Rachel Carson's *Silent Spring*

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Rachel Carson was an improbable revolutionary, even an unlikely reformer, yet she challenged industrial empires, exposed a scientific establishment that cherished its elitism, and accused the government of being irresponsible. She consciously questioned the dominant system of institutional arrangements and the culture's unequivocal devotion to technological progress. Her crusade renewed the political power of homeowners and housewives. Most important, her message fundamentally altered the way Americans, indeed citizens of the planet, look upon the living environment.

By the eloquence of her prose and rigor of her synthesis, Rachel Carson educated the public and made the life sciences a vehicle for understanding complex technology. *Silent Spring*, published thirty years ago, alerted the world to the invisible dangers of environmental poisoning. She intended to alarm and hoped to encourage change, but she did not anticipate becoming a public figure or inspiring a cultural revolution.

An intensely private person, reserved rather than shy, Carson had the fortitude and perseverance of a strong Scotch-Irish, Presbyterian heritage. She grew up in Springdale, Pennsylvania, a dreary town north and east of Pittsburgh which never became much more than a bedroom community for the West Penn Power Company. A much elder sister and brother were out of the tiny Carson home by the time Rachel was in elementary school. Her mother, Maria McLean, was the most important influence on her intellect and outlook.[1]

Carson's early aptitude for writing was remarkable. She won several awards for stories published in juvenile literary magazines and liked to say that she had been a professional writer since the age of eleven. Her mother directed her out of school time to nature and to the natural life of the family farm and countryside. The Carson homestead was set into the hills overlooking a particularly beautiful curve of the Allegheny River. There mother and daughter walked in the woods, wetlands, and river flats. They named plants and insects, watched birds, and collected leaves, seeds, and berries. They discussed the changes brought by the seasons and talked about the cycles and webs of the natural world.

The Carson family fortunes were always precarious. Maria taught piano lessons while Robert Carson tried several careers without notable success or financial stability. They were particularly penurious in 1925 when Rachel, propelled by her mother's insistence that she should have a college education, entered Pennsylvania College for Women. Mrs. Carson selected a roommate for Rachel from a Presbyterian farm family in nearby Washington County and sent her daughter forth to become a writer.[2]

Carson's college years were distinguished by her financial insecurity, her solitude, her scholarship, and her remarkable decision at the end of her sophomore year to change her major from English to biology. Once set upon her course, Carson's drive and determination propelled her to take greater risks. She was one of only three upper-class biology majors and found friendship for the first time with those like-minded young women. Her perfectionism and dedication were often ridiculed by classmates jealous of the esteem with which the faculty regarded her. She accumulated academic honors upon graduation in 1929 and was rewarded with a summer fellowship at Woods Hole Marine Biological Laboratory. There she saw the sea for the first time. Her academic success also earned her a small fellowship to Johns Hopkins University where she completed an MA in Zoology in 1932 while teaching part-time there and at the nearby University of Maryland in College Park.[3] Although she completed two courses

toward her doctorate, and had won a small fellowship, continued graduate education was beyond Carson's grasp; a luxury she could not afford during the depression.

When Robert Carson died suddenly in 1935 Rachel, known as "Ray" to her friends, became the family breadwinner. She was fortunate to find a part-time job with the Bureau of Fisheries, then part of the Department of Commerce. Her supervisor, biologist Elmer Higgins, put her to work writing radio scripts for a series on marine life called "Romance under the Water." The following year, scoring higher than anyone else in the civil service examination, Carson entered the federal service as a junior aquatic biologist at a salary of $2000 a year. Higgins recognized Carson's literary abilities and asked her to write an introduction to a series of pamphlets on sea creatures. Rachel's dream of combining writing and scientific study was fulfilled first by her government job.

For the next sixteen years Rachel Carson was a successful employee of the Fish and Wildlife Service, moving up the Department of the Interior bureaucracy to become Editor-in-Chief of all service publications in 1949. With the exception of a brief stint in public information immediately after the war, Carson was content in her federal career. She was temperamentally suited to the certain routine of government and she found congenial colleagues with whom she enjoyed social occasions. Her early years in this supportive environment were formative ones. Not only was her writing encouraged, but her emotional and intellectual connection with nature was given both outlet and framework.

Her only complaint was that there was not enough time after work in her crowded household for her own writing. But dogged persistence paid off when the introduction she had written for Higgins was published in the *Atlantic Monthly* in September 1937 and received critical notice and a book contract. After several more years of midnight writing, she expanded it into her first, and perhaps best natural history of the ocean, *Under the Sea-Wind*, which appeared in November 1941.

It took another decade of moon-lighting to produce a second book. This time there was no world war to distract reviewers or the public. With the help of a savvy literary agent, *The Sea Around Us* was serialized in *The New Yorker* magazine and became an instant publishing bonanza, catapulting Rachel Carson to international fame and to some measure of financial security. It was chosen as a Book-of-the-Month Club selection and remained on the *New York Times* best-seller list for a record number of months.

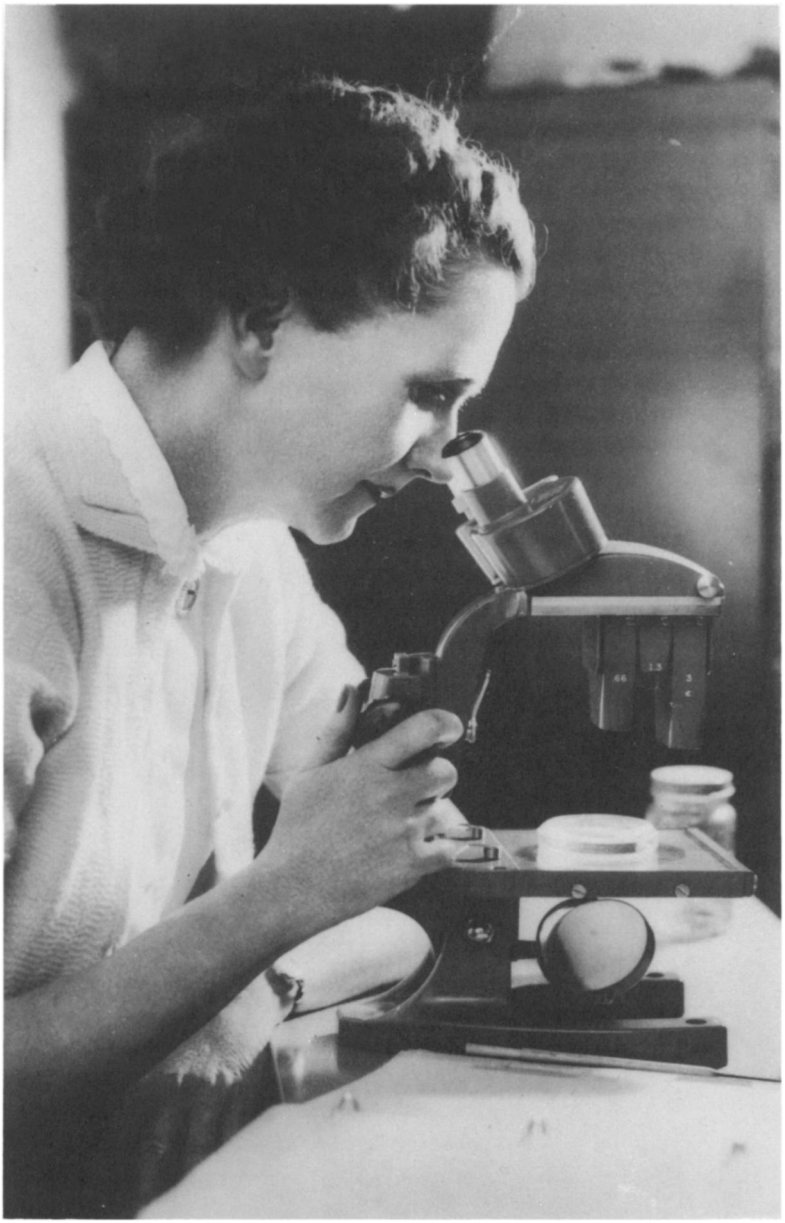

Figure 1: Rachel Carson at the time *The Sea Around Us* was published.

