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Chapter Ten

Change and Continuity in Environmental World-View: The Politics of Nature in Rachel Carson's *Silent Spring*

Yaakov Garb

Introduction

The publication of Rachel Carson's *Silent Spring* is often marked as a watershed in the history of the American environmental movement.[1] Within a year of its publication, the book's critique of pesticides had prompted scientific research into their hazards, brought significant changes in their regulation, spurred public debate on environmental practices, inspired a younger generation of environmental activists, and made ecology a household word. Arguably the century's most consequential book on an environmental topic, *Silent Spring* achieved its impact largely through the balance it achieved between questioning the prevailing environmental beliefs and practices, on the one hand, and remaining continous with them, on the other. While sufficiently disturbing to galvanize change, the book, on the *New York Times* bestseller list for almost three years, was nevertheless ideologically acceptable to a large audience. In this essay I read Carson's text to better understand this balance between challenge and compromise, and to evaluate its political opportunities and hazards.[2]

Let me begin my account with a brief biographical sketch of Carson, highlighting those aspects of her background that brought her to a seemingly

unlikely yet perfect position from which to initiate this reworking of the environmental consciousness of middle-class Americans. Carson's childhood on a family farm in Pennsylvania helped establish her visceral and lifelong connection to the outdoors and wildlife. Her talents as a writer had emerged by her early teens and, in 1925, she entered a small women's college in Pennsylvania as an English major, switching to biology at the end of her sophomore year. Academic achievements earned Carson a summer fellowship at Woods Hole Marine Biological Laboratory, and later support for completing her M.A. in zoology at Johns Hopkins University. However, her studies were constantly accompanied by financial insecurity and, with the death of her father in 1935, she abandoned doctoral work to become her family's breadwinner, working for the federal government primarily in the Fish and Wildlife Service as a writer for service publications in a position that drew on both her scientific expertise and writing talent.

Working slowly after hours on her own writing, in 1941 she produced a natural history of the ocean, *Under the Sea-Wind*, and a decade later, *The Sea Around Us*, whose bestseller status allowed her to buy a home on the Maine coast and retire to pursue her own writing. After completing a third work on the sea in 1955, she became increasingly preoccupied with the dangers of pesticides, which she had first encountered in her work for the government. Drawing on a range of written materials and her connections to agricultural and medical researchers and individuals in government agencies and wildlife societies, Carson put together the picture that appeared as *Silent Spring* in the summer of 1962. The book created a storm of media and government attention and elicited angry rebuttal and attacks, including a well-funded campaign by the chemical industry.

Several factors made Carson ideally suited to synthesize and present a case against indiscriminate pesticide use. She felt a deep passion for the natural world that, combined with the sensibilities absorbed from the nature writers whose works she had grown up with and her own considerable writing skill, made her a familiar and uncontroversial writer within an established tradition. This standing served her well with the publication of her more controversial book. Carson's training as a biologist and familiarity with government bureaucracies enabled her to locate and assimilate technical material, and her income as a writer allowed her to pursue her topic independently. Paradoxically, her relatively marginalized status assisted her in her task; because she never had the opportunity for narrow specialization, as did many of her male colleagues, and because she did not share their allegiances to specific research programs, she could range freely across disciplinary lines and was less constrained in her conclusions. Furthermore, her gender and lack of "professional standing," which her detractors later turned against her,[3] probably made her a less threatening figure as she gathered what was often quite sensitive information from a wide range of sources. After the furor of her book's publication, her quiet,

dignified bearing helped to stabilize her position and made the rather frenzied attacks of her opponents seem ridiculous.

Carson's intermediate position—involved in yet removed from scientific orthodoxy and bureaucratic structures—enabled the writing of *Silent Spring*. The book itself occupied a similar middle ground, challenging yet remaining continuous with prevailing beliefs about the environment, science, and society. On the one hand, it introduced its readers to the new and frightening hazards of an increasingly toxic landscape, described insidious and far-reaching disruptions of "the natural," and questioned prevailing images of science and the technological mastery of the natural world. On the other, by drawing on familiar cultural themes and notions of nature, and by not extending hints about the role of greed into direct and specific accusations or a substantial challenge to existing economic and political structures, the book remained safely within the bounds of the American mainstream.

Was *Silent Spring* an extraordinary balancing act or a disappointing compromise? If Carson's critique of pesticides had diverged greatly from common understandings of nature and society, it is unlikely it would have been so popular and thereby effective. I will explore this claim by comparing *Silent Spring* to Murray Bookchin's *Our Synthetic Environment*,[4] a scarcely remembered work published a half-year earlier, which described the same pesticide problems as Carson's book. Several circumstances contributed, no doubt, to his book's slight impact. Bookchin lacked Carson's standing and skills as an accomplished nature writer as well as the platform of a *New Yorker* series that placed *Silent Spring* in the center of public attention. Probably the most serious impediment to *Our Synthetic Environment*'s broad acceptance, however, was its content. Bookchin's account of the dangers of pesticides was part of a comprehensive and politically forthright chronicle of the many assaults on the environment and human well-being that he claimed were inevitable in an industrial capitalist society. This pill was too big, bitter, and unfamiliar for most Americans to countenance, much less swallow. But Carson's moderation, I will argue, also had its costs. There are places where her account can barely sustain the logical strain of not pursuing its own implications and, more seriously, structures and assumptions she left unchallenged continue to underlie pesticide problems today.

Nature: Whole, Harmed, and Regained

Silent Spring issues its challenge to environmental practices from within deeply conventional conceptions of nature. It is energized by a familiar, simple, and powerful narrative: nature disturbed, wholeness undone. Nature's integrity is centered on a concept of natural balance that has a long heritage in Western thought. Carson's time-honored pastoral vision of human reconciliation with the natural world, her ease with mechanical and productivist metaphors of

natural process, and the conscious downplaying of her biocentric leanings in favor of more acceptable anthropocentric and utilitarian grounds of persuasion, further contribute to a book that offers its readers a remarkably familiar framework through which to understand the potentially disturbing phenomenon of pesticide use.

NATURE WHOLE

"A fanatic defender of the cult of the balance of nature" was the way that the president of Monsanto characterized Carson in a cover letter to the distributors of an industry hit piece on the virtues of chemicals, commissioned to counteract the growing support for *Silent Spring*.[5] He was reacting to the book's central metaphor, the balance Carson defined as "a complex, precise, and highly integrated system of relationships between living things which cannot be safely ignored any more than the law of gravity can be defied with impunity. . . . The balance of nature is not a status quo; it is fluid, ever shifting, in a constant state of adjustment (218).[6]

This "economy of nature"—a "precise and delicate" system in which everything has its place, where relations of "interdependence and mutual benefit" and checks and balances prevail—provides the norm against which human interference can be assessed and challenged (72, 73, 77). In her use of these concepts of nature's balance or economy, Carson invokes an element of Western thought that can be traced back to antiquity. In the eighteenth century, it achieved quite explicit form in theological beliefs that regarded the world as underlain by harmony and order; God's providence ensured a system of perpetual balance among all living things, in which each creature had its allotted place.[7]

A second strong guiding metaphor in the book is the notion of an "ecological web of life" whose "threads" "bind" together organisms and their environment so that even minute changes in one area reverberate over space and time throughout the natural world (75, 57, 170). "The earth's vegetation," for example, "is part of a web of life in which there are intimate and essential relations between plants and the earth, between plants and other plants, between plants and animals" (64).

Much of the power and novelty of Carson's warnings about the hazards of pesticides to human health is achieved through extending these ecological notions of balance and interconnectedness to include the internal realm of physiology: "there is also an ecology of the world within our bodies" (170). The seamlessness of inner and outer landscapes is beautiful, but its implications are chilling. It is a "web of life—or death" (170). The complex and precisely regulated nuances of physiological functioning exist within a system that is now seen to include far-flung and unsuspected agents, linking chemicals and radiation to the fragile processes of mitosis.[8]

A tremendous amount of the persuasive work in her book is achieved through these well-established notions: the balance of nature, the ecological web, "the natural." They provide her with a versatile conceptual framework and evocative imagery with which to underscore the durability or fragility of natural systems, and to evoke wonder at the intricacy of connections or dismay at the consequences of their disruption. Nature whole is the basis for *Silent Spring*'s most unsettling tidings of balance lost, and the implicit ground of critique in her portrait of an emerging toxic landscape. The unnaturalness and damage of pesticides lies in the ways they "disturb," "upset," "alter," and "do violence to" nature's lawlike integrity (17, 60, 231, 17).

