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An Element of Controversy

The Life of Chlorine in Science, Medicine, Technology and War

Edited by Hasok Chang and Catherine Jackson

from research by undergraduate students at
University College London

British Society for the History of Science

2007

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The Noisy Reception of *Silent Spring**

Kimm Groshong

1. The content and context of *Silent Spring*

The publication of Rachel Carson's *Silent Spring* in 1962 was a momentous event. It was initially published as a series of articles in *The New Yorker*, and shortly afterwards in book form. Within a year Carson had become a household name, and her book a best-seller.¹ *Silent Spring*'s impact has been lasting, and it is often considered one of the most influential books of the mid-20th century. It was a key text in the development of the environmental movement, and contributed greatly to the increasing awareness of the problems associated with technology. Carson used the example of the deleterious effects of DDT (dichloro-diphenyl-trichloroethane) to argue that the public should demand more investigation into the long-term effects of pesticides. Her purpose was to inform the general public about the disruption of nature resulting from an indiscriminate use of pesticides and herbicides, specifically chlorinated hydrocarbons, including DDT, and organic phosphorus insecticides. In this essay, I examine the various responses to *Silent Spring* in order to discover the attitude of Americans to environmental issues in 1962 and the fluctuations in the authority of science. My analysis is based on a study of materials found in the Rachel Carson archive at Yale University,

* Groshong (2002) is a more extended version of this essay.

¹ *Silent Spring* made it on best-seller lists in newspapers from around the U.S., including the *Chicago Sun–Times* (21 October 1962), the *New York Post* (4 November 1962), and the *Michigan Free Press–Detroit* (9 December 1962). Numerous best-seller lists featuring *Silent Spring* can be found in files 1283–1287 (Boxes 72 and 73) of the Rachel Carson Papers, Yale Collection of American Literature, Beinecke Rare Book and Manuscript Library, Yale University (henceforth “Rachel Carson Papers”). All of the sources cited in this chapter, except for those listed in the bibliography at the end, have been found in the Rachel Carson Papers.

Hasok Chang and Catherine Jackson, eds., *An Element of Controversy: The Life of Chlorine in Science, Medicine, Technology and War* (*British Society for the History of Science*, 2007).

as well as a survey of various secondary sources and a close reading of *Silent Spring* itself.

The first chapter of *Silent Spring*, which attracted much of the criticism, was called “A Fable for Tomorrow”. It was a short narrative chapter in which Carson depicted an imaginary town that changed from one in which “all life seemed to live in harmony with its surroundings”, to one under “a shadow of death”.² The town was ruined by pesticides: “No witchcraft, no enemy action had silenced the rebirth of new life in this stricken world. The people had done it themselves”.³ In the following chapter, Carson laid out the problem of increasing use of chemical pesticides:

It is not my contention that chemical insecticides must never be used. I do contend that we have put poisonous and biologically potent chemicals indiscriminately into the hands of persons largely or wholly ignorant of their potentials for harm. We have subjected enormous numbers of people to contact with these poisons, without their consent and often without their knowledge. If the Bill of Rights contains no guarantee that a citizen shall be secure against lethal poisons distributed by private individuals or by public officials, it is surely only because our forefathers, despite their considerable wisdom and foresight, could conceive of no such problem.

I contend, furthermore, that we have allowed these chemicals to be used with little or no advance investigation of their effect on soil, water, wildlife, and man himself. Future generations are unlikely to condone our lack of prudent concern for the integrity of the natural world that supports all life.⁴

In later chapters, Carson described the various pesticides and herbicides being used in America at the time, giving technical information about their chemical composition and known effects on humans and the environment, including the problem of gradual accumulation of pesticides in the food chain and the emergence of pesticide resistance. She also identified the extent to which these chemicals were being dispersed: “For the first time in the history of the world, every human being is now subjected to contact with dangerous chemicals, from the moment of conception until death.”⁵ Carson made a powerful case for biological

² Carson [1962] (1994), pp. 1–2.

³ *Ibid.*, p. 3.

⁴ *Ibid.*, pp. 11–12.

⁵ *Ibid.*, p. 15.

control as a desirable alternative to pesticide use. She reiterated and summarized her views in a “CBS Reports” television show shortly after the publication of *Silent Spring*:

The balance of nature is built of a series of interrelationships between living things, and between living things and their environment. You can't just step in with some brute force and change one thing without changing a good many others. Now this doesn't mean, of course, that we must never interfere, that we must not attempt to tilt the balance of nature in our favour. But when we do make this attempt, we must know what we're doing, we must know the consequences.⁶

Ideas such as the “balance of nature”, bioaccumulation, and taking care of the environment are widely accepted today, but they were new to the majority of those people who made *Silent Spring* a best-seller in 1962. Peter Warshall suggests that until the 1960s ecological concerns were largely restricted to the elite upper classes in America.⁷ Carson's literary talent sparked interest amongst the general public. Her biographer Linda Lear argues that by the time of Carson's death in 1964:

she had set in motion a course of events which would result in banning the domestic production of DDT by 1972 and create a grassroots movement to ensure the protection of the environment through state and federal regulation. Most importantly, Carson's writing and her courageous witness helped transform the relationship between humans and the natural world and led to an awakening of public environmental consciousness.⁸

Rachel Carson (1907–1964) was not the first person to write about the abuse of the natural environment through the use of pesticides, but the earlier works were mainly written for specialist audiences. As early as 1945, the American Association of Economic Entomologists published a statement describing the “misunderstanding, over-optimism and distorted

⁶ “CBS Reports: The Silent Spring of Rachel Carson”, transcript of broadcast over the CBS Television Network, Wednesday, 3 April 1963, 7:30–8:30 p.m. E.S.T., p. 30. See also Gartner (1983), p. 107.