(Photo courtesy of Collection of American Literature, Beinecke Rare Book and Manuscript Library, Yale University.)

Carson used some of her new income to buy property on the Maine seacoast and to retire from the Fish and Wildlife Service in 1952. *The Edge of the Sea* followed quickly in 1955, completing the "sea's biography" and making Carson one of the worlds' most beloved writers of science and natural history.

The completion of *The Edge of the Sea* allowed Carson to turn to other projects. One was a study of clouds for the "Omnibus" television series, and the other an article for *Women's Home Companion* on how to explore nature with children. She fretted over an unfulfilled contract for a book on evolution for the prestigious Harper science series. There was, she thought, a need for a book on how life evolves and how mutations were induced and transmitted. "The implications of the current furore [sic.] about the effect of radio-active fallout" she told her agent, "were not understood by the general public."[4] She dabbled with the idea of an anthology of nature writing. As it turned out, she never began either project.[5]

Instead outside forces compelled Carson to examine her own values, particularly her scientific and spiritual understanding of the place of humanity in nature. Haltingly at first, but with a building sense of urgency she investigated an issue which had disturbed her years earlier. As a young biologist at the Fish and Wildlife Service she had been alarmed by the increasing misuse of synthetic pesticides. Her research led to an unexpected confrontation between a biologist concerned with preserving the life systems of the planet and the little known implications of scientific and technological progress. *Silent Spring*, the product of this reflection, can be read on many levels, but at its essence it is the expression of Rachel Carson's outrage at humankind's crude tampering with the physical world which she had always thought inviolate. Her critique of the culture that condoned such roughshod carelessness very deliberately attacked the institutions and power structure supporting that technology. The force of her moral convictions as well as her scientific evidence initiated an avalanche of changes.

Silent Spring indicted the chemical industry, the government, and agribusiness for indiscriminately using pesticides. Her claims seemed fantastic, but if proven, unthinkably frightening. "For the first time in the history of the world," she wrote, "every human being is now subjected to contact with dangerous chemicals, from the moment of conception until death."[6] The book was an overnight sensation. It alarmed the public and was accused of gross distortions. *Time Magazine* charged the book of "oversimplifications and downright errors," calling it an "emotional and inaccurate outburst."[7]

There are very few books that can be said to have changed the course of history, but this was one of them. It polarized government, science, and industry, and made people stop in their tracks and see the world in a new way. With its publication, "ecology" became part of everyday vocabulary. Amid the clamor of what the *New York Times* called the "noisy summer" of 1962, supporters and opponents alike wondered where this powerful critique had come from, and what had possessed gentle poet-naturalist Rachel Carson to take on such a distasteful cause?

For Carson, like many scientists of her generation, the atomic bomb forever changed the way she perceived the living world. "Only within the moment of time represented by the present century has one species-man-acquired significant power to alter the nature of his world."[8] The technology that produced the atomic bomb gave humans the illusion of power. Now they had the ability to unleash forces which eventually would outrun their control.

This nightmare vision drove Carson to endure the five harrowing years that it took to complete *Silent Spring*. Although public readiness to hear her message was a complex of this and other scientific fears over fallout, the pesticide contaminated cranberries in 1959, and the terrible infant deformities produced by thalidomide, the bomb threatened Carson's personal scientific and spiritual understanding of the relationship between humans and the natural world as did nothing else. Her concern over the effects of the misuse of pesticides flowed from a deep discomfort with the unintended ends of science and technology. Her alarm was both for humankind's hubris and nature's integrity.

Throughout the postwar period Rachel Carson was on the periphery of the public and private debate over the application of pesticides in agriculture and their extensive use in a variety of government extermination programs. Several federal agencies were active in pesticide research and development. The specific culture of the scientists, particularly the entomologists in those agencies, and the perceived mission of the agency were critical variables in establishing the goals of this new technology.[9]

The Public Health Service, the Food and Drug Administration, and the Department of Agriculture (USDA) were primarily concerned with adverse impacts in human populations while the Fish and Wildlife Service (FWS) of the Department of the Interior was focused on non-human populations. These orientations were critical in understanding the political and public responses of these bureaucracies. Both USDA and FWS maintained research facilities in suburban Washington where

DDT and other synthetic pesticides were tested: the Agricultural Research Service (ARS) in Beltsville, Maryland, and the Patuxent Wildlife Research Center in nearby Patuxent. Of the two research facilities, the USDA's ARS had more money and greater political leverage because farmers were its primary constituency.

Even so there were significant divisions between ARS research entomologists and those economic entomologists more exclusively concerned with pest control. FWS research was also divided between predator control efforts vital to western ranchers and farmers and wildlife conservation and preservation activities, which were supported by a more diverse constituency with less political muscle. Wildlife biology was a relatively new science but after the war the service pioneered studies to evaluate the effects of directly ingested pesticides and of pen spraying on mortality, reproduction, and genetic mutation. Led by outstanding wildlife scientists like Assistant Director Clarence Cottam, Elmer Higgins, James DeWitt, and John George, FWS scientists were often the only government researchers who were skeptical of the claim that synthetic pesticides were harmless. Ecological understanding was central to wildlife research but peripheral to the "new" economic entomology.[10]

While all this research was underway at FWS, Rachel Carson had been working her way up the bureaucratic ladder of the *one* agency in the government, which by the mid-1950s, had a long standing record of concern about the widespread use of synthetic pesticides.[11] As a government employee, Carson had observed that the debates about pesticide toxicity were carried on internally and rarely reached the public. She read the field reports and the papers of the Patuxent scientists. She was part of a unique research culture within the government that prided itself on its vigilant protection of wildlife and was outspoken in its skepticism of pesticides.[12]

Carson was also active as a private naturalist. She served on the Board of Directors of the Audubon Naturalist Society of the Central Atlantic States, a well-regarded voice in defense of wildlife, and took an active part in society meetings and activities. Society members included some of Washington's best known scientists, many of whom were employed by the federal government. As a naturalist with broad interests, Carson was also familiar with those post-war critics like William Vogt and Fairfield Osborn, who for different reasons deplored the outcome of humanity's hasty efforts to modify nature. She was also familiar with the early work of W.C. Hueper of the National Cancer Institute and Malcolm Hargraves of the Mayo Clinic, who both raised concerns about cellular and molecular changes caused

by chemical exposure. Throughout the post-war years Carson's activities led her to questions concerning the wisdom of the increasing use of synthetic pesticides.[13]

When *Silent Spring* appeared in the summer of 1962, Rachel Carson was indebted to a generation of critics and scientists who had prepared the public mind to listen to what she had to say. She quite consciously drew upon the public's decade of experience with nuclear fallout, and transferred that understanding to the similar behavior of synthetic pesticides. Forever altering what might have remained a quiet, academic discussion among scientists in their professional journals, Carson intentionally moved the issue into the noisy classroom of public debate.[14]

The hindsight of thirty years reveals that the power of *Silent Spring* came only partly from the timeliness of its cultural critique. By 1962 Rachel Carson enjoyed an international reputation. She was the most highly regarded marine biologist writing for the general public. She had the unique combination of scientific expertise and public trust to take on such a controversial subject. One of the finest writers in the English language of her day, she combined a poet's voice with a scientist's dispassion.