BALANCE LOST

Like her previous books and many others on natural history, *Silent Spring* presents the unseen currents, mechanisms, and balances that animate the natural world. Now, however, discovery is simultaneous with a realization of disruption.[9] Nature's wonders are known through their loss: we learn of the dark hidden sea of groundwater through its contamination; of the "aerial highways" because of the culling of the birds that normally fly through them (111); of the "unseen and intangible" paths from river mouths to far offshore because the fish that have followed them for thousands of years are now being attracted to their deaths (120). "The soil exists in a state of constant change," we are told, "taking part in cycles that have no beginning and no end" (57), even as we learn of the sterilizing effect of pesticides on soil life. This convergence of natural history and elegy continues today: the public discovered the miraculous protective layer of ozone through news of its breaching, the critical functions of the rain forest through its disappearance, and the significance of genetic diversity through its loss.

The density of Carson's imagery of disruption strikes me as new to natural-history writing. She speaks of the penetration and shattering of the living world, a "breaking [of] the threads that bind life to life," the "bludgeoning of the landscape," the "ripping apart" of "the whole closely knit fabric of life," the "uncoupling" of the phosphorylation process by radiation or chemicals, the disruption of checks and balances and "age-old patterns" (73, 64, 67, 203, 209). She reaches for jarring metaphors to convey the crudity of the human rupture of natural process: "a crowbar between the spokes of a wheel" (183); "a cave man's club" hurled against the delicate fabric of life (261).

THE TOXIC LANDSCAPE

Perhaps the greatest novelty of *Silent Spring* was its sustained presentation of what it might mean to live in a world of unfamiliar vulnerabilities and hazards: the increasingly toxic landscape of postwar America. To do this,

Carson sketched a new phenomenology of hazard, for intuitions learned from encounters with macroscopic physical threats or pathogenically borne disease were no longer adequate for grasping the effects of exposure to radiation and toxins. Though we have grown more accustomed to them today, these hazards were still quite new in the late 1950s and early 1960s, and much of the impact of *Silent Spring* stemmed from its reworking of popular perceptions of self-in-environment.[10]

In this new and alien toxic landscape, what was once life-giving has become poisonous. The title of chapter 3, "Elixirs of Death," conveys this reversal. Molecules based on carbon, the foundation of life, have become agents of death (27). Exposure to "air and sunlight," formerly principles of wholesomeness, can spontaneously transform chemicals into poisonous substances" in a way that is not only unpredictable but beyond control" (48–49). For birds in a sprayed area, "the once beneficial rain had been changed, through the evil power of the poison introduced into their world, into an agent of destruction" (90). This world we are coming to inhabit, suggests Carson, is like a scary fairy tale where shiny red apples poison and chemists have become evil sorcerers, tricking nature into becoming death-dealing with their systemic pesticides that offer poison to pests in place of the nourishment they expect (39).

Unlike many dangers, we encounter these chemicals regularly and unsuspectingly in our everyday life. This results in the "innumerable small-scale exposures to which we are subjected day by day, year after year. . . . Each of these recurrent exposures . . . contributes to the progressive buildup of chemicals in our bodies ands so to cumulative poisoning. . . . Lulled by the soft sell and the hidden persuader, the average citizen is seldom aware of the deadly materials with which he is surrounding himself; indeed, he may not realize he is using them at all" (157).

Carson emphasizes the everydayness and "intimacy" of our contact with these threats (197), juxtaposing mundane occasions, such as taking home fish to fry for dinner (53, 130), with their terrible consequences. When an average diet can produce liver damage (31), normalcy has become hazardous—surely engendering a new stance towards the world.

Our usual indications of hazard are useless in this new landscape, for these novel threats are invisible:[11] "Whether detected or not, the pesticides are there" (46). Even in the absence of apparent bodily harm in one generation, reproduction may be affected (113) or damage may appear only in subsequent generations.

These chemicals also disrupt our usual judgments of scale and sense of causality in assessing danger. At the outset of the book Carson establishes the potency of minuscule amounts, which make everyday estimations of hazard meaningless (29–30). By the book's end, the reader will come to read concentrations measured in parts per million with shock rather than dismissal. Expo-

sures to small amounts ("no matter how slight" [157]) can have huge consequences and cause shifts that are "subtle but far-reaching" (78). "Minute causes produce mighty effects" (170). Carson repeats variations on this theme to drive home an alternative notion of causality: "a little twist" in structure makes a molecule "five times as poisonous" (34); "seemingly moderate applications of insecticides . . . may build up fantastic quantities in soil" (60), and over the course of several pages in her chapter on cancer, Carson explicates how tiny distortions of chromosomal material lead to horrendous consequences (such as Mongolism, leukemia, Klinefelter's syndrome, and Turner's syndrome). When "a change at one point in one molecule even may reverberate throughout the entire system to initiate changes in seemingly unrelated organs and tissues," our habit of "looking for gross and immediate effect and . . . ignoring all else" no longer applies. In this new landscape, "cause and effect are seldom simple and easily demonstrated relationships. They may be widely separated in space and time" (170).

These toxic threats are also new in the degree to which they penetrate into the innermost levels of our physiology, the very core of the self. Synthetic chemicals, as opposed to naturally occurring ones, "enter into the most vital processes of the body and change them in . . . often deadly ways" (25). Because they "make use of all available portals to enter the body" (31) and easily "penetrate [its] inadequate defenses" (196), pesticides affect the "chemical conversions and transformations that lie *at the very heart* of the living world" (60, emphasis added). They compromise reproduction and "strike at the genetic material of the race" (41); they lodge in the "very marrow of our bones" (25) and affect the nervous system that defines higher life forms (178); they undermine even the innermost lines of defense, "the very [liver] enzymes whose function is to protect" (25), and pass across the "traditional protective shield" of the placenta (31), a profoundly symbolic affront.

In addition to the traits already mentioned, the impact of these new chemicals is cross-generational (52), cumulative, synergistic, and often delayed (chap. 11, pp. 169, 201). It is probably because they defy conventional mental schemata in so many ways that these chemicals readily acquire their aura of eeriness, evil, and unnaturalness, which Carson reinforces. The book's title *Silent Spring*, sets the tone, evoking a disruption of annual seasons, the largest and most reliable natural cycle. The regular return of the robin (99), the "early mornings . . . filled with song" (97)—"all [this] is changed, and not even the return of the birds may be taken for granted" (99), says Carson, their absence leaving a silence she calls "eerie, terrifying" and "weird" (98). She describes as "sinister" (45) the chemicals that can do such strange things as speeding up animal metabolism to the point of death, or causing "the leaves of the oaks [to begin] to curl and turn brown, although it was the season for spring growth" (71). Her image of the sorcerer's cauldron reinforces these connotations.

IS NATURE OURS?

Carson's ethic of nature in *Silent Spring* was calculatedly moderate. She was careful not to express in the book her own sense that nature's rights exist apart from human needs, though she argued for the political representation of those who enjoy a noninstrumental (i.e., recreational and aesthetic)[12] relationship with nature. She claimed, for instance, that the suburban bird watcher's enjoyment of nature, or that of the hunter, fisherman, or explorer of wilderness, is just as legitimate as the interests of those ostensibly safeguarded by chemical spraying (84) and should be represented in decision making. "Who," she asks,

> has made the decision that sets in motion these chains of poisonings . . . 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 . . . 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? (emphasis added)

"The decision," she answers, "is that of the authoritarian temporarily entrusted with power." And through a typically indirect kind of formulation, whose significance in *Silent Spring* I will discuss later, she inserts a veiled call for greater public oversight: "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" (119).