⁷ Peter Warshall, “A Whole Earth View of the Environmental Movement”, Global Business Network, March 2001, http://www.gbn.org/public/gbstory/articles/ex_wholeearth.htm, p. 1 (last accessed in December 2001).

⁸ Linda Lear, “Rachel Carson and the Awakening of Environmental Consciousness”, *Wilderness and American Identity*, <http://www.nhc.rtpnc.us:8080/tserve/nattrans/ntwilderness/essays/Carson.htm>, part 1 (last accessed on 12 June 2007).

impressions” about DDT.⁹ This statement alleged that the large-scale use of DDT would not only kill beneficial insects along with the harmful ones, but also “might create problems which do not now exist”.¹⁰ As Carol Gartner notes, by the early 1960s “glimmers of concern” were developing as “promotion of pesticides by industry and the United States Department of Agriculture increased”.¹¹ Carson’s *Silent Spring* provided the first comprehensive statement of the pesticide problem in plain terms for a large number of readers. In doing so, she galvanized the fledgling environmental movement into action.

Carson’s ability to write this scientifically provocative yet popular book was the result of her unusual training. An early, avid reader, she entered Pennsylvania College for Women in Pittsburgh (now Chatham College) as an English major. Her professor Mary Scott Skinker recognized Carson’s unusual curiosity and combination of analytical and creative abilities. She encouraged Carson to change her major to biology and, after graduation, Carson followed Skinker to Johns Hopkins University, where she received her doctorate in zoology in 1932.¹² Carson’s employment at the U.S. Bureau of Fisheries provided ample opportunities for “someone who knew marine biology and who also could write”.¹³ She combined the knowledge of a scientist, including the laboratory experience to understand technical procedures, and the literary talent that scientists often lack. In 1937 the editor of the prestigious *Atlantic* magazine, Edward Weeks, accepted her essay “The World of Waters” for publication with a compliment for “the findings of science you have illuminated in such a way as to fire the imagination of the layman”.¹⁴ Her first book, *Under the Sea-Wind* was published in 1941, followed by *The Sea Around Us* in 1951 and *The Edge of the Sea* in 1955. In these books, she developed her ability to present coherent summaries of large amounts of scientific material in a form that would be pleasing to the non-scientist. This would prove crucial to the success of *Silent Spring*.

⁹ Such impressions would have been encouraged by the earlier U.S. Chemical Warfare Service propaganda campaign on the peacetime use of toxic gases, which we have briefly described in Chapter 9, Section 4.

¹⁰ Quoted in Brooks (1972), p. 230.

¹¹ Gartner (1983), p. 21.

¹² Lear (1997), p. 74.

¹³ Rachel Carson, “The Real World Around Us”. See also Lear (1997), p. 78.

¹⁴ Edward Weeks to Rachel Carson, 8 July 1937. See also Lear (1997), pp. 86–87.

2. Responses to *Silent Spring*

The response to *Silent Spring* was quite polarized. The fan mail Carson received immediately following the book's publication was very appreciative. On the other hand, *Silent Spring* was also singled out as being "unscientific", "alarmist", and "hysterical" by people in certain sectors, including both the chemical industry and some U.S. government agencies. These interests, who fought *Silent Spring* when it was published, were aware that much more was at stake than a ban on DDT. They were trying to prevent an alteration in the way people thought about the role played by humans in the environment and the extent to which they understood how they affected everything around them. They did not want people to inquire into the delicate balance of nature. Looking at the responses to *Silent Spring*, we find that despite the negativity that emerged from interested scientists and members of the agro-chemical industry and its trade associations, the general public, disinterested scientists, and much of the popular press embraced the book.

2.1. Negative responses

Immediately following the initial serial publication of *Silent Spring* in the *New Yorker* magazine (beginning June 16, 1962), the pesticide industry in particular, and the agricultural and chemical industries in general, launched an extensive campaign against it, with the help of powerful governmental agencies such as the U.S. Department of Agriculture. Fearing a wave of dissatisfaction and decreased support for pesticide usage, the chemical industries spent hundreds of thousands of dollars on their attack. At the same time, the trade association, the National Agricultural Chemicals Association (NACA), spent over a quarter of a million dollars publishing a great number of pamphlets and newsletters explaining the necessity of pesticides, "to improve the image of the industry".¹⁵ In an attempt to stop the publication of *Silent Spring* in the form of a book, representatives from the Velsicol Corporation of Chicago, one of the leading insecticide manufacturers at the time, approached the Houghton Mifflin Company in August 1962. They threatened to sue if the "inaccurate and disparaging statements" about two

¹⁵ Brooks (1972), p. 295.

of their products¹⁶ were published as they had appeared in the *New Yorker* articles. Since fact-checking carried out by an independent toxicologist showed Carson's statements to be true, the publishers left them as they were and called Velsicol's bluff. No suit was ever filed.¹⁷

Examination of the primary sources shows that the chemical industry treated the dispute over Carson and her book as a public relations problem more than as a scientific argument. A meeting of the Manufacturing Chemists' Association, Inc., held on 8 May 1962, discussed Carson's *New Yorker* articles:

The Association has the matter under serious consideration, and a meeting of the *Public Relations Committee* has been scheduled on August 10 to discuss measures which should be taken to *bring the matter back to proper perspective in the eyes of the public*. An Association program is being evolved, to be handled as a cooperative venture with other interested industry groups . . .¹⁸

Carson was not surprised by this partisan response. As early as 1958, she had anticipated the storm that would follow the publication of her book. In a letter to her friend Dorothy Freeman, Carson wrote: "I know you dread the unpleasantness that will inevitably be associated with its publication But it is something I have taken into account; it will not surprise me!"¹⁹ A flood of brochures, pamphlets, newsletters, reviews, and various other commentaries came pouring out from the chemical and agricultural industries and their affiliates, beginning in the summer of 1962.