Ralph Nader attributes Carson's power to her ability to describe "as perhaps nobody has since, the aesthetic dimensions of the scientific crisis."[15] Carson's editor, friend, and literary biographer Paul Brooks credits the force of her "fundamental attitude toward life, which came through most clearly when her deepest beliefs were at stake."[16] Even these qualities might not have combined to alter the course of history if Rachel Carson had not also been a brilliant educator in the classic sense. Her scientific training, her literary talent, her compassion, and her authoritative and familiar voice informed *Silent Spring* with a burning intensity. Her aim was to inspire the public to save what she understood was central to all life. It was this voice which set Carson apart from other critics who wrote about environmental pollution and initiated a revolution in our thinking about the natural world.

Carson's power as a public educator is all the more impressive considering how marginalized she was in 1962. She had no Ph.D., nor was she engaged in original research. She had no institutional affiliation or support and most damning of all, she was a female scientist who wrote for the public.[17] Of all these impediments, gender was used to undermine her most, although critics often employed all three in their efforts to dismiss her claims.[18]

Carson entered professional science during the Great Depression. Although government service offered her greater flexibility than the academy, she still encountered what Margaret Rossiter calls the "rigid lines" of propriety which dictated what sort of science women could do. Biology rather than chemistry or physics was the preferred choice.[19] The acceptability of the life sciences for women was apparent at Woods Hole in the summer of 1929 when Carson won a seat as a "beginning investigator." There she was one of thirty-one women in the biological sciences, which claimed the most female students by far at the Marine Institute.[20]

Away from Woods Hole Carson was, like most other women in the field, nearly "invisible."[21] This was especially so within the government where few women were employed exclusively as scientists. She was one of the first two women ever hired at the professional level at the Fish and Wildlife Service in the 1930s.[22] However Carson was never employed even primarily as an aquatic biologist. Her assignments were exclusively public information, writing and editing agency publications; this work required her to know the scientific background of every subject that came across her desk. Breadth rather than specialized knowledge enabled her to excel as a government scientist during the Cold War.[23]

On assignment at several FWS refuges in order to produce the "Conservation in Action" pamphlets, Carson did do some field work from 1946 to 1949. These refuge guides, at least three of which she wrote entirely, are still highly regarded. Like her other writing they combined her keen ability to observe nature and to synthesize the latest research. She used her editorial position to meet field researchers, to discuss their work, and incorporated it in her own writing. While there were disadvantages to Carson's editorial position, it broadened her ecological perspective immeasurably.

But Carson's marine research after she joined the federal service was limited to several brief trips to Woods Hole and local excursions with friends. Travel was expensive, and her family obligations were enormous. She made one trip aboard the "Albatross III," a Bureau of Fisheries research vessel, in 1949 to complete work on *The Sea Around Us*, taking leave without pay to do so. It was the only time her research was supported by foundation funding. For the most part, her laboratories were the tidal pools and shores of the eastern seacoast. Even after she left the government in 1952, her coastal research was carried out privately, without benefit of colleague or critic, and certainly without the protection or prestige of institutional affiliation.[24]

The three "sea books," *Under the Sea-Wind, The Sea Around Us,* and *The Edge of the Sea* of 1941, 1951, and 1955 respectively, displayed Carson's field research in the tidal pools and shores of the Atlantic and her acute powers of observation. But these eloquent studies were equally dependent upon the immense secondary literature Carson discovered and devoured. Like most great teachers, Carson's genius lay in synthesizing an enormous amount of information generated by other scholars, adding her unique vision and experience, and distilling it in prose that educated as it captivated. Had her writing been less graceful, Carson still would have been a great teacher. But because she was a scientist in love with the English language, and an observer of the natural world with few peers, her ability to communicate what she saw increased exponentially.

Carson's liabilities as a female biologist in an age which valued narrow, technical expertise and relegated even male biologists to the "soft" periphery of science were real. Although many in the academy admired and respected her ecological sophistication, especially as demonstrated in *The Sea Around Us,* Carson was never a scientific insider. This isolation, combined with her early impecuniousness and heavy familial obligation, ironically forced her to concentrate on what she did best: research and writing to inform.

Even as a naturalist where women were somewhat more accepted, Carson moved autonomously, largely in a male world.[25] Brought up loving the writings of Henry Williamson and Richard Jefferies, she admired the work of H. M.Tomlison, Edwin Way Teale, Hendrik Willem van Loon, and later Curtis Bok and Henry Beston. The writing of Albert Schweitzer and his "reverence for life" deeply influenced her. There were no women naturalists of stature equal to hers; she had no role models, nor did she seem to need any. Her friendship with another fine female writer Elizabeth Coatsworth, who was Henry Beston's wife, came toward the end of her life. Van Loon, Teale, Beebe, and Bok did what they could to encourage her and all recognized her genius. But Carson's voice and vision were unique, and ultimately they held the key to her literary power and personal courage.[26]

Like the earlier "sea books," *Silent Spring* abounds with images taken from the experiences with nature that were familiar to the middle-class in both urban and suburban settings. Carson's voice comes to us from familiar places, even while she is describing the invisible workings of chemicals and molecular change. Nature is at once familiar and intimate, yet mysterious and ephemeral; ultimately unknowable because it is uncontrollable. Her language and syntax

derive from an epistemology rich in spiritual dimension and almost mystical in content. Reverence, awe, and wonder are the hallmarks of this encounter with the common yet wholly other elements of nature. This unique vision allows Carson to describe the frightening damage out of control technology was doing to the natural world while her spiritual apprehension of nature's economy was the source of her outrage at humankind's careless interference.[27]

Carson's concern about poisons and pollution can be documented as early as 1938 and probably began even earlier.[28] She was personally and professionally opposed to FWS predator control policies throughout her federal career not simply because they were based on killing certain animals, but because they ignored the ecology of the total habitat. While writing the FWS "Conservation Bulletins" on fish and fisheries during the war, she read the reports of Cottam and Higgins on DDT residues present in inland and marine fish and like her mentors, worried about increased contamination.

In the summer of 1945, after publishing an article on bats that *Readers Digest* later republished, she suggested to the editor of the *Digest* that there was a timely story in the outcome of the Patuxent DDT experiments. These tests would "show what other effects DDT may have if applied to wide areas" and "whether it may upset the whole delicate balance of nature if unwisely used."[29] Although she was never commissioned to write the article, she continued to monitor the data from Patuxent.[30] At Audubon Naturalist discussions she expressed interest in FWS scientist James DeWitt's reports of DDT's adverse effects on the reproduction and survival of birds after repeated applications.[31]

Meanwhile three unrelated events involving the aerial application of chlorinated hydrocarbon pesticides coalesced to persuade Carson the natural world as she knew it was in danger. The first involved the controversial campaign undertaken by USDA in 1957 to eradicate the imported fire ant from the southern states by massive applications of dieldrin and heptachlor, two of the most persistent and most toxic new pesticides. Reports of wildlife damage brought a chorus of criticism from conservation groups. Carson read these reports, discussed them with her friends, attended USDA briefings as an Audubon member, and followed the acrimonious pesticide debate within the National Academy of Science/National Research Council on which her friend and former supervisor Clarence Cottam served.[32]

About the same time she also received information on bird mortality caused by the aerial spraying of DDT mixed in fuel oil for

mosquito control in the coastal counties of northern Massachusetts. Friend and fellow writer Olga Owens Huckins' home and bird sanctuary in Duxbury had been subjected to that spraying. Saddened and angry over the numbers of birds that had perished, Huckins wrote to the Boston *Herald* in protest. She sent Carson a copy of the published letter in January 1958 urging her to find someone in Washington to help stop the spraying. In the course of sleuthing on Huckins's behalf Carson uncovered the enormity of the pesticide problem. She understood immediately that there was material for an article at least and perhaps for a book.[33]

Finally, Carson's initial inquiries about aerial spraying took place not only during the height of the fire ant controversy, but also at a time when newspapers were full of accounts of a trial in Long Island involving shocking misuse of pesticides. Robert Cushman Murphy, noted ornithologist, director of the American Museum of Natural History, and one of Carson's early benefactors, pursued the novel strategy of attempting to enjoin the federal government from further aerial pesticide spraying. Testimony presented during the trial documented enormous damage that pesticides had done to fish, birds, wildlife, dairy cattle, gardens, livestock, and perhaps to children. The suit, which was eventually dismissed on technicalities after appeal to the Supreme Court, gathered testimony from a variety of experts. It provided Rachel Carson with "mountains of material," important collaborators such as Mary Richards and Marjorie Spock, and a wealth of expert contacts in medical and agricultural fields previously unknown to her.

