Audubon Society's Rachel Carson Fund provided an assured income, and by 1970 the EDF, with a greatly enlarged staff, was involved in some eighty actions throughout the country.<sup>55</sup>

The growth of the EDF and of similar groups, as well as the popularity of environmental litigation, were due at least in part to the advantages of legal action over public education as a means of rallying public opinion, informing the public, and getting results. The EDF first showed most of these advantages in the Madison hearing. The most obvious benefit of a quasi-judicial proceeding was cross-examination, which allowed the environmentalists to question their opponents. Victor Yannacone put it very simply: "Only in a courtroom can bureaucratic hogwash be tested in the crucible of cross-examination."<sup>56</sup> With the backing of Charles Wurster and of various outside scientists, and with the volunteer help of both students and faculty at the University of Wisconsin-Madison, Yannacone kept the crucible hot.

The drama provided by the format was another advantage, making it much easier for the environmentalists to get and hold public attention. The Wisconsin hearing gave both structure and coherence to the issue; the case developed gradually over a period of days. Also, unlike other forums for debate, this one had an outcome: someone won, someone lost. The possibility of "beating" the defenders of DDT attracted support from environmental-

ists and conservationists, the stakes attracted the public, and the dramatic possibilities of the situation, which Yannacone skillfully exploited, held their attention.

The adversary procedure before an impartial arbiter also allowed the environmentalists certain advantages. They could define the issue—in this case the effects of DDT residues in the environment—and limit the witnesses. Those who came to testify had to be qualified to speak on the problem; each had to subject his scientific credentials to scrutiny. Each witness had also to confine himself to the issue at hand (though both sides occasionally strayed). Finally, the hearing placed the issue before someone not professionally involved in the field whose livelihood and reputation did not rest with any of the contending interests, and who, unlike officials of the regulatory agencies, did not deal with these issues on a continuing basis. There was the possibility of having an ignorant arbiter, but the environmentalists obviously felt that this was less dangerous than placing their case in the hands of the regulatory agencies.<sup>57</sup>

Following the Wisconsin hearing, other groups took to the courts to defend the environment, and for a time it seemed that environmental litigation would be a cure-all for environmental ills. This has not happened. Court decisions have limited standing, particularly in class-action suits; judges are reluctant to delve deeply into complicated issues of scientific expertise; and the high cost of litigation has discouraged environmentalists, particularly in cases where the environmental benefits of action are diffuse and the costs to the advocates who must bear them are immediate and crushing. Even the Environmental Defense Fund has increasingly sought to work out problems without resorting to legal action. Environmental law will continue to grow as human action impinges with greater force on natural ecosystems, but the place of environmental defenders using litigation is still uncertain.

<sup>55</sup> Carter, "Environmental Law (I)"; Environmental Defense Fund, "Brief Description of Cases in Which EDF Has Taken Action and Is Considering" (mimeographed, seven-page memo, undated, Environmental Defense Fund). Internal evidence dates it to summer or fall of 1970; a copy is in the papers of Victor Yannacone.

<sup>56</sup> Quoted in Frank Graham, Jr., "Taking Polluters to Court," in *New Republic*, 158: 8-9 (January 13, 1968).

<sup>57</sup> Joseph Sax, *Defending the Environment* (New York, 1971).