The anti-Carson campaign "to bring the matter back to proper perspective in the eyes of the public" included some recurring elements. In one of her few public acknowledgments of these critiques, Rachel Carson laid out what she saw as the structure of industry's attack on her work:

One obvious way to try to weaken a cause is to discredit the person who champions it. So — the masters of invective and insinuation have been busy: I am a "bird lover — a cat lover — a fish lover," a priestess

¹⁶ These were heptachlor (3-chlorochlordene) and chlordane (1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindane).

¹⁷ Graham (1970), p. 47.

¹⁸ M. F. Crass, "MINUTES of the one hundred eighteenth meeting of the Directors of the Manufacturing Chemists' Association, Inc., held at the Union Club, New York City, on May 8 1962, at 11:00 a.m. p. 816", emphases added.

¹⁹ Rachel Carson to Dorothy Freeman, 28 June 1958, in Freeman (1995), p. 259.

of nature, a devotee of a mystical cult having to do with laws of the universe which my critics consider themselves immune to. Another well-known, and much used, device is to misrepresent my position and attack the things I have never said Another piece in the pattern of attack largely ignores *Silent Spring* and concentrates on what I suppose would be called the soft sell — the soothing reassurances to the public.²⁰

I follow Carson in distinguishing different tactics employed by the critics of *Silent Spring*. The first category of attacks sought to discredit Carson as a researcher. This covers all portrayals of her as a “non-scientist”, a “hysterical woman”, a “fanatical naturalist”, a “science-fictionalist”, and other such descriptors. Critics also frequently grouped her with radical conservationists. The editor of the trade periodical *Chemical and Engineering News* wrote an article immediately following the publication of the *New Yorker* articles. The article quoted comments from the Director of New Jersey’s Department of Agriculture on those campaigning to put a hold on the gypsy-moth aerial spraying programme:

In any large scale pest control program in this area, we are immediately confronted with the objection of a vociferous, misinformed group of nature-balancing, organic-gardening, bird-loving, unreasonable citizenry that has not been convinced of the important place of agricultural chemicals in our economy.²¹

Carson could be derided as part of this “unreasonable citizenry”, if not in fact its leader. According to P. Rothberg, President of Montrose Chemical Corporation of California, Carson was “a fanatic defender of the cult of the balance of nature”.²²

A different category of attacks involved the use of parody. Monsanto Chemical Company, one of the leaders in DDT manufacture in the U.S., published an essay entitled “The Desolate Year” in their magazine in October 1962, when *Silent Spring* was the selection of the Book-of-the-Month Club. Although it did not name Carson or her book, the essay mimicked her style of writing and told of the atrocities the world would suffer during “an extremely lively spring” resulting from the absence of chemical pesticides:

²⁰ Rachel Carson, speech to the Women’s National Press Club, 5 December 1962. See also Brooks (1972), p. 303.

²¹ *Chemical and Engineering News*, 2 July 1962, quoted in Brooks (1972), p. 295.

²² John M. Lee, “‘Silent Spring’ is now noisy summer”, *The New York Times*, 22 July 1962, p. 11.

So went sweet corn, for that year hardly an ear from corner to corner of the nation brimmed with just its own sweet juice. If its stalk and ear escaped the harsh attack of the borers, along came the earworm, hatching from eggs that a brown-gray moth slipped into the receptive silks alongside the life-giving pollen. Her worm-children ate and defecated and ate more, working from the tender small kernels down into the large firm ones.

At the end of its narrative section, the article read:

The terrible thing about the 'desolate year' is this: Its events are not built of fantasy. They are true. All of them, fortunately, did not take place in a single year, because so far man has been able to prevent such a thing. But all the major events of the 'desolate year' have actually occurred. They have occurred in the United States. They could repeat themselves next year in greatly magnified form simply by removing the country's chemical weapons against pests.²³

The article continued by offering sixteen examples of the dangers insects presented to modern society, accompanied by startling statistics, such as: "Insects take a \$500,000,000 annual toll on food and fiber storage and transit, even with controls used now." In conclusion, the article presented nine quotations from academic, industrial and governmental organizations focusing on the benefits of pesticide usage and suggesting that problems resulted from misuse and not from routine use, even on a very large scale.

An editorial from the *American Agriculturalist* included a similar parody, in which a grandfather sits on a log with his grandson eating acorns, explaining that a book called *Quiet Summer* had brought a return to natural living that resulted in famine, malaria, blight and the death of his parents.²⁴ Publications like these were attempts by interested parties to spread the idea that Carson advocated a complete ban on the use of pesticides. This allowed them to admit the problems with pesticides while highlighting the mess in which humans would soon find themselves without chemical pesticides. This widespread strategy was not based on an accurate reading of Carson's views. In chapter two of *Silent Spring*, Carson explained very clearly:

All this is not to say there is no insect problem and no need of control. I am saying, rather, that control must be geared into realities, not to

²³ "The Desolate Year", *Monsanto Magazine*, October 1962.