Soon Carson was corresponding with every independent scientist who knew something about pesticides and every government scientist who was brave enough to answer her letters. The Long Island trial lent a sense of urgency to her inquiries, and as her research on the subject grew, so did her determination to find out the truth. "Knowing the facts as I did," she later recalled, "I could not rest until I had brought them to public attention."[34]

Rachel Carson began publicly questioning of the direction and results of scientific research near the height of the McCarthy era.[35] Policies, decisions, and activities of various departments of the federal government were central to her story. They revealed how the indiscriminate use of pesticides and the basic irresponsibility of an industrialized society threatened the natural world. Many government officials regarded her questions and requests with both hostility and alarm. Her persistence undoubtedly threatened them as much as her

intelligent understanding of what was considered a highly technical subject.[36]

The fire ant controversy had made the Plant Pest Control Division of ARS a bastion of pesticide defenders. Carson was not surprised when they ignored her inquiries. PPC field agents harassed anyone who asked too many questions about eradication programs. FWS field scientists who reported wildlife losses accurately were routinely intimidated.[37] The prestigious Forest Service, whose programs against the gypsy moth and Dutch elm disease employed massive aerial spraying, proved similarly reticent.[38]

When Carson found normal avenues of information blocked, she could usually persuade a disaffected scientist to supply her with field reports or experimental data for the price of anonymity. A friend on the staff of the Public Health Service Library and former colleagues in Fish and Wildlife regularly spirited material she needed. She even discovered a kindred soul within ARS who provided confirmation of some of the long-term hazards of organic pesticides which were known to that agency.[39]

Carson's decision to tell only one side of the pesticide story was criticized in 1962 and remains a point of contention. Carson made this choice deliberately. She had no quarrel with the use of some pesticides to control insect-born diseases or even for many agricultural applications. While she may have lacked an understanding of the individual farmer's economic choices, she realized that a world without pesticides was neither possible nor preferable. The profitability of agribusiness and the agrichemical industry had produced plenty of supporters, but in Carson's estimation the natural world had far too few.[40] Her decision was political and emotional; concerned for the whole of life, Carson became an advocate for the complexity of nature's interrelationships and its intricate balances. From the beginning she assumed the uncomfortable role of reformer, or of "crusader" as she called it, because no one else would. In November 1958 she told Harvard scientist E. O. Wilson "I have to admit that I have taken on this venture in a crusading spirit.... In my sincere opinion, the weight of evidence amounts to an overwhelming indictment of most of the present programs."[41]

The June 16, 1962 issue of *The New Yorker* carried the first of three articles condensed from *Silent Spring*. It was Carson's second appearance in the "profiles" column.[42] That distinguished periodical had a history of bringing important social issues and authors to the reading public and this was no exception. The serialization of *Silent Spring* assured it the widest and most influential readership.

The impact of *Silent Spring* on the highest levels of the Kennedy administration and the "informed public" was immediate. As other journalists picked up *The New Yorker* story, Carson's exposé of the side-effects of technological progress reached a mass audience. National media attention began with the acclaimed serialization and continued in the pages of the *New York Times*, which on July 3 editorialized:

> Miss Carson will be accused of alarmism, or lack of objectivity, of showing only the bad side of pesticides while ignoring their benefits. But this, we suspect, is her purpose as well as her method....If her series helps arouse enough public concern to immunize government agencies against the blandishments of hucksters and enforce adequate controls, the author will be as deserving of the Nobel Prize as was the inventor of DDT.[43]

The following week the *Washington Post* commented that "Carson's negative case is virtually as powerful as the poisons she deplores."[44] Officials within the Department of Agriculture who took the brunt of Carson's attack were caught off-guard and were privately outraged. Departmental representatives who sat on the toothless Federal Pest Review Control Board (FPCRB), a formal advisory committee that coordinated and monitored all federal pesticide activities, "alternated between angry attacks on *Silent Spring* and nasty remarks about Miss Carson."[45]

Gender was used to denigrate her science.[46] Ezra Taft Benson, former Agriculture Secretary, privately suggested to former President Dwight Eisenhower that Carson was "probably a communist." Why was a "spinster was so worried about genetics" he wondered?[47] Other male critics castigated her as a "bird and bunny lover," and some suggested that she was just an "hysterical female." Privately some officials worried that Carson's message could create a constituency potentially disruptive of the pesticide status quo. But other observers found in Rachel Carson's gentle femininity and quiet self-containment a credibility and stature that mocked appeals to gender stereotypes. Still, gender and professional status remained the targets of Carson's detractors.[48]

In the pesticide industry the uproar caused by *The New Yorker* articles went far beyond that produced by the earlier cranberry scare. Most industry spokesmen criticized Carson's "unbalanced" presentation while they waited to examine her evidence. The president

of Monsanto Corporation set the tone of the ensuing debate, calling Carson "a fanatic defender of the cult of the balance of nature."[49]

The attacks increased in early August when the Velsicol Corporation, one of the chief manufacturers of chlordane, threatened Houghton Mifflin with a libel suit if they persisted in publishing the book. Its corporate counsel suggested that Carson was an unwitting pawn of "sinister" Cold War influences. The National Agricultural Chemical Association set aside $25,000 for a major public relations blitz to combat Carson's alarming conclusions.[50]

By the time Houghton Mifflin published the book on September 27th, the critics had coalesced into two broad groups. One was composed of the USDA and their most powerful constituents, the chemical industry and "Big Farmers." Initially they viewed the controversy as a short-term, but expensive, public relations and education issue. Industry experts of all sorts emerged; each one refuted Carson's evidence of contamination, most rebutting things Carson never said, and all proclaimed the necessity of the present level of pesticides to feed the U.S. and the world. Advertising campaigns for government and industry programs emphasized the horrors of a future without pesticides and a world without enough food.[51] Yet many of these industry critics had read little more of *Silent Spring* than its opening fable.[52]

The scientific community, however, viewed *Silent Spring* as a serious attack on its professional integrity. Carson's sharpest detractors, I. L. Baldwin, George C. Decker, and William J. Darby, had all served in some capacity on the National Academy of Science-National Research Council pesticides panel. They correctly regarded the book as an assault on their work, on the tenets of scientific orthodoxy, and on the nature of progress itself.