Ultimately, however, the nature of *Silent Spring* remains a resource, albeit for the relatively benign ends of the hunter and wildlife enthusiast. I agree with Roderick Nash's and Donald Fleming's assessments of why Carson chose not to raise the more biocentric views, influenced in part by Transcendentalist thinking,[13] evident in her three earlier books[14] and unpublished works.[15] "The ethical philosophy displayed in *Silent Spring*," says Nash,

> is a blend of old ideas and new ones. Carson intended the book to shock Americans into awareness and action. She was angry. Her objective was to outlaw pesticides or at least greatly constrain their use. Like Muir and Leopold she wanted to be effective in the political arena, and she knew she would lose her audience if she stepped too far ahead of public opinion. As a result there is no direct mention in *Silent Spring* of the rights of insects, birds, fish, and other victims of the poisons.[16]

More than any of her previous works, says Fleming, *Silent Spring*

> was written to persuade and arouse. To this end Rachel Carson had to calculate her effects as never before, trim her sails to catch the prevailing winds. That was the great contrast between her last testament and Aldo

> Leopold's. He thought of himself as writing *A Sand County Almanac* for a minority. He was almost despairing at the changes that had to be wrought in the world to make it livable again, and [was] correspondingly reckless and intransigent, ready to throw off all disguises and defiantly insist on his own vision on his own terms, with no concession to the timid or temporizing. He would save absolutely all the species as a matter of 'biotic right,' and that was that, take it or leave it. Rachel Carson could not strike any such posture in *Silent Spring*. She could not defy the majority as if she despaired of reaching them, for she meant to get around them, however skeptical or hostile to begin with, and force them to capitulate. She certainly could not afford to lose them straight off by taking a religious tone about biotic rights.[17]

Instead, in a voice that was "studiously reasonable,"[18] Carson rallied a huge amount of scientific information on the impact of pesticides and appealed in her argument primarily to considerations of human health, prudence and, to a lesser degree, appreciation of nature as aesthetic and recreational resource. Keenly aware, no doubt, that human concern for the nonhuman is not distributed evenly over all of Creation, she presented images of destruction most likely to elicit her audience's empathy: the impact of chemicals on *young* animals or humans;[19] the poisoning of the emblematic Bald Eagle (111); and a page-long description of how pesticides undermine male virility (weakening bull sperm, for example, and causing smaller testicles in animals [186]).

Despite her vision of radical interconnectedness, Carson employs familiarly mechanistic, utilitarian, and industrial imagery in describing the natural world. At the cellular level, she images mitochondria as "powerhouses"; ATP and ADP as "a storage battery" or "a common currency of energy" that is circulated and exchanged; and cellular processes as a "rotating wheel" or "racing engine" (185). The soil life she describes has a sensible division of labor (58), and the plants are busy little factories: "harnessing" the sun's energy, "manufacturing" products (64), and "extracting" nutrients (59). Indeed, her argument for the conservation of soil microbiota and for the use of natural predators rather than chemicals to control insect populations is presented in sound (one might say ruthless) managerial and economic terms. Whereas chemicals are costly, soil microbes, a "horde of . . . ceaselessly toiling creatures" (58), provide free labor to "improve" the soil (59). And the industriousness of insects—"working," she marvels at them, "working in sun and rain, during the hours of darkness, even when the winter's grip has damped down the fires of life to mere embers" (222)—invites their enlistment as rather short-shrifted "allies" in our war against pests. One might argue that Carson could scarcely have described biological process otherwise in the early sixties—no other language was available. That is precisely my point: *Silent Spring*'s challenge to accepted thinking about nature was fused with quite conventional conceptions of it.

Hints of Carson's broader conception of natural rights emerge only subtly

at two points in the book: its dedication to Albert Schweitzer, with whose biocentric reverence for life she sympathized, and her complaint that innocent animals were "doomed by a judge and jury who neither knew of their existence nor cared" (118), where she seems implicitly (if only in metaphor) to extend a juridical model to include the rights of other species and to charge that due process was not observed.[20]

THE CONTRADICTIONS OF "NATURE"

Terms like "nature," the "natural," and the "balance of nature" have great discursive force not in spite of but because of their fuzziness. Their multiple connotations and self-evident (thus unexamined) definition within the community that shares them, enable protean versatility. We add great force to any argument by adducing the "natural" to it, so long as no one asks too carefully what we mean by the term. If they do, it will often turn out that nature (and its cognates) are not preexisting, ontologically firm objects or conditions in the natural world, but a reification of human criteria and definitions.

The socially defined nature of "nature" sometimes becomes apparent when the concept is used as a guide for concrete actions in the world, such as the appropriate way to "control" insect pests. Carson's approval of certain forms of biological over chemical methods, for example, ostensibly rests on their noninterference with "the balance of nature." The actual operative criteria, however, lie largely elsewhere, in judgments about the benefits and costs—to humans—of these methods.

The social criteria smuggled in through talk of "the balance of nature" emerge as internal contradictions in Carson's account. Why, for instance, is the importation of an exotic pathogen (a bacteria) to kill the Japanese beetle (93–95) a "natural" means of control? Is this intervention which, as Carson notes in passing in another context (94), kills not only the target species but at least forty other species in the scarabaeid family, more respectful of the balance of nature than certain pesticides?

Similar questions could be asked of each of the methods for "biological control" that Carson celebrates: juvenile hormones, chemical attractants, repellent sounds, microbial and viral infection of insects, introduced predators and parasites. Carson enthusiastically endorses, for instance, the dispersal of X-ray-sterilized males, and heralds the "complete extinction of the screw-worm in the Southeast" (247) as a "brilliant success" (248) and "a triumphant demonstration of the worth of scientific creativity" (247). Slipping into the same militaristic imagery to which she objects in the mentality of proponents of pesticide spraying, she writes approvingly of research by Dr. Knipling that turned "insect sterilization into a weapon that would wipe out a major insect enemy" (246).[21]

Surely the difference between this celebrated method of control (of an

unsavory insect responsible for livestock losses of $40 million a year [246]) and the chemical practices Carson castigates lies in the priorities and tastes of humans, rather than in the degrees of "naturalness" of these respective interventions. Had Carson chosen to cast the X-ray sterilization of males as unnatural, and rallied to this end the same rhetorical resources she uses in her discussion of pesticides, her description would have been quite different. The following is my imagined rendition of it:

> Rather than seeking to understand the intricate life cycle and ecology of this tiny insect, scientists invented a scheme that would allow them, by infiltrating the very heart of their natural reproductive cycle, to sever the link between generations. Day after day, in huge "fly factories," technicians bombarded male insects with mutagenic X-ray radiation and then, using twenty light planes working five to six hours daily, these insidious carriers of genetically altered material were dispersed over huge areas. Unsuspecting females mated with these seemingly normal products of the laboratory. While these unions produced eggs, these were, without exception, sterile. In less than two years, the species had vanished.

Though my version contains the same facts as Carson's celebratory account, its redirection of the rhetoric of "naturalness" turns a tale of creative triumph into a tragedy of technological hubris. This easy mutability of the "natural" into the "unnatural" highlights the extent to which it is human desires—rather than "nature" itself—that define which creatures belong in the balance of nature and what form that balance should take.

Murray Bookchin's analysis in *Our Synthetic Environment*, which did not rest on notions of a balance of nature as a guide to human interaction with the environment, is spared these particular paradoxes. Bookchin claims that the veneration of "nature as the only source of human health and well-being," and the "quasi-mystical" and unreserved valorization of the "natural state" as superior, are misguided, "an impediment to a rational outlook" (26–27). We should not, he asserts, be averse in principle to altering the environment technologically to create a new kind of community, if this is done with an eye first and foremost toward "promoting human health and fitness" (244). Of course, he cautions, the remaking of nature in the service of our own needs should be done with due caution and testing, since "an environmental setting developed by natural selection over many millions of years must be considered to have some merit" (30). But this is purely a pragmatic reticence, not a sentimental one: emotions in the presence of nature are not, for Bookchin, any indication of nature's special metaphysical status (as they were for the Transcendentalists with whom Carson sympathized), only a reflection of rational human needs. "Our nostalgia," he claimed, "springs neither from a greater sensitivity nor from the wilder depths of human instinct. It springs from a growing need to restore the normal, balanced, and manageable rhythms of

human life—that is, an environment that meets *our* requirements as individuals and biological beings" (240, emphasis added).

CARSON'S CALL FOR REGAINING BALANCE

Just as Carson's use of "natural balance" masks the social (in this case, the criteria informing the acceptability of certain forms of pest management), her framing of a solution to pesticide problems largely in terms of achieving an appropriate relationship with "nature" shifts attention away from the social roots of the destruction she describes. Later in this essay I describe Carson's reticence to discuss the political and economic forces that encourage heedless pesticide use. This disabled her capacity to talk about fundamental social interventions in the pesticide problem, leaving a respect for the balance of nature and ecological interconnectedness as her primary resources for its solution. The result is a reasonable, even inspiring repudiation of human arrogance, whose mildness and abstraction are proportional to the book's missing politics.