²⁴ Brooks (1972), p. 295.

mythical situations, and that the methods employed must be such that they do not destroy us along with the insects.²⁵

Other critics portrayed Carson's writing talent as introducing scientific error into her work. They highlighted the literary skill she had displayed in her previous works in order to "disparage her science, or express fear that literary brilliance will blind readers to what these critics consider logical or scientific flaws".²⁶ "A Fable for Tomorrow" attracted particular criticism. According to Lear, "The fable was almost uniformly derided by reviewers unable to understand its basis in allegory".²⁷ Two other common accusations were associated with this focus on the literary qualities of *Silent Spring*, typified by this excerpt from a September 1962 review in *The Cincinnati Enquirer*:

Miss Carson, a marine biologist, seems to have abandoned scientific disinterest and objectivity. Carried to their emotional conclusion, her arguments lead to a virtual abandonment of pesticides to save nature from the ravages of man. And man is dehumanized into giant chemical firms grasping profits at the expense of helpless and harmless insects, birds, squirrels, bunnies and other cute, cuddly forest creatures.²⁸

These arguments, that Carson's writing was overwhelmingly sentimental and not backed up by scientific findings, appear in some form in almost every negative publication about *Silent Spring*. Examples are too numerous to list exhaustively, but a small sample will give an idea of the variety of newspapers, magazines, and other publications that printed very similar statements across the U.S. and overseas. Even Carson's obituary in *Time* magazine contained fragments of these arguments:

Despite her scientific training, she rejected facts that weakened her case, while using almost any material, regardless of authenticity, that seemed to support her thesis. Her critics, who included many eminent scientists, objected that the book's exaggerations and emotional tone played on the vague fears of city dwellers, the bulk of the U.S. population, who have little contact with uncontrolled nature and do not know how unpleasantly hostile it generally is.²⁹

²⁵ Carson [1962] (1994), p. 26.

²⁶ Gartner (1983), p. 102.

²⁷ Lear (1997), p. 430.

²⁸ Jack Smith, "Could Be Year's Most Noted Book", *The Cincinnati Enquirer*, 29 September 1962, p. 10.

²⁹ *Time*, 24 March 1964, p. 43.

In the United Kingdom, an article by Ieuan Thomas, the Director of the Ministry of Agriculture's Infestation Control Laboratory, entitled "An emotional book", read:

The biologist who has worked in this field for many years is left with the feeling that had this book been written more objectively, it would have met a real need and would have narrowed rather than widened the gap between scientist and layman. There is a very real danger that the general public, knowing this book to be written by a biologist, will accept it as a genuine scientific version of this problem. This it certainly is not and was probably never intended to be. In a highly emotional and over-emphatic way *Silent Spring* will draw the attention of the public to acute problems that biologists and chemists have been striving, and with considerable success, to solve for two decades or more.³⁰

Similar arguments appeared in articles in various media such as the *Birmingham (Alabama) News*, *Nutrition Reviews*, and the *American Chemical Society Publications*.³¹ In the summer of 1963 a critical review appeared in the journal *Perspectives in Biology and Medicine*. The author of this review, Dr. William B. Bean of the State University of Iowa, considered Carson's book unbalanced "banner-waving": "The importance of *Silent Spring* thus does not derive from its scientific accuracy, of which it has little enough, or even from its lively style".³² In another article, published in the *Archives of Internal Medicine*, Bean went further: "as science, [*Silent Spring*] is so much hogwash . . . I was made curious again and again by her disregard of the rubrics of evidence, . . . for scientific validity, or of any feeling that what she presented should be unbiased".³³ Writing in a similar if milder vein, William Vogt's review for *Natural History* accused Carson of being "all too vulnerable to attack because of a tendency to exaggerate and an occasional, uncritical acceptance of data".³⁴

³⁰ Ieuan Thomas, "Silent Spring", March 1963, p. 105.

³¹ J. F. Rothermel, "Rachel Carson's 'Silent Spring' Is Too Emotional", *Birmingham, Alabama News*, 21 October 1962; Frederick J. Stare, "Some Comments on 'Silent Spring'", *Nutrition Reviews*, January 1963; and William J. Darby, "A Scientist Looks at 'Silent Spring'", *American Chemical Society Publications*, 1962.

³² William B. Bean, *Perspectives in Biology and Medicine*, vol. 6, no. 4 (Summer 1963), pp. 531–534.

³³ Quoted in Graham (1970), p. 55.

³⁴ William Vogt, "On Man the Destroyer", *Natural History* (January 1963), pp. 3–5.

According to these writers, Carson's conclusions were invalid because she was inaccurate in her description of scientific data, and biased in selecting the data she reported. James Westman, Chairman of the Department of Wildlife Conservation at the College of Agriculture at Rutgers University, associated "Carson's propensity for unwarranted conclusions" with "what seems to be a mystical attachment to the 'balance of nature' myth", and accused her of neglecting "the significance of mankind's expanding population or the dramatic eruptions of other animal species".³⁵ Gordon Tullock was similarly critical of what he perceived to be Carson's unbalanced approach:

Her book is replete with examples of the damage which she believes to have been caused by various programs for the extermination of agricultural parasites. There is only one paragraph where the fact that these programs increase agricultural output is discussed To solve difficult problems we need accurate information and serious thought. Dr. Carson's new book provides neither; it is, instead, an obscurantist appeal to the emotions.³⁶

Another "well-known and much used device" in the attack on Carson was to misrepresent the content of her arguments, and criticize her for things she never said. The NACA was quick to produce a thirteen-page pamphlet entitled "Fact and Fancy", distributed in August 1962. The pamphlet listed Carson's "allegations" alongside refuting "facts" established by the chemical industries. The formulation of these "allegations" exhibited a typical biased reading of *Silent Spring*. As for the "facts", they originated from sources including Frederick J. Stare, author of one of the critical reviews described above, and George C. Decker, one of the most outspoken opponents of *Silent Spring*, a scientist who had been an advisor on insect control to the U.S. Department of Agriculture and a consultant to chemical companies. All the reports and individuals cited in the pamphlet had close industry associations, and many of the "facts" were one-sided. For example, one "fact" stated: "Despite the use of billions of pounds of pesticides on millions of acres of cropland, damage to wildlife has been relatively insignificant and in the

³⁵ James Westman, *News and Views from the Bureau of Conservation and Environmental Science*, no. 1 (November 1962).