Some scientists, particularly those within the Entomological Society of America, resented the critical intrusion of a professional "outsider" into what they had long regarded as a private debate among equals. Others reacted viscerally to Carson's charges that they had "traded their professional objectivity for obeisance to the needs of industry and to their own research funding."[53]

They all realized that Carson had challenged the design and intent of much of the reigning paradigm of pest control. They acknowledged Carson's critique for what it was, "an attack on the model of insect control on which they had built a valued and valuable profession."[54] The emotional reaction of the economic entomologists in particular was understandable given that their reputation, self-

esteem, and careers were tied to a research model that Carson condemned as part of a "Neanderthal age of biology."[55]

Silent Spring presented a view completely at variance with the prestigious NAS-NRC report on pesticides. Carson correctly suggested that the panel had not been impartial and that some members were minions of industry. Yet the stormy debate between Carson and the scientific establishment sparked by *Silent Spring* was not fundamentally over scientific fact or institutional objectivity. It was a quarrel about values, and consequently, about power.[56]

Influences beyond the immediate partisans also contributed to the outcome of the controversy. Unlike other authors who wrote about chemical pollution both before and after *Silent Spring*, Carson's message got the immediate attention of the White House.[57]

During a press conference on August 29, 1962 President John Kennedy pledged an investigation of the abuses Carson cited in the *New Yorker* series. An astute politician, Kennedy saw Carson's charges as political dynamite.[58] The President's attention immediately expanded the book's influence. In late July Kennedy assigned Jerome Weisner, his Science Advisor, to set up a special panel of the Science Advisory Committee to investigate.[59] Pesticides and pesticide use became a public policy issue, an event which USDA, the agrichemical industry, and many scientists regarded with alarm.[60]

As *Silent Spring* leaped to the top of the best-seller lists in the fall of 1962, selling more than 600,000 copies, Carson herself became the center of a "human interest" story. The specter of the government, and the scientific and corporate establishments ganging up on the reticent Miss Carson attracted large segments of the American public who never read *The New Yorker* or the book. They sympathized with the demure author who was subjected to such heavy-handed attack.

The Columbia Broadcasting System (CBS) announced late in 1962 that it would produce a special on the book the following spring. The USDA, FDA, and PHS were flooded with letters from citizens protesting government spraying programs. Conservation organizations, particularly the Audubon Society, reported record membership growth. In Congress, John Dingell (D-Mich.), announced that his patience with the anemic FPCRB was at an end and that he would reintroduce mandatory federal coordination measures. Similar measures were introduced in the Senate. Activity within the states was even more furious as bills were introduced to limit the broadcast use of pesticides.

In spite of a mysterious letter writing campaign designed to pressure CBS to withdraw the show, and despite the last minute

withdrawal of several corporate sponsors, the CBS prime-time special "The Silent Spring of Rachel Carson" aired on April 3, 1963, dramatically escalating the debate. The show amounted to nothing less than a second printing of *Silent Spring*. Although the network and producer Jay McMullen went to great lengths to offer a wide range of opinions on the pesticide issue, what the viewers saw was a graphic, one-hour portrayal of Carson's simple and compelling thesis that "we know not what harm we face."[61]

The visual impact of the quiet, self-assured author who reiterated her deep concern that humanity had begun a process that threatened both its own future and that of the living environment was deeply convincing to many viewers.[62] The contrast between the calm and articulate Carson, who spoke about the interrelatedness of all life, and her loud, "wild-eyed" opponent, Dr. Robert White-Stevens, could not have been more striking. White-Stevens, a heavily spectacled scientist with a white lab coat and a proper British accent, represented the chemical industry and American Cyanamid Company. He dramatically predicted a return to the "dark ages" of starvation, disease, and death if pesticide use was restricted. Television allowed Carson and not her critics to define the issue. By the end of the broadcast, the environment had been added to the public agenda.[63]

The next day Connecticut Senator Abraham Ribicoff announced that he would conduct a congressional review of environmental pollution, including federal regulation of pesticides and federal pesticide control programs.[64] Hearings of the Senate Subcommittee on Reorganization and International Organizations began on May 16th. With exquisite timing, the White House released the long awaited report of the PSAC with Kennedy's emphatic endorsement the day before the hearings began.[65]

The PSAC report, "The Uses of Pesticides," was not as harsh in its recommendations as many in government and industry feared. Nevertheless, in language that clearly vindicated Rachel Carson, it concluded that "the accretion of residues in the environment can be controlled only by orderly reductions of persistent pesticides." [66] It urged an end to the use of all chemicals like DDT and heptachlor, but failed to specify how this should be done. The PSAC criticized the operative scientific paradigm specifically challenging the concept of pest eradication. The report recommended increased public education on the benefits and hazards of pesticide use, noting that "until the publication of *Silent Spring* by Rachel Carson, people were generally unaware of the toxicity of pesticides."[67]

The Christian Science Monitor declared the following day "Rachel Carson Stands Vindicated!" That evening, CBS news commentator Eric Sevareid recalled that "Miss Carson had two immediate aims. One was to alert the public; the second, to build a fire under the government."[68] She had accomplished this and much more.

Silent Spring and the controversy it produced brought science into the wide arena of public understanding and debate for the first time since the end of World War II. Carson convinced those who read her book that there was a fragile partnership between humans and nature, which once broken, could lead to the destruction of both. By providing an alternative vision of scientific progress, one that required an informed and vigilant citizenry, she launched a popular movement she never dreamed possible.

Rachel Carson eloquently testified before the Ribicoff committee hearings on June 4th. She accepted awards from the world of letters, arts, and science as graciously and quietly as she had faced the criticism which had been heaped upon her earlier. But her time was running out. On April 14, 1964 at the age of fifty-six she died of cancer at her home in Silver Spring, Maryland.

Yet as the public mourned her untimely passing, the world was reading translations of *Silent Spring*. A younger generation of ecology conscious activists moved by her courage and vision were taking up their own crusades and broadening the cause. Ralph Nader remembers as a student at Princeton his conscience had first been disturbed by the death of songbirds in the university commons after aerial spraying of DDT. Barry Commoner worked on DDT as a Navy scientist during World War II. He shared Carson's alarm and was inspired by her actions.

Shortly before her death, Sierra Club director David Brower played host to Carson in California, fulfilling a dream of hers to visit Muir Woods and see the Pacific Ocean. Brower recalls that he took Carson down to the shore at Rodeo Lagoon where he first gave her several handfuls of Pacific beach sand which she examined minutely commenting on the different colored crystals. Then as Brower pushed Carson in her wheelchair around a beach cove they came upon the biggest flock of brown pelicans he had ever seen. The birds had only recently been near extermination. Brower later said it was as if the pelicans were there that day to thank Carson. In her will, Carson made bequests to the Sierra Club as well as to the Nature Conservancy whose chapter in Maine she helped to establish. Perhaps because of Carson's influence, or perhaps inevitably, the Sierra Club, Audubon,

Figure 2: Carson at her cottage in Maine, 1961.

(Photgraph by Bob Hines. Used by permission of Rachel Carson History Project, Rachel Carson Council, Inc., Chevy Chase, MD.)

and other mainline conservation organizations soon widened their focus to embrace a broader ecological orientation which included habitat and species preservation.[69]

Rachel Carson was an important role model for this younger generation of scientists and environmental activists. Stuart Udall, who was Secretary of the Interior when *Silent Spring* was published, considers Carson the "fountainhead" of the new environmental movement.[70] For Udall what distinguishes this new group of activists is that they share Carson's ecological values and care about the whole of the living world. This new ethic of interconnectedness is her most enduring legacy, and it is this quality which, at its best, distinguishes the modern movement. [71] In a speech near the end of her life Carson defined the moral problem:

> What is important is the relation of man to all life. This has never been so tragically overlooked as in our present age, when through our technology we are waging war against the natural world. It is a valid question whether any civilization can do this and retain the right to be called civilized. By acquiescing in needless destruction and suffering, our stature as human beings is diminished.[72]

Through her ability to make the complexities of the living world understandable, Carson helped "democratize" science and make scientists more accountable. She showed that the public could understand complex scientific principles if they were explained in simple but accurate terms. Her teaching proved that once informed the public would demand the right to know what was being done to them in the name of "progress." Carson's insistence that the ultimate directions of science and technology were debatable initiated other institutional challenges that have altered public policy and the national agenda.

Never dreaming that one book could alter the course of history, Rachel Carson simply spoke for what she herself held most precious and hoped others might listen. Thanks to her courage and vision, millions did.