Thus, Carson's call for a science of biological control emphasizes a philosophical and epistemic problematic: the need for replacing an arrogant domination of nature with new attitudes. "Nature herself," she says, "has met many of the problems that now beset us, and she has usually solved them in her own successful way. Where man has been intelligent enough to observe and to emulate Nature he, too is often rewarded with success" (80).

But are insufficient humility (64) and lack of knowledge of natural process the barriers to solutions? Are they the reason for the recurring situation Carson describes, where cheap, effective, and harmless forms of biological control are overlooked in favor of harmful expensive chemicals? After all, as Carson knew, it was in the late nineteenth century, long before the synthesis of artificial pesticides, that a form of biological control saved California's citrus groves from the cottony-cushion scale in less than a year. The solution—a predator species, the ladybeetle (Vedalia)—was an acclaimed success not because it offered a more "natural" or ethically superior solution, but because it was simple, cheap, and outstandingly effective.[22] Biological control was not a newly discovered technology whose promise lay in the future, as one might surmise from *Silent Spring*, but one that had been investigated by the USDA for seventy-five years prior to the book's appearance, underfunded and mismanaged into decline, then given the coup de grace by the rise of faster-acting, profit-producing insecticides after World War II.[23] Nor were the many problems that plagued chemical pesticides (resistance, resurgence, toxicity, bioaccumulation) a surprise that surfaced only with widespread agricultural use in the postwar years; most were recognized decades before *Silent Spring* was published.[24]

Silent Spring opened a space that might have been occupied by an attempt to answer the difficult and messy political and economic questions of how pest

control might be guided by biological knowledge and democratically determined priorities, rather than the logic of capital accumulation. Instead, this space was more palatably filled with the hopeful ideal of biological control as Yankee ingenuity in service of a pastoral ideal. The pastoral mode, the most long-lived Western model for an appropriate relation to nature, proposes a middle ground between the wild and the overcivilized.[25] *Silent Spring*'s middle ground lies in the *status quo* it portrays as being disrupted by pesticides (as in the rustic idyll of the book's opening paragraphs), and in the science of biological control. The latter navigates between excessive technological hubris on the one hand, and a vulnerability to nature's wildness in the form of pests on the other, incorporating the best of human artifice and inventiveness while preserving a closeness to natural cycles and creatures. The relation to nature that Carson proposes is one of cautious "guidance" (243, 261), reasonable "accommodation" (261), sensitive "management" (80), and an ethic of "sharing" (261) rather than "brute force" (80). These are valuable orientations in themselves, but less so when they function as vague substitutes for attention to the relations of human groups to one another.

Science and Technology: Challenged and Affirmed

Part of *Silent Spring*'s success followed from its appearance at a moment ripe for a lucid, accessible, and nonthreatening statement around which anxieties about technology, and especially toxic hazards, could coalesce. In the larger background loomed the technological excesses of the two world wars, but more proximally, Americans had been anxious about fallout for well over a decade and had been shaken by the cranberry scandal of Thanksgiving 1959[26] and the thalidomide tragedy publicized a short while before the *New Yorker* version of *Silent Spring* appeared.[27] Carson makes masterly use of these preexisting anxieties. She loses no opportunity, for example, to underline the similarities between the chemicals she is introducing to public consciousness and the radiation people had grown to fear over the years,[28] or to heighten the aura of evil surrounding dangerous synthetic chemicals by muted but consistent reminders that these were fabricated by German chemists (32, 35).

More generally, Carson subtly but firmly challenges science's authority along almost every dimension. *Silent Spring* undermines scientific pretensions of omniscience, omnipotence, infallibility, and benignity. She reveals instead an enterprise that can at times be arrogant, gratuitously bellicose, childishly irresponsible, insensitive to nuance and complexity, unaccountable, and for all these reasons, in need of moderation by nonprofessional forms of knowledge and sectors of society.

Carson's discussion of pesticides and their impacts repeatedly highlights the limitations of scientific knowledge. These chemicals, which can defy

detection or identification by science (45), give rise to "little-understood interactions, transformations, and summations of effect" (45) whose impacts are not well understood. To a public accustomed to confident scientific proclamations, Carson presented a stream of admissions of limitation and helplessness. Of a composite of river pollutants, says a Professor Eliass, "We don't begin to know what that is. . . . What is the effect on the people? We don't know" (45). Of aquatic pollution Carson informs us, "The chemist who guards water purity has no routine tests for these organic pollutants and no way to remove them. . . . Investigators knew of no way to contain the contamination or halt its advance" (46–48). On fields contaminated by heptachlor she reports, "Scientists were unable to predict how long [they] would remain poisonous or to recommend any procedure for correcting the condition" (63). Her chapter on aquatic pollution ends with what seems like more holes than knowledge about the "unseen . . . unknown and unmeasurable effects of pesticides." "The whole situation is beset with questions for which there are at present no satisfactory answers . . . we do not know the identity [or] . . . total quality . . . and we do not presently have any dependable tests for identifying them . . . we do not know whether the altered chemical is more toxic than the original or less. Another unexplored area is the question of interactions between chemicals" (139).

Carson challenged not only the completeness of scientific knowledge, but also its unproblematic translation into the useful products and desirable mastery of nature that are often posed as the basis for scientific authority. In writing so extensively about the hazardous products of past scientific laboratories, and by showing that what scientists regard as safe today might turn out to be dangerous tomorrow (199), she contributed still further to the post-Hiroshima erosion of science's claim to benefit society. She suggested problems in mapping theoretical knowledge onto the real world, as when an engineering model is applied to agriculture (20) or an attempt is made to transfer laboratory-derived knowledge to the field (116). Most basically, she turned the story of pesticides toward a critique of the very project of the "control of nature," which is apt to "boomerang" (78), marking her skepticism by writing of pest "control" and "eradication" in quotation marks (117). "The control of nature," she says dramatically at the book's conclusion, "is a phrase conceived in arrogance" (261), and a science which is predicated on control as its sole criterion, and produces and uses pesticides accordingly, belongs in the "stone age."

In this questioning of the project of control, *Silent Spring* contains premonitions of the critique of instrumental rationality later made popular by Marcuse, Roszak, and others, and of subsequent claims by some feminist critics of science. Carson also anticipates the sensitivity of some of these later works to the metaphors and desires informing technological prowess. She rejects, for example, a scientific relation to nature modeled on warfare, and at times seems to mock the pesticide industry ("a child of the Second World War") for its use

of recycled military tools and imagery. Thus, she criticizes the spray planes sent on "a mission of death" to "wage" a "needless war" on blackbirds (118), and scorns those intoxicated with the "bright new toy" of chemical control (68).

As Carson undermines scientific authority, she also valorizes nonspecialist and local knowledge of nature. She does this implicitly, by drawing extensively on lay accounts of the destructiveness of pesticides (in the many letters and calls of concerned citizens she quotes), and by virtue of her own status as an expert despite her lack of a doctorate. She also does so explicitly by ranking the insight of "men of long experience with the ways of the land" favorably alongside that of scientists (67; see also 23), and by valuing the knowledge of those directly affected above the institutional prestige of professionals. "A glance at the Letters-from-Readers column of newspapers almost anywhere that spraying is being done makes clear the fact that citizens are not only becoming aroused and indignant but that often they show a keener understanding of the dangers and inconsistencies of spraying than do the officials who order it done" (106). It is for this reason that she trusts the suggestions of people at regional levels over the blanket recommendations of federal agencies (108).

Carson's call for democratic control and public accountability of scientists and the chemical industry is, for reasons I discuss below, partial and often indirectly phrased, but it is not entirely absent from the book. She highlights a lack of public oversight when she quotes an entomologist's complaint that regulatory entomologists function as "prosecutor, judge and jury, tax assessor and collector and sheriff to enforce their own orders" (22). Her typification of our era as one in which the right of industry to "make a dollar at whatever cost is seldom challenged" (23), and her noting of the impulse to shut out thoughts of "the sterile and hideous world we are letting our technicians make" (71) are (typically roundabout) appeals for greater public assertiveness. However, the book rests its confidence not so much on a more democratic process for setting priorities, but on the capacity of science to extricate society from the troubles it has created through new technologies of biological control. *Silent Spring* relied, finally, on scientific evaluation to establish the occurrence of environmental damage; it helped to make this a central component of subsequent environmental activism.