³⁶ Gordon Tullock, "Of Mites and Men", *National Review*, 20 November 1962, pp. 398-399.

vast majority of cases undetectable.”³⁷ The findings presented by Carson in *Silent Spring* were not taken into consideration.

The final “fact” in this pamphlet listed for the public exactly which were the interested parties in this debate:

The U.S. Department of Agriculture, the U.S. Public Health Service, the National Safety Council’s Farm Division, the National Agricultural Chemicals Association, and individual companies which make pesticide chemicals are continually warning users of the nature of pesticide chemicals and cautioning them to read the label for specific warnings and cautions.³⁸

The education of the general public was an important objective of such publications. Another NACA pamphlet published in the same year read:

Because the general public has little knowledge or understanding of the creation, use and benefits of chemicals in the production and protection of our food and fiber and their resulting quality and abundance; and because lack of knowledge and understanding breeds questions, doubts, and outright attacks on chemicals, we submit for your information and files, data and information based on scientific fact which we believe will be useful to you when the role of agricultural chemicals in the world today is under discussion.³⁹

Yet another strategy of attack was what Carson called “soft-sell”. As exemplified by Monsanto’s parody article discussed above, the strategy was not to mention Carson or *Silent Spring* by name, but simply to highlight the benefits that chemical pesticides bring to the world and to point out errors in the opinions of their opponents. In September 1962 the Velsicol Chemical Corporation, which had tried to prevent the publication of *Silent Spring* by challenging the veracity of its content, produced its own pamphlet called *The Necessity, Value and Safety of Pesticides*. As usual with such “soft-sell” publications, Carson was not named and her work not cited, but the target of the pamphlet was clear:

Throughout the centuries, however, the superstitious and the impractical, giving voice to their desires to escape from reality, have repeatedly misasserted a benevolence in nature and have stated that man’s efforts to bend nature to better serve man are themselves evil.⁴⁰

³⁷ National Agricultural Chemicals Association, *Fact and Fancy* (August 1962), p. 3

³⁸ *Ibid.*, p. 13.

³⁹ National Agricultural Chemicals Association (1962).

⁴⁰ Louis A. McLean, *The Necessity, Value and Safety of Pesticides* (1962).

The nineteen-page pamphlet went on to quote statistics and opinions that supported the industry side of the argument. For example:

Insects annually kill and curtail more than 15.6 billion board feet of saw lumber in our forests and 2.8 billion cubic feet of other timber. This and the smaller losses of cover caused by fire each account for substantially greater losses of wildlife habitats than the small amount of incidental damage caused by pesticides.⁴¹

At no stage did the pamphlet discuss the possible long-term effects of pesticide use, one of the issues that most concerned Carson.

These negative arguments against *Silent Spring* were extremely pervasive, traces of them appearing even in some of the book's most positive reviews. A review entitled, "Upsetting Balance of Nature: Poisoning Ourselves" contained a deluge of praise for Carson and her book, yet right at its heart, the review accused her of inevitable bias:

Miss Carson documents her denunciations almost to the point where her readers become dizzy. Her evidence, including a bountiful list of source material, appears to be overwhelming. Of course, in this kind of a book, the crusader takes pains to present only her side of the argument. Coupled with that, she writes extremely well. It is doubtful if anyone could do a better job of describing some of the biochemical effects of such toxic substances as DDT, chlordane, parathion, malathion and arsenic.⁴²

Such infiltration of the negative message disseminated by industry and government agencies brought it to a much wider readership and led to its propagation in popular publications.

2.2. Positive responses

Despite the onslaught of critical reviews of *Silent Spring*, the general public's reaction was resoundingly positive. This enthusiastic endorsement of her work was completely unexpected by Carson: "The tremendous response that has come in letters to me and to the *New Yorker* editor has been beyond all expectations and seems to indicate a strong desire on the part of the public to bring about some improvement in the

⁴¹ Ibid., p. 13.

⁴² Graham Berry, "Upsetting the Balance of Nature: Poisoning Ourselves", *Independent Star-News*, 23 September 1962.

situation.”⁴³ Here is an example of the letters Carson received from her readers:

Dear Miss Carson

I have a city boy's attraction to nature: this is, ignorant and un-discriminating, but reverential. And I must say thank you for the brilliant beginning of your series in *The New Yorker*. Not since I read *The Sea Around Us* years ago have I breathed so deep indoors.

I'm sure that you have been told many times that you are a poet as well as a scientist, but I wanted to say it to you myself. You are a poet not only because you use words so well, but because by describing non-human life without pathetic fallacies you make us readers understand our place on earth so much better. As I drive home along the Hudson tonight I'll feel more human for having read your lovely, loving words today. I know, too, that your great quiet eloquence will open many eyes and close many bottles.⁴⁴

Generally speaking, the reviews of *Silent Spring* in the popular press were similarly congratulatory. In sharp contrast to the criticisms described in the previous section, hundreds of articles across the U.S. and abroad pointed out the merits of Carson's argument and expression. Examining these articles together, it becomes apparent that there were three common emphases among the positive reviews.