Acknowledgments

An earlier version of this article was originally commissioned by Peace River Films, Cambridge, MA, for use in their documentary film "Rachel Carson's Silent Spring" *produced for PBS* The American Experience, *which aired February 8, 1993. I wish to thank producer Neil Goodwin, Margo Barnes and my other colleagues William Cronon, Paul Brooks, David Pimentel, and Suzanne Smith, who worked on this project and contributed to my understanding of Carson. Interviews conducted by Peace River Films are used here with the kind permission of Neil Goodwin. I am also grateful to Clayton Koppes, John Perkins, and Ralph Lutts who read and commented on later drafts.*

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1 Maria McLean, the daughter of a Presbyterian minister, had been well educated and was an accomplished musician. She lived almost continuously with her daughter Rachel until her death at nearly 90. Rachel's father, Robert Warden Carson, was never a significant influence on his daughter's development or outlook. His family background, employment history, and his marriage remain obscure. By the time Rachel went off to graduate school, he was in questionable health and died of cardiac arrest in 1935.

2 Interview with Helen Meyers Knox, February 11, 1992, Greensburg, Pa. Both she and Rachel had to live frugally and were unlikely to participate in collegiate social life with the daughters of Pittsburgh's wealthy industrialists.

3 Dorothy Thompson Seif, "Letters from Rachel Carson: A Young Scientist Sets her Course," (unpublished mss., c. 1987) Rachel Carson Council, Inc. Chevy Chase, Md.

4 "I remember Muller's work on the effect of radiation on germ cells was just being talked about when I first studied genetics...." Rachel Carson to Marie Rodell, November 29,1955. Rachel Carson Papers, Yale Collection of American Literature, Beinecke Rare Book and Manuscript Library, Yale University, New Haven, CT. Hereafter cited as RCP. The importance she gave to her work in genetics and mutation is also clear from the text she wrote for the dust jacket of *Silent Spring* which read in part, "While at Hopkins she studied genetics with HS Jennings and later worked with the geneticist Raymond Pearl. She studied radiation as *cause* of mutations." Marie Rodell to Paul Brooks, February 16, 1960, RCP.

However, early letters to Dorothy Seif indicate that Carson had been originally less than enthusiastic about her study of genetics at Hopkins, although she admired Pearl deeply.

5 General biographical information other than noted comes from the author's interviews and material in the Rachel Carson Papers.

6 Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin, 1962), 24.

7 *Time Magazine* (September 28, 1962): 45-46.

8 Carson, *Silent Spring*, 5.

9 Historians of DDT and its wartime development and early civilian agricultural application, James Wharton, Thomas Dunlap, John Perkins, David Pimentel, and Edmund Russell have ably documented the scientific arguments advanced for DDT and its related synthetic hydrocarbon pesticides as well as the enthusiastic response of the military, industry, and agriculture. My concern here is to point out the distinctive bureaucratic cultures in which pesticide applications were debated and Rachel Carson's involvement on the periphery of those discussions.

[10] In FWS the control unit was Rodent and Predator Control. Their counterpart in ARS was Plant Pest Control. Interview with John L. George. July 30, 1991. State College Pa. George worked for FWS from 1958 to 1963 when he moved to the faculty of Pennsylvania State University. George was the first wildlife biologist specifically interested in pesticides to be hired by FWS. Thomas R.Dunlap, *DDT,Scientists, Citizens, and Public Policy* (Princeton: Princeton University Press, 1981), 36.

This is a crucial distinction. Dunlap clarifies this noting that this shift to chemical control occurred when pioneer entomologists with broad training in biology were replaced by those with a far narrower technical training. The "old" economic entomologists "tended to see insects as part of nature, and to see economic entomology as part of ecology." The "new" economic entomologists were agricultural scientists, not biologists, interested in applications. They were "less concerned about general study of insects or their place in biology." See Royal N. Chapman, *Animal Ecology* (New York: McGraw Hill, 1931): 873-898. See also E.H. Smith, "The Entomological Society of America: The First Hundred Years, 1889-1989." The Entomological Society of America, 1989. Stephen A. Forbes in his Presidential Address to the Entomological Society of America in 1915 was disturbed by the direction of the profession. "An economic entomologist," he argued is an ecologist, pure and simple, whether he calls himself so or not." "Ecological Foundations of Applied Entomology," *Annuals of the Entomological Society of America*. 7(1915): 1-19.

I am indebted to David Pimentel, Department of Entomology, Cornell University, for refining my understanding of the "new" entomology and the pesticide debate within the profession during the *Silent Spring* controversy.

[11] Interview with John L. George, July 31, 1991, State College, Pa. James B. DeWitt, "Chronic Toxicity to Quail and Pheasants of Some Chlorinated Insecticides," *Journal of Agriculture and Food Chemistry*, 4 (October 1956): 863-866. Linda J. Lear, "Bombshell in Beltsville: The USDA and the Challenge of *Silent Spring*." *Agricultural History*. 66, 2(Spring 1992): 152-170. See also Pete Daniel, "A Rogue Bureaucracy: The USDA Fire Ant Campaign of the Late 1950s," *Agricultural History*, 64(Spring 1990): 99-121.

[12] "Patuxent Wildlife Research Center," *Fish and Wildlife News* (February-March 1989): 6-7.

[13] At Patuxent George and his chief, biochemist James DeWitt, directed field work on pesticide residues and established the increasing concentrations of hydrocarbon pesticides in a variety of birds. Like Cottam earlier, George increasingly found himself professionally and politically isolated. Both Dan Janzen, the director of FWS and John Buckley, the director of Patuxent, shared the views of the control entomologists that "there was nothing good about the noxious critters," and supported the program of pest eradication. These control entomologists understood chemicals but they knew little about the life cycle of the insect they were attempting to eradicate. Interview with John L. George, July 30, 1991, State College, Pa.

Interview with Robert Rudd, April 25, 1991.(This is one of several extended conversations with Rudd. Dates of each will be given in citation.) Rudd's book which had been commissioned by the Conservation Foundation, was completed at least a year before Carson finished *Silent Spring*. The University of Wisconsin Press extended the peer review process to the entire agricultural school faculty, including the President of the university. Meanwhile the controversy over *Silent Spring* had broken out further delaying publication of Rudd's important work as well as his tenure decision. Interview with Samuel Epstein, Peace River Films, October 24, 1991.

[14] Ralph Lutts, "Chemical Fallout: Rachel Carson's *Silent Spring*, Radioactive Fallout and the Environmental Movement." *Environmental Review*, 9 (Fall 1985): 214. Lutts argues that Carson consciously used the public's apprehension about radioactive fallout to educate them on how pesticides worked. "Danger—Strontium 90," *Newsweek* (November 12, 1956): 88, 90.

[15] Unbroadcast interview with Ralph Nader. Recorded for WGBH Television, "Race to Save the Planet." Chedd-Angier Production, Co.

[16] Paul Brooks, *The House of Life.Rachel Carson at Work* (New York: Houghton Mifflin, 1972), 228.

[17] See for example the attitudes of Donald Fleming, "Roots of the New Conservation Movement." *Perspectives in American History* VI.(Charles Warren Center for Studies in American History, Harvard University, 1972), 27-34, see especially 31. Stephen Fox, *The American Conservation Movement* (Madison: University of Wisconsin Press, 1985), 292-299.

[18] See Linda J. Lear, "War in the Garden? Rachel Carson, Gender, and Pesticides." Paper presented at the conference of the American Society for Environmental History, Pittsburgh, Pa. March 6, 1993 for a more elaborate discussion of how her critics used gender to trivialize her charges.

[19] Margaret Rossiter, *Women Scientists in America* (Baltimore: Johns Hopkins University Press, 1982), 313-314.

