

Women, Scientists, Agitators: Magazine Portrayal of Rachel Carson and Theo Colborn

By Julia B. Corbett

This study utilized a theoretical framework of the media's role in reporting conflict and uncertain science, and feminism and science in a thematic analysis of magazine coverage given Rachel Carson and "the Rachel Carson of the '90s," Theo Colborn. Carson and Colborn's identities as women, scientists, and agitators led critics to charge that their work was nonscience or they were nonfeminine. Their scientific claims, which were essentially co-opted, blurred nature/culture boundaries and challenged the power structure and scientific authority. Discussion centers on the media's role in reifying the epistemic authority of science and media portrayal of female scientist-agitators who step outside the boundaries of traditional science.

When Theo Colborn, a woman zoologist in her 50s, wrote a book in 1996 about the dangers of chemicals to wildlife and humans, it was only natural that she was compared with Rachel Carson. After all, Carson was a woman zoologist in her 50s when she published *Silent Spring* in 1962. Both women called for thorough investigations of the effects of commonly used chemicals on soil, water, wildlife, and humans. Carson was concerned about DDT—but also about 2,4-D, 2,4-T, DDE, aldrin, dieldrin, malathion, and heptachlor—and the ability of these chemicals to kill wildlife and disrupt reproduction and to cause health problems and cancer in humans. In Colborn's book, *Our Stolen Future* (1996), this "modern-day Rachel Carson" discussed virtually all of the same chemicals plus the newer PCBs, DES, and dioxin, concluding that these substances—referred to as endocrine disruptors—sent chemical messages capable of mimicking hormones and disrupting reproductive and endocrine systems in both wildlife and humans.

Despite the similarities between the women and their work, the 34 years between *Silent Spring* and *Our Stolen Future* were marked by tremendous amounts of social change. On the heels of the women's movement, women scientists gained

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considerable ground (Sonnert, 1995), occupying much more prominent roles in government, industry, and academics. After the revitalization of the environmental movement in the 1960s and 1970s, environmental groups flourished and gained greater access to policy making and public debate, greatly affecting public awareness and public opinion toward environmental issues (Shabecoff, 1993).

Does this portend a different media reaction in the 1990s to a woman scientist sounding the alarm? In other words, does media coverage reflect widespread environmental awareness and the position of women in the workplace by treating a female scientist who warns of environmental dangers and challenges current scientific thinking with more credence than the media initially granted Carson in 1962?

To help answer this question, this study employs a theoretical framework that revolves around the role of media in the reporting of conflict within the social system (Olien, Tichenor, & Donohue, 1995). Although mass media often report on agitators' calls for social change, coverage nevertheless will support the established power structure and existing power relationships, performing a social control function (Demers & Viswanath, 1999; McLeod & Hertog, 1999). Through the use of quoted sources, story framing, and treatment of the agitators, media stories give powerful naysayers more than equal opportunity to rebuke the claims and maintain the current balance of power. If the agitator receives legitimation or if evidence supporting the agitator appears incontrovertible, media coverage may shift in support of the agitator (Olien, Tichenor, & Donohue, 1989).

According to this macrosocial framework, media are dependent on the power structure for news and look to it for cues to the importance and veracity of claims, both scientific and political (Donohue, Tichenor, & Olien, 1995). Because of this direct dependency, media coverage can be expected to take note of changes over time in the balance of power and social structure—such as changes produced by the women's and environmental movements. In this study, the agitators were female scientists who advocated for environmental changes through popular books. Although women generally held more power in the social system in the 1990s than in the 1960s, they often still exist at the edges of power and influence structures. The literature on feminism and science suggests that science historically has granted more power to men and that scientific values reward masculine-associated qualities (Fee, 1986; Keller, 1989; Schiebinger, 1987). A female scientist advocating social (and scientific) change, both then and now, could be marginalized within the scientific community and by the media who take cues from it, particularly in matters of uncertain science and social policy. One could expect a similar outcome regarding media reporting of environmental issues; despite dramatic increases in public awareness and coverage since the 1960s, media are still likely to support current relationships toward the natural world over claims by agitators for change.

This theoretical framework moves the analysis beyond a historical comparison of two women agitators to inform us more broadly about the media's role in perpetuating and reifying the epistemic authority of science and the ramifications for those who challenge it. Answers to the research question have implications for several areas of media scholarship, including science and environmental communication, feminism and science, and the social change literature that traditionally has not treated gender as a distinct factor in the social change process.