First, although Rachel Carson's name was usually associated with poetical accounts of the sea, these reviewers recognized that the aim of her new book was not to mesmerize the reader with allegory and description. They argued that *Silent Spring* was a serious account of a vital issue and was written in an appealing yet objective manner. The inclusion of this argument was especially common after the publication of attacks that used Carson's literary talents as evidence for the unscientific nature of her book. It seems that reviewers in the general press were not convinced by those arguments. On the contrary, Harry Hansen of the *Chicago Tribune* appreciated Carson's "deliberation" and her ability to state "a startling fact unsensationally". Hers was "an example of the still, small voice that carries a long way".⁴⁵ *The Memphis Commercial Appeal* also appreciated the book's sober tone: "This is no mouthing by a

⁴³ Rachel Carson to Paul Knight, 10 July 1962.

⁴⁴ Charles Simmons to Rachel Carson, 18 June 1962, quoted in Brooks (1972).

⁴⁵ Harry Hansen, *Chicago Tribune*, 30 September 1962.

Johnny-come-lately self-styled Cassandra. Rather, it is a series of serious questions about our effort to control the natural world about us.”⁴⁶ When *Silent Spring* was chosen as Book of the Month for October 1962, William O. Douglas wrote: “The alarming story is calmly told, with no theatrics and in a sober, factual way.”⁴⁷ Paul B. Sears, Professor Emeritus of Conservation at Yale University, compared Carson’s language with that used in the legal profession: “The result, over and above, her usual clarity of structure and presentation, is a brief of which any attorney might well be proud. If anything can convince the court of public opinion, this should do so.”⁴⁸

A second, related vein of commentary frequently made reference to the scientific basis of Carson’s book, noting its accuracy and thorough documentation. Sometimes this took the form of reference to the extensive research and correspondence with scientists which Carson relied on for the development of the book. *The Sunday Times–Advertiser* of Trenton, New Jersey, carried an article of this type in October 1962:

Now, Miss Carson is a scientist and is not given to tossing charges around carelessly. She is a marine biologist, the gifted author of “The Sea Around Us” and other books distinguished for their scientific accuracy as well as their literary grace. When she warns us, as she does with such a profound sense of urgency, that there are grave dangers to human beings in the free use we make of chemicals in our eternal war on weeds and insect pests, we ought to take heed.

Her book is based on four and a half years’ research. She is careful to document her case with page after page of scientific data, with an extraordinarily long list of sources and with case histories that argue her point.⁴⁹

These accounts accentuated Carson’s training as a biologist. Some scientists wrote positive reviews of *Silent Spring*, indicating that Carson’s work presented information with a sound scientific basis. The chemist Mike Baker wrote in *The Alembic*:

Miss Carson is not a faddist, she is not an anti-science “nut”. She is not a mere professional writer looking for a sensational topic which she

⁴⁶ *The Memphis Commercial Appeal*, 10 September 1962.

⁴⁷ William O. Douglas, *The Book-of-the-Month Club News*, September 1962.

⁴⁸ Quoted in Gartner (1983), p. 106.

⁴⁹ V. A. B., “Shocking Book”, *Sunday Times–Advertiser* (Trenton, New Jersey), 21 October 1962.

could parlay into a “best-seller.” She is instead a biologist, retired from government service, technically competent and qualified to discuss such matters as are discussed in *Silent Spring*. That she feels regulation . . . is needed to guard against misuse of chemical insecticides is a logical result of her training and of her experience. I found nothing I could disbelieve, little with which I could not agree in her review of how man uses and abuses chemicals as pesticides.⁵⁰

The third emphasis in positive reviews of *Silent Spring* was on the service it was providing by alerting the public in the much-overlooked problem of human environmental impact. By provoking horror in its readers, the book was startling them into action. Such articles argued that if *Silent Spring* achieved nothing else, it at least made people think a bit about their natural surroundings. The Nobel Prize-winning geneticist Herman Muller emphasized what would happen if Carson’s warning were not taken seriously. His review in the *New York Herald Tribune* described her work as “a smashing indictment . . . of the chemical mass-warfare that is being waged today indiscriminately against noxious insects, weeds, and fungi”. Muller continued:

It is therefore urgently necessary for the case against the continuance of these practices in their present indiscriminate form to be understood as promptly and by as wide a public as possible . . . Perhaps the most important service to be rendered by Miss Carson’s book will consist in the enlightenment it brings the public regarding the high complexity and interrelatedness of the web of life in which we have our being.⁵¹

As with the negative responses, most positive reviews presented a combination of these approaches. Loren Eiseley synthesized all three in the *Saturday Review*:

It is a devastating, heavily documented, relentless attack upon human carelessness, greed, and irresponsibility . . . All of these facts Rachel Carson has set forth sensibly in the quiet, rational prose for which she is so famous. If her present book does not possess the beauty of *The Sea Around Us*, it is because she has courageously chosen, at the height of her powers, to educate us upon a sad, an unpleasant, an unbeautiful topic, and one of our own making. *Silent Spring* should be read by every American who does not want it to be the epitaph of a world not very far beyond us in time.⁵²

⁵⁰ Mike Baker, *The Alembic* (Trenton, New Jersey), 29 September 1962.

⁵¹ Herman J. Muller, *New York Herald Tribune*, 23 September 1962.

⁵² Loren Eiseley, *Saturday Review*, 23 September 1962.

3. Explaining the noisy reception

It is clear that lay readers, scientists, and government officials alike were intensely interested in the topic discussed in *Silent Spring*. The impact of Carson's work has been variously attributed to her writing talent and established reputation, the situation regarding pesticide use, the power of Houghton Mifflin's advertising, the public perception of industry's response as overkill, and an increasing public awareness of environmental problems.⁵³ Yet, even taking all these factors into account, it remains unclear why Carson's work was such a huge success while other similar works failed to interest a large readership.