[20] 32nd Annual Report of the Marine Biological Laboratory, Woods Hole. Report for 1929. (Woods Hole, Massachusetts, 1929), 28-29.

There were 71 scientists listed as "beginning investigators" in biology that year; 31 of whom, or nearly half, were women. This number included new college graduates, graduate students, and faculty in the lower ranks.

21 The Woods Hole Marine Biological Laboratory Annual Report for 1964 reflects a sad example of this "invisibility" when they failed to note Carson's death even though she had been an elected member of the Corporation since 1952. Obituary memorials in the report for that year were for four male scientists who had been Corporation members, but whose professional achievements were within traditional academic, government and industry norms.

22 *Rossiter*, 313-316. Rossiter makes the important point that the depression of the 1930s hardened the rigid lines already drawn about the types of "science" women could be employed to do. Carson experienced this first hand in her several efforts to find alternative employment both before and after she entered government service. Shirley Briggs argues that her assignment as an editor rather than a field biologist was fortuitous because it brought her into contact was such a variety of scientists and scientific information and broadened her understanding rather than limited it. While this is certainly the case, it ignores the possibility of what she might have accomplished had she had the opportunity for research as well as writing. Interview with Shirley A. Briggs. Executive Director, Rachel Carson Council, Chevy Chase, Md. February 20, 1992. The other woman hired as an aquatic biologist was Loella Cable. Rachel and Shirley joined Loella tagging shad on the Chesapeake on several occasions. *Ibid.*

23 She tried to leave Fish and Wildlife at the end of World War II, apparently because she had been assigned more public relations work than science writing. She applied unsuccessfully to the New York Zoological Society and to National Audubon Society. Both organizations had openings for which she was eminently qualified, but neither apparently was ready to hire female biologists to fill them.

24 Carson won a Eugene F. Saxton Memorial Fellowship in 1949 and a Guggenheim Fellowship in 1951 for work on *The Edge of the Sea*. However Carson returned the award from the Guggenheim when she found that her income from *The Sea Around Us* made it unnecessary. Shirley Briggs, her colleague from Fish and Wildlife, sometimes accompanied her on field trips, and Bob Hines, who was also a FWS illustrator and colleague travelled with Carson and her mother to different locations for work on *The Edge of the Sea* which Hines illustrated. Interview with Shirley A. Briggs, February 20, 1992, Bethesda, Maryland; Interview with Robert Hines, April 25, 1991, Arlington, Virginia.

25 See Marcia Myers Bonta, *Women in the Field* (College Station: Texas A & M Press, 1991) for a discussion of women's contributions to the natural sciences and Vera L. Norwood, *Made From This Earth* (Chapel Hill: University of North Carolina Press, 1993). Norwood suggests that the relationship of female naturalists with the environment was markedly different from their male counterparts.

26 Both Vera Norwood, "The Nature of Knowing: Rachel Carson and the American Environment," *Signs* 12(December 1975): 743 and H.Patricia Hynes, *The Recurring Silent Spring* (Elmsford, N.Y.: Pergammon Press, 1987), 1-67 argue that Carson's vision was the product of her gender. While I agree that gender is an important factor in how nature is perceived and described, I ascribe particular significance to Carson's spirituality.

27 The article which appeared in *Women's Home Companion* as "Teach Your Child to Wonder" was the beginning of this exploration, both in moral and philosophical terms. Carson considered this work of greatest importance and intended to return to it and expand upon it had she lived long enough to do so.

My understanding of Carson's thinking about the spiritual dimensions of the living world has been aided enormously by numerous conversations with her friend Ruth Scott, her assistant and friend, Jeanne Davis, and Jennifer Wilder Logan. Interview with Ruth Scott, April 13, 1991, Pittsburgh, Pa. Interview with Jeanne Davis, January 10, 1991. See Jennifer Wilder Logan, "A Scientist's Reverence for Life. *Chrysalis*. VII.Spring, 1992): 65-70.

28 In November 1938 Carson tried unsuccessfully to interest the *Baltimore Sun* in an article on selenium and some fluorides; poisons naturally present in the soil. She told Sunday editor Mark Watson that "it has been known for a good while that stock was being poisoned from this source and there is some recent work which indicates that people may not fare so well when their drinking water is polluted.... Also, the cumulative effect on fish is rather startling." This letter indicates that Carson's interest in environmental and human contamination from toxins was basic to her thinking about the natural world and that the discovery and use of synthetic hydrocarbon pesticides only sparked a long-term interest and apprehension. Rachel Carson to Mark S. Watson, November 11, 1938. RCP.

29 Rachel Carson to Harold Lynch, July 15, 1945. RCP.

30 Interview with John L. George, July 31, 1991, State College, Pa.

31 See Stewart L. Udall, "Testimony", Subcommittee on Reorganization and International Organization of the Committee on Government Operations, U.S. Senate, 88th Congress, 1st Session. 1964 for a discussion of early experiments at Patuxent.
32 Lear, 157-159; Brooks, 247.
33 Accordingly Carson directed her agent, Marie Rodell, to contact magazines like *Readers Digest, Ladies Home Journal, Good Housekeeping* and *Women's Home Companion*, while she continued to track down the facts. Two weeks later she wrote Rodell that she had hit "pay dirt" uncovering the "horrifying facts about what is happening through the mass application of insecticides... and naturally feel I should like to do an article myself." When the magazines proved unenthusiastic, Carson realized a book would be necessary, but she held out for one to which she would contribute only parts.

Brooks, 237. Rachel later recalled that "it was in the course of finding that "someone" that I realized that I must write the book." Rachel Carson to Olga Huckins, October 3, 1962. RCP. She signed a contract with Houghton Mifflin in early April 1958 to contribute to a book entitled "The Control of Nature" to be co-authored with Edward Diamond a science writer for several magazines. The collaboration was short lived and Diamond later became one of Carson's most caustic critics. See Paul Brooks, "Report to the Executive Committee. K.5040. April 1, 1958. RCP. Interview with Paul Brooks, October 6, 1991, Lincoln Center, MA.
34 Quoted in Brooks, 228.
35 See Brian Balogh, *Chain Reaction: Expert Debate and Public Participation in American Commercial Nuclear Power, 1945-1975* (Cambridge University Press, 1991), 21-59 for an interesting discussion of the impact of cold war politics on science.
36 Lear, 159.
37 Interview with John L. George, July 31, 1991, State College, Pa. A postscript to Professor Joseph J. Hickey's letter to Rachel Carson at the end of 1957 says it all. "This phenomenon" [character assassination] "is one to which several wildlife biologists have been exposed. As long as I am trying to carry out objective research on the wildlife effects of pesticides, I am not going to discuss it in public, and I hope you will keep my name out of it. In Georgia, they even went so far, I am told, as to try and get Walter Rosene fired by the U.S.Fish and Wildlife Service. Jim DeWitt at Patuxent knows the full story of L'Affaire Rosene." J.J. Hickey to RC. December 10, 1959. RCP; Interview with John L. George, Peace River Films, April 9, 1992. George describes the atmosphere in the field as conducive to "paranoia" because individual field agents had no institutional support for their sightings or their data.
38 Rachel Carson to Olaus Murie, November 19, 1960. RCP.
39 W.L. Popham to Rachel Carson, January 28, 1958 RG 310. Agricultural Research Service, Regulatory Crops, Fire Ant.#944. National Archives; Interview with Shirley A. Briggs.April 24, 1991, Chevy Chase, Md; Interview with Mrs. Jeanne Davis, March 30,1991, Chevy Chase, Md.
40 Rachel Carson to Harold Lynch, July 15, 1945. RCP; Stewart L. Udall, "The Legacy of Rachel Carson." *Saturday Review* (May 16, 1964): 33.
41 Rachel Carson to Edward O. Wilson, November 11, 1958. RCP.
42 The runaway best-seller, *The Sea Around Us*, had been introduced in the pages of *The New Yorker* in 1951. Marie Rodell, Carson's literary agent and close friend again convinced William Shawn, the magazine's distinguished editor, to take a very different sort of book. Staff columnist E.B. White, who was a long-time admirer of Carson's naturalist writing, was an enthusiastic supporter. But Shawn's risk was limited. The Rodell-Carson team had already made money for the magazine. By 1957 Carson's international reputation was such that Rodell's job of selling Shawn even a book about poisons was relatively easy. Shawn's timing was perfect.