Politics, and Its Avoidance

In a brief review of Patricia Hynes's *Recurring Silent Spring*, a feminist analysis of Carson's life and of current pesticide issues, Peter Taylor remarks that a richly contextual account of the development of Carson's work and its reception "remains unwritten."[29] In particular, he would like to understand better how Carson was constrained by the audience she hoped to affect, contributing to the "political softness" of her account of the pesticide problem.

I agree with the need for such an account, but would want to reflect carefully on the question of political softness. Despite all its blind spots, *Silent Spring* is not entirely lacking in political bite, but more important, there is evidence that the book's moderation was in part a calculated move—Carson had a sharper critique of some of the political underpinnings of pesticide use than she let on. Was this softness, then, or tactical restraint, and can we condemn it if it resulted in the book's mass acceptance?

Before examining the politics that got left out of *Silent Spring*, let's look at what got in. Taylor overstates the claim that Carson "made no attempt to identify who profited from the situation she described and whose interests would be threatened by substituting biological for chemical control of pests."[30] Carson was explicitly critical, for instance, of the profit incentives of chemical manufacturers and resellers that skewed the definitions of certain plants as "weeds" (71), biased the gardening advice given to suburbanites (79), and encouraged irrational scientific research priorities (92) and spraying programs (69). In one exceptional paragraph, she offers an unusually direct explanation of why chemical control had outstripped biological control: chemical companies poured money into pesticide research, which promised them fortunes that biological control did not. This funding, she says, is the reason that "certain outstanding entomologists are among leading advocates of chemical control. Inquiry into the background of some of these men reveals that their entire research program is supported by the chemical industry. . . . Their professional prestige, sometimes their very jobs depend on the perpetuation of chemical methods. Can we expect them to bite the hand that literally feeds them? (. . .) Knowing their bias, how much credence can we give to their protests that insecticides are harmless?" (229).

Carson was even more outspoken where she did not have to weigh her statements so carefully as she felt she needed to in the book. In a talk at the Women's National Press Club on December 5, 1962, Carson told her audience of a reviewer who had been offended by the above charge. "I can scarcely believe the reviewer is unaware of [the support of university research by pesticide manufacturers]," she continued, "because his own university is among those receiving such grants." She then went on to call attention to research in the *Journal of Economic Entomology* whose academic writers acknowledged support from Shell, Velsicol, and Monsanto.[31] On another occasion, she was asked to respond to the American Medical Association's suggestion that doctors direct patients concerned about pesticides to the chemical trade associations for information. "I can't believe," she told her interviewer, "that the AMA seriously believes that an industry with $300 million a year in pesticide sales at stake is an objective source of data on health hazards."[32]

Carson's collaboration with Clarence Cottam, one of her closest confidants in compiling *Silent Spring*,[33] further indicates her considerable awareness of the role of profit incentives in creating the problem she documented.

Cottam, who resigned from his post as assistant director of the USDA Biological Survey, was probably Carson's key source of information on the fire ant eradication program Carson describes (98, 129–131, 146–156). He was sharply critical of the effort and not afraid to complain of "the hustling salesmanship of the free enterprise system,"[34] or to ask the Agricultural Research Service responsible for the program in February 1960, "who was profiting from the excess use of poison?"[35] Before its publication, Cottam reviewed Carson's manuscript and warned her what she might expect: "I am convinced you are going to be subjected to ridicule and condemnation by a few. Facts will not stand in the way of some confirmed pest control workers and those who are receiving substantial subsidies from pesticide manufacturers."[36] Writing in the *Sierra Club Bulletin* after the book's appearance, Cottam dismissed the suggestion that *Silent Spring* should have presented the "other side" of the pesticide issue. "Hasn't [the benefit of pesticide use] already been overemphasized by a multi-billion dollar industry employing the most experienced salesmen and lobbyists available?"[37]

There is clear evidence then that Carson knew whose interests were served by the situation she described, though she kept much of this critique out of the book. I suspect it would be fascinating to look through early drafts of *Silent Spring* and her correspondence to understand at a finer level the process of and pressures for exclusion.[38] Remember that she wrote in what some have called the "McCarthy era of the environmental movement," in which those who questioned the use of pesticides were specifically branded as being against the spirit of free enterprise.[39] After the appearance of the *New Yorker* articles, for example, Louis A. McLean, secretary and general counsel of Velsicol, the sole manufacturer of chlordane and heptachlor, sent a five-page registered letter to Houghton Mifflin suggesting they might want to reconsider publishing *Silent Spring*. His letter built up to the following statement.

> Unfortunately, in addition to the sincere opinions by natural food faddists, Audubon groups and others, members of the chemical industry in this country and in Western Europe must deal with sinister influences whose attacks on the chemical industry have a dual purpose: (1) to create the false impression that all business is grasping and immoral, and (2) to reduce the use of agricultural chemicals in this country and in the countries of Western Europe, so that our supply of food will be reduced to east-curtain parity. Many innocent groups are financed and led into attacks on the chemical industry by these sinister parties.[40]

While this was an extreme reaction, it indicates the climate in which Carson wrote and chose to moderate her claims.

Not all this moderation was calculated ploy, of course. Nothing in Carson's background had provided her with a framework for analyzing and talking about the structural determinants of environmental destruction. In this respect, it is

useful to compare her work with that of Murray Bookchin, who in the same period drew from a Marxist and anarchist tradition[41] to present a more fully social and political critique of some of the same problems. Published half a year before *Silent Spring*, *Our Synthetic Environment*—while lacking Carson's lyricism and evocative images of poisoned wildlife—was a much more comprehensive, multidimensional, and above all politically far-reaching work.

Bookchin documents a range of challenges to human well-being that result from life in an industrialized society. His treatment of pesticides in agriculture (97–104) is thorough and brisk, touching on many of the same significant concepts as Carson, such as their physiological impacts, their tendency to concentrate in fat, the growing insect resistance, and in much bolder terms, the economic incentives that perpetuate the use of dangerous pesticides. This discussion forms only part of his chapter on chemicals in food, which also treats the dangers associated with the use of synthetic hormones and antibiotics, and it is one chapter out of eight devoted to other problems in agriculture, urban life, chemicals in food, the environmental causes of cancer, radiation, and human health.

Bookchin's work is also deeply social, never losing sight of how these various challenges to human well-being result from particular social arrangements. Bookchin's emphasis in his work almost inverts the dictum of Albert Schweitzer that Carson chose as her motto: "that we are not being truly civilized if we concern ourselves only with the relations of man to man. What is important is the relation of man to all life."[42] *Our Synthetic Environment*, Bookchin declared in his 1974 preface, "is concerned not only with the relationship of humanity to nature and the balance of nature; it is even more fundamentally concerned with the relationship between human and human. The book advances the notion that there can be no sound natural environment without a sound, ecologically oriented social environment."[43]

Environmental problems cannot be solved through "remedial legislation" (226–237) alone, he claimed, but demand an alternative to a capitalist economy[44] in which "the most pernicious laws of the market place are given precedence over the most compelling laws of biology" (26). The book contains in embryonic form the critique of domination that Bookchin developed extensively in his later works (52–53), and its vision of agricultural and urban regionalism and decentralized "communities of human scale" (244–245) anticipates bioregional thought. An America ready to take this book to heart to the same extent it did Carson's would have been and become quite a different place.

Bookchin's unabashedly political orientation highlights what *Silent Spring* did not do, though *Our Synthetic Environment*'s failure as a work of mass appeal might make us more forgiving of those "limitations." In the remainder of this section, I look more closely at how the absence or evasion of a political analysis is felt in *Silent Spring*: the rhetorical means by which Carson avoided the

political implications of the problem she had exposed, and how these strained the logic of her text. My examples concern the book's lack of specificity about the identity of responsible agents; its consistent refusal to follow case studies through to their logical (political) implications; its gentle tread in impugning motives of greed in that minority of cases where a responsible agent is mentioned; and its penchant for passive sentence constructions in critical places, which helped to achieve the diffusion of identity and agency. It is as if Carson believed it was enough to voice the sheer facts of pesticides' destructiveness, carefully and fully, and wait for public opinion to do the rest.