Ralph Lutts's contention is that one of the most significant reasons for the public acceptance of *Silent Spring*'s message was that, by 1962, people had been living in fear of nuclear fallout for a decade. Lutts notes in support of his argument that the radioactive isotope and long-lasting component of nuclear fallout, strontium-90, was the first pollutant mentioned by Carson in *Silent Spring*:

Just as Strontium-90 could travel great distances, enter the food chain and accumulate in human tissue, so too could pesticides. Just as radioactive materials may produce chronic rather than acute poisoning, so too with pesticides. And just as exposure to radiation may produce cancer, birth defects and mutations, so might pesticides. The public already knew the basic concepts — all it needed was a little reminding.⁵⁴

Since the American public was already familiar with strontium-90 from discussions of nuclear holocaust, it served as a useful analogy for persistent chemical pesticides.

Carson's description in "A Fable for Tomorrow" of white dust falling from the sky like snow followed by large numbers of plant and animal deaths was also designed to remind readers of nuclear fallout. As Lutts explains, an early draft drew attention to the dust that fell on the crew of the *Lucky Dragon*, a Japanese tuna boat that had found itself near the Bikini Atoll during the atomic bomb tests in 1946. The crew did not realize they were in danger, so did nothing as white powder containing strontium-90 fell on them. All became very ill for several months and one crewmember died. The fish they brought back and sold to the public were

⁵³ See Lutts (1985), p. 212, for this analysis.

⁵⁴ *Ibid.*, p. 222.

contaminated with radioactivity. Once this was discovered, Japanese fish consumption declined and the price of fish collapsed. These events had been covered in the U.S. media and Carson clearly expected her readers to be familiar with the story. She used both direct and indirect analogies between pesticide pollution and nuclear fallout frequently in *Silent Spring*. Direct analogies included the following:

We are rightly appalled by the genetic effects of radiation; how then, can we be indifferent to the same effect in chemicals that we disseminate widely in our environment?⁵⁵

The pollution entering our waterways comes from many sources: radioactive wastes from reactors, laboratories, and hospitals; fallout from nuclear explosions; domestic wastes from cities and towns; chemical wastes from factories. To these is added a new kind of fallout — the chemical sprays applied to croplands and gardens, forests and fields. Many of the chemical agents in this alarming melange imitate and augment the harmful effects of radiation . . .⁵⁶

The new environmental health problems are multiple — created by radiation in all its forms, born of the never-ending stream of chemicals of which pesticides are a part . . .⁵⁷

Carson used indirect analogy in her argument that the presence of chemicals “casts a shadow that is no less ominous because it is formless and obscure, no less frightening because it is simply impossible to predict the effects of lifetime exposure to chemical and physical agents that are not part of the biological experience of man.”⁵⁸

A more recent article by Craig Waddell also presents cogent arguments for the inadequacy of standard explanations of Carson’s success. For example, he points out the much more limited impact of other books including Murray Bookchin’s *Our Synthetic Environment*, Theron G. Randolph’s *Human Ecology and Susceptibility to the Chemical Environment*, and Robert Rudd’s *Pesticides and the Living Landscape*, all of which dealt with similar topics and were published around the same time as *Silent Spring*. He also uses the less-than-impressive sales of Carson’s first book, *Under the Sea Wind*, to refute the suggestion that literary ability was solely responsible for her success. Waddell began his study

⁵⁵ Carson [1962] (1994), pp. 36–37.

⁵⁶ *Ibid.*, p. 39.

⁵⁷ *Ibid.*, p. 188.

⁵⁸ *Ibid.*

believing that Carson's rhetorical strategy and the apocalyptic quality of her writing might be sufficient to explain her success. After studying Carson's archival papers, he was forced to conclude that "no one factor — either within or outside the text — can adequately explain the success of *Silent Spring*".⁵⁹

I think Waddell is correct to suggest that analysis of the public reception of *Silent Spring* "must consider not only multiple factors within the text but also the influence of other texts and of the historical context".⁶⁰ There is one major contributing factor that has been overlooked, namely the shifts in the public's view of science and scientists. In the period up to the early 1960s, science in America was viewed as a purely objective pursuit by both philosophers of science and the general public. In addition, science was viewed as a panacea that would answer all the world's problems. It was thought of as a value-free endeavour, unaffected by the personal goals of researchers. The scientist was seen as a superior individual, doing the kind of work that most people could not understand. Public funding of science continued to increase after the Second World War, during which the government-funded Manhattan Project had developed the atomic bomb. In his 1945 report *Science, the Endless Frontier*, Vannevar Bush, Director of the Office of Scientific Research and Development, famously promoted this view of science and scientists. He explained the benefits that science could produce, adding that "the flow of new scientific knowledge must be both continuous and substantial" in order to create a secure, safe, and prosperous future for America and the American people.⁶¹

This attitude was reflected in newspaper articles on scientific topics from the 1950s and early 1960s. Science was treated with awe, and little acknowledgement was made of possible adverse social consequences it might have. Just as a small illustration, take John Finney's 1959 article in *The New York Times* about a new nuclear engine, which mentioned none of its possible drawbacks. The article was intended to dazzle its readers, impressing them with the engine's technical capabilities. Finney simply described the new "Ramjet", which was being developed for the U.S. Air Force, as being able to "propel a missile around the world at supersonic

⁵⁹ Waddell (2000), p.11.

⁶⁰ Ibid., p. 12.

⁶¹ Vannevar Bush, quoted in Sarewitz (1996), p. 17.

speeds”.⁶² Dorothy Nelkin has commented on the dangers of this kind of idealized public perception of scientists and the work they do: “Far from enhancing public understanding, such media images create a distance between scientists and the public.”⁶³ The general public, persuaded to believe in the miraculous capabilities of science, trusted scientists to deal with the ethical consequences of their actions. To make matters worse, it was only a small group of experts who shaped policy decision on scientific questions.