Both the *New Yorker* and Houghton Mifflin were threatened with law suits by Velsicol. Carson herself was terrified of being financially wiped out by having to defend herself against libel suits. Houghton Mifflin took out extra insurance with Lloyds of London before publication. Interview with Paul Brooks, October 6, 1991, Lincoln Center, MA.
43 *New York Times*, July 3, 1962.
44 *The Washington Post*, July 10, 1962.
45 Frank Graham, Jr. *Since Silent Spring* (Boston:Houghton Mifflin, 1970), 60.
46 Interview with Frank Graham, Jr., July 19, 1992, Milbridge, ME. Graham speculated that Carson was subjected to much more gender denigration than is evident from press reports because much of it was verbal.
47 Cited in Blanche Wiesen Cook, "Viewpoints." *AHA Perspectives* (November 1992), 14. The "spinster" comment has been attributed to members of the PSAC committee and to members of the Federal Pest Review Control Board as well as to Benson. From conversations with archivists at the

Dwight D. Eisenhower Presidential Library, I suspect that Benson either originated that remark as well as the "communist" appellation or quoted it to Eisenhower. However I am unable to provide a specific printed citation.

48 Lear, "War in the Garden? Rachel Carson, Gender and Pesticides," 2-10.

49 "The Desolate Year" (New York: The Monsanto Corporation, 1963). Cover letter to distributors.

50 Velsicol Corporation of Chicago [Louis A.McLean] to Houghton Mifflin [William E. Spaulding]. August 2, 1962, RCP. Monsanto Corporation ridiculed the book in a parody describing a world without pesticides and food in *The Desolate Year*. The National Agricultural Chemical Association (NACA) spent well over $25,000 in a "campaign to improve the image of industry" and published a question and answer booklet called *Fact and Fancy* to refute Carson's "errors." *Chemical and Engineering News* took the offensive publicizing an increase in pesticide sales despite the objections 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." Brooks, 294-295. For an important summary of the spectrum of reaction to *Silent Spring* see Paul Knight's manuscript "A Case Study on Environmental Contamination" done at the request of Secretary Stewart Udall. Manuscript deposited at the Rachel Carson Council, Chevy Chase, MD.

51 Christopher J. Bosso, *Pesticides and Politics: The Life Cycle of a Public Issue.* (Pittsburgh: University of Pittsburgh Press, 1987), 116. Bosso's work is one of the best on pesticide policy. His analysis of the limited victory of pesticide legislation in the late 1960s is particularly incisive. For an up to date review of pesticide legislation from the enactment of FIFRA to the present see Shirley A. Briggs and the Rachel Carson Council," Appendix Six: U.S.Federal Regulation of Pesticides, 1910-1988, *Basic Guide to Pesticides* (Washington, D.C.: Taylor & Francis/Hemisphere Publishing, Inc., 1992), 279-283.

52 Interview with Roland Clement, Peace River Films, March 8, 1992, North Bradford, CT. Rachel Carson, Speech to the National Women's Press Club, Washington, D.C. December 4, 1962. She was both irritated and amused by her critic's ignorance of her position.

53 Bosso, 116.

54 Dunlap, 112. Dunlap sympathetically observes that if the economic entomologists reacted emotionally, there was "little reason to condemn them." Carson's attack was visceral.

55 Carson, *Silent Spring*, 297.

56 Bosso, 117.

57 John George, Roland Clement and the late William Drury are among contemporaries who see Kennedy's role a pivotal. See interviews with George and Clement already cited. Interview with William Drury, February 29, 1992. Bar Harbor, ME. Drury was a member of the President's Science Advisory Committee. See also Frank Graham,Jr. *Since Silent Spring* (Boston:Houghton Mifflin Co.,1970), and author's interview with Frank and Ada Graham, July 19, 1992, Milbridge, ME.

As a case in point, Murray Bookchin who wrote *Our Synthetic Environment* (New York: Alfred A. Knopf, 1962) under the pseudonym Lewis Herber, published six months before Carson's, never got attention from the White House or the public even though it covered much of the same ground.

58 There was intense political pressure on the administration to seize the issue. As Secretary of HEW Abraham Ribicoff and his staff had already been working on air and water pollution. Kennedy was pressured by high level party appointees to take positive action on the issue. Interview with Jerome Sonosky, Washington, D.C. June 17, 1992. Interview with Abraham Ribicoff. Washington, D.C. June 2, 1992, New York, NY. Interview with Stewart L. Udall, March 8, 1992, Fairfax, VA.

59 Interview with John L. George, July 30, 1990, State College, Pa. As George tells it, one day a noted physicist on the PSAC told President Kennedy about *Silent Spring* series in the *New Yorker* and urged Kennedy to have the Committee study the matter. As far as George is concerned the President's attention was the crucial ingredient. Stewart Udall, Kennedy's Secretary of Interior, friend and supporter of Rachel Carson, remembers that Kennedy had read both the articles in *The New Yorker*, as well as the book. Interview with Stewart L. Udall, March 8, 1992, Fairfax, Va.

60 There was great rejoicing within the Department of Interior and especially at the Fish and Wildlife Service because almost certainly USDA's power over pesticide policy would be curtailed and Interior would gain influence. Interview with Stewart L. Udall, March 8, 1992, Fairfax, VA. and Lear, 17.

61 Interview with Jay McMullen, February 27, 1992, Greenwich, CT. Peace River Films. McMullen speculates that the flood of letters to CBS all came from one source, probably the agrichemical industry, because they were all identical.

62 Judging by the hundreds of letters written to the USDA questioning and complaining about their pesticide policy, viewer sentiment was overwhelmingly in Carson's favor. See Lear, "Bombshell in Beltsville," 169.

63 On the impact of television, see Bosso, pp.119-120. Interview with Jay McMullen, February 27, 1992, Greenwich,CT. Peace River Films. *CBS Reports*, "The Silent Spring of Rachel Carson." Broadcast transcript. April 3, 1963. After the broadcast, CBS was overwhelmed with favorable letters.

64 Interview with Jerome Sonosky. June 17, 1992. Washington, D.C. Interview with Abraham Ribicoff, June 2, 1992, New York, NY.

65 Sonosky had previously served on Ribicoff's staff at HEW and because of his connections knew when the PSAC report would be completed. These hearings marked Ribicoff's debut in the Senate as an "environmental" champion. Interview with Jerome Sonosky; Interview with Abraham Ribicoff. *Ibid.*

66 "The Uses of Pesticides," A Report of the President's Science Advisory Committee. The White House. Washington, D.C., May 15, 1963. U.S.Government Printing Office, 23.

67 *Ibid.*

68 Graham, 79.

69 Interview with David Brower, April 4, 1991, Pittsburgh, Pa. See also *For Earth's Sake . The Life and Times of David Brower.* (Salt Lake City:Gibbs-Smith Publisher, 1990), 214-215.

70 Interview with Stewart L. Udall, March 8, 1991, Fairfax, VA.

71 *Ibid.*

72 Rachel Carson, Speech accepting the Schweitzer Medal, Animal Welfare Institute, January 7, 1963. RCP.