With the exception of the Rocky Mountain Arsenal of the Army Chemical Corps (47), Carson does not name a single manufacturer of chemicals or other delinquent party. In some places in the book she must have consciously restrained herself, so appropriate would specific names have been. She mentions, for example, "a chemical plant" that had been dumping pesticide wastes for ten years, but does not name it (134). Why? Carson's avoidance of brand names in discussing a new carcinogenic chemical used against mites and ticks (199–200) requires a stream of nonspecific circumlocutions: "a chemical," "this chemical," "the chemical," "the product," "the suspected carcinogen," and so on. How much simpler, though more politically challenging, to have said Aramite.[45] More frustrating is the avoidance of brand names in her complaint about the innocuously named weed-killers sold for suburban lawns that do not list their ingredients (which include chlordane and dieldrin), nor mention their dangers (161). Wouldn't she have served her audience well by noting some of these brand names at this tantalizingly apt point, thus working directly to end, not just describe, the facade of benignity of which she is critical?

Another pattern of evasion recurs at a larger scale in Carson's consistently elliptical capping of her descriptions of irrational pesticide use. Repeatedly she builds a careful case to show that the instances of spraying she describes were not only harmful to humans and wildlife, but unjustified even in terms of biological effectiveness or economic payoff to farmers. Why did spraying take place nonetheless? Carson's scenarios demand an answer, but hers is vague or often lacking altogether. The reader is left to make their own inferences or, more likely, to ignore the troubling questions these narrative lapses signal. This kind of hanging question seems to be most comfortably accommodated at the end of sections. "The science of range-management," she says in the last sentence of chapter 6, "has largely ignored [the] possibility [of biological control of weeds by plant-eating insects] although these insects . . . could easily be turned to man's advantage" (81–82). "There is no dearth of men who understand these things," she says in the last sentence of another section, "but they are not the men who order the wholesale drenching of the landscape with chemicals" (73). "Funds for chemical control came in never-ending streams," she says elsewhere, "while the biologists . . . who attempted to measure the damage to wildlife had to operate on a financial shoestring" (89). Why the

marginalization of effective biological control? the distance between those who know and those who order? the discrepancy between budgets for inventing chemicals and for studying their damage? Carson's silence on these questions buries the problem of the democratic control of science, technology, and production.

To the extent that Carson does trace the origins of the destruction whose "irrationality" she has exposed, her account of agency is feeble and diffuse and her blame is mild. People's destruction of the environment stems from their failure to "read" the "open book" of the landscape (65); facts about pesticides' destructiveness are denied out of "shortsightedness"[46]; spraying continues because of "entrenched custom" (74) or "surely, only because the facts are not known" (75).[47] "We are walking in nature like an elephant in the china cabinet," she quotes a scientist of "rare understanding" (77) as saying, implying "our" problem to be one of clumsiness.[48] And in choosing the "man with the spray gun" (83) as her icon of destructive pesticide use (rather than a symbol pointing back to the government agency, the chemical manufacturing tycoon, or the market), she locates agency in and directs expectations of responsibility toward only this most visible and least structural of entities.

Carson's frequent use of passive or negative sentence constructions further supports this masking of agency and blame. She uses a passive construction, for example, in explaining why a simple change in agricultural practices (a shift to a different variety of corn) was not the chosen solution to a problem with crows. Though this measure would have obviated the need for spraying with harmful pesticides, she explains, "the farmers *had been persuaded* of the merits of killing by poison" (118, emphasis added). Her excision of the subject closes down a crucial line of investigation. The following typical example of a negative formulation lessens blame even as it assigns it. "Because the spray planes were paid by the gallon rather than by the acre," Carson says, "there was no effort to be conservative" (145–146). How much more powerful would this sentence have been had its latter part been directly and positively phrased: "they tried to use as much as possible." (It also would have helped had she worked to unreify "spray planes" and see exactly which *people* were paid.)

Similar passive constructions pervade her description of the development of the fire ant eradication program mentioned earlier in connection with Carson's outspoken informant, Clarence Cottam. Initially the fire ant was not felt to be a particularly serious pest, but:

> with the development of chemicals of broad lethal powers, *there came* a sudden change in the official attitude toward the fire ant. . . . The fire ant suddenly *became the target* of a barrage of government releases, motion pictures, and government-inspired stories portraying it as a despoiler of southern agriculture and a killer of birds, livestock, and man. A mighty campaign *was announced*. . . . The fire ant *was pictured* as a serious threat to

> southern agriculture. . . . Its sting *was said* to make it a serious menace to human health, etc. (146–147, emphasis added)

Carson assigns agency for this development, but weakly and indirectly, relying on the following quote from a trade journal to hint at why a widely criticized program she calls "ill conceived and badly executed" received continuing support: "United States pesticide manufacturers appear to have tapped a sales bonanza in the increasing numbers of broad-scale pest elimination programs conducted by the U.S. Department of Agriculture." Imagine the rather different effect that might have been achieved by a description in which the italicized phrases were in active form, and in which Carson used her own voice to speak of the "creation" rather than the "tapping" of a sales bonanza.

Carson's account of the Japanese beetle spraying program in southeastern Michigan (85–95) further illustrates the mechanisms she used to depoliticize her writing, and how these undermine the logic of her account. She tells of a method of biological control for the beetle that was found to be efficient in the eastern states. Why then was this not employed in Michigan, rather than spraying, she asks? She eliminates two possible explanations: biological control was actually less expensive than spraying, and it would have been effective even at the limits of the beetle's range in Michigan. Her explanation of why the spraying she has now posed as irrational occurred nonetheless points to two agents: (1) those who "want immediate results at whatever cost"—a valid point about a (broad cultural?) bias toward immediate gratification, though one that begs the question of the attitude's origins and bearers; and (2) those "who favor the modern trend to built-in obsolescence, for chemical control is self-perpetuating, needing frequent and costly repetition" (95). The latter is an extremely nonspecific and indirect way of speaking about profits and who makes them, and neither assertion helps to understand how these interests have come to dominate the science, policy, and decision making surrounding beetle treatment.

Conclusions

In *Silent Spring*, Carson drew on familiar and widely shared conceptions of nature, and especially the balance of nature, to frame the pesticide poisoning she wanted to stop. She artfully harnessed and imaginatively inflected these to portray the damage the new chemicals caused, and to frame what it was they disturbed that should be restored. Her portrait of an increasingly and needlessly toxic landscape had the potential to dismay and anger; but its galvanizing capacity was directed largely away from questioning the ground rules of capitalist economy that shape destruction-inducing incentive structures in agriculture and pesticide production, and toward a diffuse critique of institu-

tional oversight and scientific and technological arrogance. Thus, she both challenged and placated, extended and maintained, existing world-views.

Several factors conditioned the book in this way. First, Carson's perspective was partial; her location curtailed her analysis even as it provided its strengths. Neither her background, nor her identities as a scientist within a government bureaucracy and a nature writer, had provided her with the experiences or theoretical resources to push through the kind of political analysis that Bookchin did. But they gave her tools to stir readers and make a convincing appeal, of limited scope, for rationalizing scientific and bureaucratic relations to pesticides. Bookchin's viewpoint was partial in its own way; his radical proposal drew on, and was continuous with and limited by, a different set of conventions in Marxist thought. Both authors shared the blind spots of their times: neither considered, for instance, the impacts of the increasing portion of U.S. pesticide production exported to the Third World.

Second, I have already mentioned Carson's desire to make herself and her message less vulnerable to the antagonism she knew the book would evoke. A third factor in the book's tameness was its crafting by Carson to ensure the largest possible constituency for the changes she hoped to catalyze. She knew from her own experience how difficult it was to change one's view of the human relation to the natural world in response to the challenge of new information. In 1958, as she began gathering her thoughts toward writing about the impact of DDT, she described her own struggle in this respect.