By the early 1960s, people were becoming increasingly ill-at-ease with the authority of science. It is interesting to note that perhaps the most decisive academic event that would shake the common image of science also took place in 1962: the publication of *The Structure of Scientific Revolutions* by Thomas Kuhn. In this new context *Silent Spring* was able to arouse public concern despite the best efforts of government and industry to rebut its arguments. That these interested parties so frequently chose to attack Carson’s scientific credibility confirms the prominent position accorded to science and scientists up to that time: by belittling her science they hoped to diminish her authority. Carson herself was keen to make the public aware of the growing and frequently hidden power of the government–industrial complex:

We see scientific societies acknowledging as “sustaining associates” a dozen or more giants of a related industry. When the scientific organization speaks, whose voice do we hear — that of science? Or of the sustaining industry? It might be a less serious situation if this voice were always clearly identified, but the public assumes it is hearing the voice of science.⁶⁴

The public’s increasing willingness to challenge the authority of the scientific establishment took place in the context of more general challenges to authority, such as the Civil Rights movement.⁶⁵ It was also fuelled by a growing awareness that scientists and policy-makers were fallible human beings acting in particular social settings. In *Silent Spring*, Carson highlighted exactly this theme:

⁶² John W. Finney, “Air Force Orders a Nuclear Engine”, *The New York Times*, 21 September 1959.

⁶³ Nelkin (1987), pp. 14–15.

⁶⁴ Rachel Carson, Speech to the 1962 Women’s National Press Club, quoted in Graham (1970), p. 170.

⁶⁵ See the discussion of a similar point in Chapter 10, Sections 3 and 4.

Who has made the decision that sets in motion . . . this ever-widening wave of death that spreads out, like ripples when a pebble is dropped into a small pond? Who has placed in one pan of the scales the leaves that might have been eaten by the beetles and in the other the pitiful heaps of many-hued feathers, the lifeless remains of the birds that fell before the unselective bludgeon of insecticidal poisons? Who has decided — who has the right to decide — for the countless legions of people who were not consulted that the supreme value is a world without insects, even though it be also a sterile world ungraced by the curving wing of a bird in flight? The decision is that of the authoritarian temporarily entrusted with power; he has made it during a moment of inattention by millions to whom beauty and the ordered world of nature still have a meaning that is deep and imperative.⁶⁶

By writing her book as a wake-up call, urging her readers to think about who provided information and why, Carson used the public's growing questioning of all kinds of authority to her advantage. She looked at science, scientists and the science–industry–government complex with a critical eye, examining the validity of their claims and recommendations. She shook the public out of complacency and helped permanently to alter its view of the authority of science.

4. Conclusion

Rachel Carson was well-equipped for the task of writing *Silent Spring*. Her writing was fluid and captivating for a wide audience and this, combined with evidence from her research and professional correspondence, resulted in an influential and society-transforming book. Placing her book in context within both the development of the environmental movement in America and the growth of the agro-chemical industry is crucial to understanding the bifurcated response to *Silent Spring*. With increased public awareness of such chemically related disasters as the failure of the gypsy-moth eradication program, the tragedy of the thalidomide birth-defects, and the mounting fear of nuclear fallout, the public was quite prepared to learn the startling facts Carson offered.

The American chemical industry, riding high after the Second World War, feared a change in public opinion of the industry as well as new federal regulations on the production, distribution, and utilization of their chemicals. Indeed, since *Silent Spring*'s publication, new federal

⁶⁶ Carson [1962] (1994), p. 127.

regulations on chemical manufacturing have caused companies to spend large amounts of money on clean-up and regulatory processes. Industrial chemists and those governmental agencies concerned with helping the chemical and agricultural industries had good reason, then, to attack Rachel Carson and her book. Failing to find character defects in Carson, and generally unable to find errors in her work, publications distributed by these groups resorted to unsubstantiated claims of scientific inaccuracy or bias, condemnations of emotionality in her work, and attention on the positive impact of their own products.

Those supporting *Silent Spring*, including many scientists as well as naturalists and conservationists along with the majority of reviewers for the general press, rebutted these claims. Carson's research process, as described not only in her letters, but also by first-hand observers, was extensive and thorough, spanning a period of over four years. She was objective, serious, and meticulous in her use of data. My own experience of working through some of Carson's research files at the Beinecke Library, looking at what she wrote in *Silent Spring*, and comparing it to the original sources, only confirms this view. Her sources were reliable and appropriate. The information she conveyed was both important and controversial. There was a sound basis to the profound influence exerted by *Silent Spring* on a wide variety of readers, from experts in the field to lay readers who were previously unaware of the idea of the balance of nature.

Yet the question remains: why was the response to *Silent Spring* so strong? I tend to agree with Craig Waddell that a variety of causes must be taken into account when considering this response. Among these, the public's increasing willingness to question authority, and particularly the authority of science and scientists, seems to me an important and previously neglected factor. In addition, I suggest that many of those who criticized *Silent Spring* were enraged by Carson's attempt to alert the public to the extent to which power was vested in the growing science–industry–government complex.⁶⁷ The bifurcated and vehement response to *Silent Spring* was therefore a natural consequence of the context into which the book was published. Although the alarm that Carson sounded did not result in a complete overturning of scientific and political

⁶⁷ In Chapter 10, Sections 3 and 4, we saw a slightly later manifestation of resistance against this power by outside scientists.

authority, public attitudes towards science have certainly not been the same since the publication of *Silent Spring* forty-five years ago.

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