> I suppose my thinking began to be affected soon after atomic science was firmly established. Some of the thoughts that came were so unattractive to me that I rejected them completely, for the old ideas die hard, especially when they are emotionally as well as intellectually dear to one. It was pleasant to believe, for example, that much of Nature was forever beyond the tampering reach of man: he might level the forests and dam the streams, but the clouds and the rain and the wind were God's. It was comforting to suppose that the stream of life would flow on through time in whatever course God had appointed for it—without interference by one of the drops of that stream, Man. And to suppose that, however the physical environment might mold Life, that life could never assume the power to change drastically—or even destroy—the physical world.
>
> These beliefs have been part of me for as long as I have thought abour such things. To have them even vaguely threatened was so shocking that I shut my mind—refused to acknowledge what I couldn't help seeing. But that does no good, and I have now opened my eyes and my mind. I may not like what I see, but it does no good to ignore it, and it's worse than useless to go on repeating the old "eternal verities" thar are no more eternal than the hills of the poets. So it seems time someone wrote of life in the light of the truth as it now appears to us. And I think that may be the book I am to write.[49]

Aware of how slow and painful it was to rework her own world-view in light of new facts, Carson must have realized how difficult it would be for her

account of pesticides to alter the sensibilities of others appreciably, especially those who did not share her training or deep love of nature. Thus, she did not aim for a full-scale conversion of her audience's world-view, only "to persuade ordinary prudent men to be more cautious at the main points of stress upon the ecological system."[50]

Carson's achievement of what may seem to us a limited goal raises at least three kinds of fascinating and important questions. First is an evaluation of the ultimate efficacy of *Silent Spring* as a political intervention. My essay has repeatedly touched on the tension between the book's achievements and limitations. On the appreciative side, one could argue that changes brought about by *Silent Spring* were an important partial step toward a radically different world, and a necessary platform on which later, more far-reaching proposals could stand. Carson was the best messenger one could hope for—a skilled writer with the best available facts and a solidly innocuous reputation that gave her both the public's trust and access to an optimal platform of three consecutive issues of the *New Yorker* during the summer months. The angry response to her work in many quarters indicates that even Carson, who artfully rallied every conceivable appealing trope in the service of her cause, could not have pushed harder without losing her broad audience. And this audience was essential to what she achieved: a book on top of the bestseller list could not be ignored by the media, the scientific community, or the Kennedy administration. That the comprehensive, uncompromising *Our Synthetic Environment*, which was the best political *analysis* one could hope for at the time, had no political *impact*, is further indication that *Silent Spring* stood at the outer limits of acceptability. This evaluation should give us pause before speaking of *Silent Spring*'s political "tameness" or "softness," for isn't the capacity to reach out to people where they are and persuade them, a strength?

At the same time, we must ask difficult questions about *Silent Spring*'s limitations. To what extent, for example, is a partial analysis a wrong analysis? Specifically, did the book mystify the pesticide issue by largely ignoring the ways in which the problem is rooted in a capitalist economy? Must *Silent Spring*'s popularity be weighed against the degree to which it eclipsed Bookchin's more "politically pointed" work?[51] Did it make subsequent radical analyses more difficult? Was its reformist framework for thinking about pesticides, which sent future efforts down the track of remedial legislation rather than the fundamental democratization of research, technology and production, a distraction rather than a first step? After all, agriculture and the chemical industry could respond relatively easily to such legislation. Restrictions placed several years later on organochlorines (the earliest generation of synthetic pesticides such as DDT) did not halt their continued manufacture for export, or the development and profitable production of other pesticides, or recent attempts to genetically engineer profitable and hazardous pest- and pesticide-resistant crops, or most

generally, the trend toward increasingly mechanized and chemicalized large-scale agriculture. Thirty years after *Silent Spring*'s publication, the executive director of the National Coalition Against the Misuse of Pesticides could still describe the crossroad facing America as the choice between "promoting safer alternative pest management techniques or simply substituting less toxic inputs into conventional pesticide-intensive practices," and complain about "the extremely limited support for alternative practices from most mainstream agricultural institutions."[52] Our celebration of the book's achievements must be tempered by a consideration of how little has changed fundamentally.

These two sides to an evaluation of *Silent Spring*'s impact are intended not to judge, dispirit, or confuse, but to clarify important topics: the limits of what could be said and widely heard in that particular historical moment; how Carson's critique embodied and perpetuated the limited viewpoint of its author and assumptions of its times; the mechanisms that favored the emergence and circulation of her more moderate criticism; and how such criticism could, despite these constraints, initiate more fundamental change. To investigate these more fully would require integrating the mostly internal reading of *Silent Spring* I have attempted here with an analysis of the following: (1) the network of factors facilitating the use of pesticides in America up until 1962[53]; (2) the processes of production and reception of both Carson's and Bookchin's work, with special attention to their respective blind spots and the pressures to blunt the strength of their critiques; and (3) *Silent Spring*'s impact on this network through its unfolding effects on subsequent legislation, scientific research, and the framing of environmentalist demands.[54] Some of these effects (and thus, the successes of *Silent Spring*) are more subtle and circuitous than appears at first glance: not simply the subsequent banning of DDT, for example, but the initiation of a slow process that raised the cost of approving a new pesticide so high that alternative forms of pest management have begun to be economically feasible.

The foregoing attempt at historical evaluation is closely allied to a second set of questions raised by *Silent Spring*. What are the implications of Carson's successful amalgam of change and continuity for political strategy on the Left today? What continuities with conventional understandings of nature are contained in protests that ostensibly break with them? When do we attempt to weed out these conventional elements, and when do we use them as persuasive resources? (Essentialisms of various sorts are, after all, powerfully galvanizing to public opinion.)[55] In what situations is a certain calculated political blandness strategically preferable to presenting radical utopias in attempts to mobilize a broad public? To what extent should we adjust the scope of calls for change in order to remain within the bounds of the popular imagination? When facing a specific political challenge, how are

we to find answers to these questions, which cannot be decided on the basis of first principles? And is this too simple and arrogant a model of critical cultural production: does the confident "we" in these questions usually have this much choice and opportunity for premeditation as it considers which aspects of a preexisting perspective it should pour into less enlightened heads?

The third set of questions that emerges from this study concerns more general consideration of what has changed and what remained the same through past shifts in environmental world-view. For example, even in a transition with such drastic and thoroughgoing impacts on the human relationship to nature as the seventeenth-century rise of the mechanical world-view, one finds continuities and precursors. Cultural elements consonant with the emerging scientific paradigm had existed sotto voce in earlier periods, and the organic world-view marginalized by the newly dominant scientific world-view did not disappear entirely, but went underground or mutated into other forms; these persist as potential counterhegemonic cultural elements up to the present.[56] The complex admixture of the old and new in ideas, books, and programs for change is a truism of intellectual history. *Silent Spring*'s impact suggests it might be worth paying attention to how events, artifacts, or movements that balance dislocation and continuity in felicitous ratio facilitate these shifts, easing the emergence of the novel by couching it in familiar forms.

Acknowledgments

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Notes

1. Rachel Carson, *Silent Spring* (New York: Ballantine, 1962). On the book's impact, see Frank J. Graham, *Since Silent Spring* (Boston: Houghton Mifflin, 1970); and Linda Lear, "Rachel Carson's *Silent Spring*," *Environmental History Review*, 17, no. 2 (1993): 23–48. Most of the biographical detail in the following several paragraphs is drawn from Lear's excellent article.

2. This can be read as a necessary but partial contribution to an as yet unwritten, broader contextual analysis of the construction and reception of *Silent Spring*. See Peter Taylor's call for such an analysis in his review of books by Rosaleen Love and Patricia Hynes, "Feminist Tales," *Science, Technology, and Human Values* 16, no. 4 (1991): 540–543.

3. Lear, "Rachel Carson's *Silent Spring*," p. 36.

4. Murray Bookchin, *Our Synthetic Environment* (New York: Knopf, 1974). The original edition appeared in 1962 under the pseudonym Lewis Herber. The 1974 edition appeared under Bookchin's name with an extensive introduction.

5. Described in Graham, *Since Silent Spring*, p. 56; see also Lear, "Rachel Carson's *Silent Spring*," n.49.

6. Page numbers in text hereafter refer to *Silent Spring*.

7. Frank N. Egerton, "Changing Concepts of the Balance of Nature," *Quarterly Review of Biology* 48 (1973): 322–350; W. F. Bynum, E. J. Browne, and Roy Porter, *Dictionary of the History of Science* (Princeton, N.J.: Princeton University Press, 1981), s.v. "economy of nature."

8. See Carson, *Silent Spring*, pp. 179–80.

9. Similarly, aspects of the inner ecology are discovered through their vulnerability. We become aware of the many ongoing miraculous processes that maintain cellular and physiological health by observing the consequences of their disruption.

10. For the kinds of attitudes and beliefs that *Silent Spring* helped to alter, see Nancy Kraus, Torbjörn Malmfors, and Paul Slovic, "Intuitive Toxicology: Expert and Lay Judgments of Chemical Risks," *Risk Analysis* 12, no. 2 (1992): 215–232, especially sect. 3.3 and n.11. Funded by Dow and Monsanto, this article tends toward a stance of "correcting" intuitive understandings so as to bring them into line with the more prochemical perceptions of professional toxicologists. As the authors point out, intuitive understandings of toxic exposure may be influenced by magical thinking about "contagion" and "contamination"; a similar line of thought has been developed by Mary Douglas in *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (New York: Praeger, 1966).

11. Carson quotes René Dubos: "Men are naturally most impressed by diseases which have obvious manifestations, yet some of their worst enemies creep on them unobtrusively" (169).

12. On aesthetic considerations, see Carson, *Silent Spring*, pp. 69–71. On nature as, quite literally, a resource akin to veins of copper and gold, see Carson's quotation of Justice Douglas on p. 72.

13. Donald Fleming, "Roots of the New Conservation Movement," *Perspectives in American History* 6 (1972): 7–91; see pp. 11–14.

14. Carson, *Under the Sea Wind* (New York: Dutton, 1941); *The Sea Around Us* (New York: Oxford University Press, 1951); *The Edge of the Sea* (Boston: Houghton Mifflin, 1955).

15. See Paul Brooks, *The House of Life: Rachel Carson at Work, With Selections from Her Writings Published and Unpublished* (Boston: Houghton Mifflin, 1955).

16. Roderick Nash, *The Rights of Nature: A History of Environmental Ethics* (Madison: University of Wisconsin Press, 1989) p. 79.

17. Fleming, "Roots of the New Conservation Movement," pp. 29–30.

18. Ibid., p. 32.

19. Carson, *Silent Spring*. See her discussions of the Clear Lake Grebes (51) and of pesticides in baby food (62).

20. An extension explicitly and extensively attempted in subsequent environmental ethics.

21. In other places, too, Carson celebrates the ability of biocontrol to "forge weapons from the insect's own life processes" (251), or looks to helpful insects as a means to "keep at bay a dark tide of enemies" (222).

22. Paul deBach and David Rosen, *Biological Control by Natural Enemies*, 2nd ed., (New York: Cambridge University Press, 1991), pp. 140–148.

23. Richard C. Sawyer, "Monopolizing the Insect Trade: Biological Control in the USDA, 1888–1951," *Agricultural History* 64, no. 2 (1990): 271–285.

24. Thomas R. Dunlap, *DDT: Scientists, Citizens, and Public Policy* (Princeton, N.J.: Princeton University Press, 1981); John H. Perkins, *Insects, Experts, and the Insecticide Crisis: The Quest for New Pest Management Strategies* (New York: Plenum, 1982); James Whorton, *Before Silent Spring: Pesticides and Public Health in pre-DDT America* (Princeton, N.J.: Princeton University Press, 1974); John H. Perkins, "Reshaping Technology in Wartime: The Effect of Military Goals on Entomological Research and Insect-Control Practices," *Technology and Culture*, 19, no. 2 (1978): 169–186; Robert van Den Bosch, *The Pesticide Conspiracy* (Berkeley: University of California Press, 1978); Edmund P. Russell, "Safe For Whom? Safe for What? Testing Insecticides and Repellents in World War II," presented at the meeting of the American Society for Environmental History, Pittsburgh, 1993; Angus A. MacIntyre, "Why Pesticides Received Extensive Use in America: A Political Economy of Agricultural Pest Management to 1970," *Natural Resources Journal* 27, no. 3 (1987): 533–578.

25. On the pastoral, and especially its adaptation to particularly American circumstances, see Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (Oxford: Oxford University Press, 1964); Marx, "Does Pastoralism Have a Future?" in *The Pastoral Landscape*, ed. John Dixon Hunt (Washington, D.C.: National Gallery of Art, distributed by University Press of New England, Hanover, N.H., 1992), pp. 209–225.

26. The FDA banned cranberries sprayed with aminotriazol. See Brooks *The House of Life*, pp. 261–262.

27. Graham, *Since Silent Spring*, pp. 50–51.

28. Carson highlights their relatedness at every opportunity. She calls them "partners of radiation" (184); introduces chemical-induced mutation as "radiomimetic" (189); and equates a Japanese fisherman caught in fallout on the boat *Lucky Dragon* with the Swedish farmer exposed to indiscriminately sprayed pesticides ("For each man a poison drifting out of the sky carried a death sentence. For one, it was radiation-poisoned ash; for the other, chemical dust" (204). See also pp. 43, 168, 209. On the book's background in A-bomb anxieties see Graham, *Since Silent Spring*, p. 40. On the connection with fallout, see R. H. Lutts, "Chemical Fallout: Rachel Carson's Silent Spring, Radioactive Fallout and the Environmental Movement," *Environmental Review* 9 (Fall 1985): 211–225.

29. Taylor, "Feminist Tales."

30. Ibid., p. 542.

31. Graham, *Since Silent Spring*, p. 71.

32. Ibid., p. 58.

33. Ibid., p. 26.

34. Ibid., p. 27.

35. P. Daniel, "A Rogue Bureaucracy: The USDA Fire Ant Campaign of the Late 1950s," *Agricultural History* 64, no. 2 (1990): 99–114; see p. 110.

36. Graham, *Since Silent Spring*, p. 36.

37. Ibid., p. 63.

38. Carson had reason to fear both for her own well-being as well as for the survival of her message. Mundanely but critically, she was terrified of being bankrupted by libel suits; her publisher, who took out extra insurance with Lloyd's before the book's publication, also anticipated trouble. Lear, "Rachel Carson's *Silent Spring*," n.42.

39. Graham, *Since Silent Spring*, pp. 29–30.

40. Ibid., p. 49.

41. In his 1974 introduction, Bookchin traces his social analysis to Kropotkin, Mumford, and Paul Goodman. *Our Synthetic Environment*, p. lxxii.

42. Carson, address on receipt of the Schweitzer Medal of the Animal Welfare Institute, 7 January 1963. Quoted in Brooks, *The House of Life*, p. 316.

43. Bookchin, *Our Synthetic Environment*, pp. xviii–xix.

44. In his 1974 introduction, Bookchin has a clearer statement of what was only implicit in his original work. Environmental destruction is a "tendency inherent in the social system" of capitalism. It stems not from "moral delinquency" or even "greed," but "from a market-oriented system in which everything is reduced to a commodity, in which everyone is reduced to a mere buyer or seller, and in which every economic dynamic centers on capital accumulation." *Our Synthetic Environment*, p. xxxiii.

45. From Carson's notes on her sources (284), I infer this to be the name of the chemical.

46. In its full context, this phrase might be read as ironic.

47. Here, too, I detect a possible irony in her use of "surely, only . . ."

48. See also her use of a shotgun metaphor (67), implying that imprecision is the problem.

49. Quoted in Graham, *Since Silent Spring*, pp. 13–14.

50. Fleming, "Roots of the New Conservation Movement," p. 30.

51. Taylor, "Feminist Tales," p. 542.

52. Jay Feldman, "Thirty Years after *Silent Spring*, the Choice is Clear," *Global Pesticide Campaigner* 2, no. 4 (1992): 11–12.

53. A remarkably comprehensive analysis of this network is given in MacIntyre's "Why Pesticides Received Extensive Use in America," but he more or less brackets the "relatively fixed conditions of American political culture and market economy" (p. 575) that underlie the more proximal causes he discusses. It is precisely *Silent Spring*'s capacity to make inroads into these that is at issue.

54. For analyses of Carson's impact, see the sources cited in MacIntyre, "Why Pesticides Received Extensive Use," p. 551, n.75, and anthologized in David Wade Chambers, ed., *Worm in the Bud: Case Study of the Pesticide Controversy* (Victoria, Australia: Deakin University Press, 1984).

55. More fundamentally, the very notion of "essentialism," or at least its current functions as taboo and conversation stopper and its unproblematic opposition to constructionism, needs to be examined. See Diana Fuss, *Essentially Speaking: Feminism, Nature, and Difference* (New York: Routledge, 1989).

56. See Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco: Harper and Row, 1980).