Although there are other notable female scientists whom we could study to help to answer the research question, Carson and Colborn were chosen for numerous reasons. First, the 34 years between the two books allow a comparison of media coverage before and after the women's and environmental movements. Second, *Silent Spring* was one of the most influential books of this century, both as a key instigator of the modern-day environmental movement and for spurring significant changes in government environmental oversight (Corbett, 1994, pp. 94–98). Third, although the impact of *Our Stolen Future* pales in comparison, its similar (but expanded) scientific arguments provide a unique pairing. Fourth, although other female scientists have sounded environmental alarms,¹ they have not written books that received such widespread media coverage. The release of popular books by scientists represents an added degree of “agitation” because it is an abandonment of accepted avenues for scientific information in search of a wider audience, not only for a sympathetic general public but also for policy makers capable of effecting social change. Fifth, release of a controversial book provides a distinct time frame for evoking media coverage and is an important record of reaction by authorities and institutions to agitators. Finally, many of the claims of Carson and Colborn have largely been validated (although controversy continues regarding the degree of danger), which helps readers evaluate the merit of criticisms directed at these women in media stories.

Method and Approach

To answer the research question of whether media reaction to a woman scientist sounding an environmental alarm had changed from 1962 to 1996, this study analyzed all magazine articles about Carson and Colborn that were published after their books appeared. Magazine stories were chosen because the longer feature format was more suited to in-depth analysis than newspaper stories and because comparison by magazine genre (i.e., news, general interest, women's, environmental) was possible.² All of the stories about Carson or *Silent Spring* were listed in *Reader's Guide to Periodical Literature* and copied from microfiche or bound copies. Articles about Colborn or *Our Stolen Future* were obtained from Web-based news services as well as library compilations; articles were double-checked with the *Reader's Guide* index for completeness. In addition, “endocrine disrupting chemicals” and “endocrine disruptor” headings were checked; these stories were included only if significant mention was made of Colborn or the book.

Sixty-eight magazine articles were written about Carson and *Silent Spring* from August 1962 (when the book appeared) to August 1964 (after which no significant

¹ An example is JoAnn Burkholder, a North Carolina State University aquatic biologist who is credited with discovering *pfiesteria*, a microscopic creature responsible for massive fish kills. When Burkholder realized the dinoflagellate could also threaten human health, “she risked her reputation and the wrath of state regulators to make the public aware” of the danger (*Natural History*, 1996, March, p. 2).

² To aid the reader in comparing coverage in, for example, women's magazines and farm magazines, articles are listed by magazine title and date in an appendix.

mentions of Carson were found); 11 of the stories in 1964 were eulogies to Carson, who died in April of that year of breast cancer. Twenty-seven stories were written about Colborn and her book between January 1996 (when publicity about *Our Stolen Future* began) and March 1998 (when the last significant mentions of Colborn or the book were found).

Adapting a Miles and Huberman (1994) thematic analysis, four themes emerged: the portrayal of Carson and Colborn as women, their portrayal as scientists, their portrayal as agitators, and the magazines' depiction of the environment. Although these themes may appear broad, they were not further explicated because differences between the two time periods necessitated individual refinement before comparisons between the two women were made. For each magazine article, a summary sheet was prepared with the date, magazine, magazine genre, story title, length, story summary, sources quoted, and notes relating to the four themes. The story summary included the focus of the article, tone (supportive, negative, sympathetic, dismissive, etc.), and conclusions. The "portrayal as woman" theme included the use of language noted in the literature as feminine- and masculine-associated (e.g., strength, emotion, reason, hysteria), physical descriptions, treatment of female experience (e.g., child-bearing, marriage, work), and use of gender to support or dismiss. The "portrayal as scientist" theme included identification as a scientist, mention of scientific credentials, and portrayal of acceptable scientific evidence, proof, and ways of knowing. "Portrayal as agitator" listed quoted sources and their positions (e.g., supportive, dismissive), the threat or focus of attack or blame (e.g., health, progress, knowledge, safety, people, or institutions), and portrayal as agitator (e.g., "reluctant crusader" vs. "hysterical propagandist"). "Environmental perspective" noted an ecocentric or anthropocentric view, and whether the article treated the issue as a discrete problem affecting humans or individual species, or as affecting the entire ecosystem. Because on occasion these four themes overlapped, two strategies were undertaken. First, if a phrase or paragraph seemed to fit two themes (such as "scientists sympathize with Miss Carson's love of wildlife"), it was recorded under both. Second, colored highlighting by theme readily identified phrases with relevance to more than one theme. Patterns were then noted for each woman and each theme; finally, comparisons were made between women for each theme.

Descriptive Comparisons

Differing Historical Contexts

Dramatic reminders of the social setting and preoccupations of the 1960s were found on the pages adjacent to the magazine articles analyzed. Next to news reports about Rachel Carson, *Time* ran stories about Negroes and of nine Apollo spacemen "on whose shoulders will ride much of the success of the U.S. race to the moon" ("Pesticides," 1962, p. 45). Advertisements promised a Eureka vacuum for \$39, a dress with a tiny belted waist for \$13, and "bug bombs" for "housewives" to use around the home. In this postwar posterity boom of the early 1960s, blossoming numbers of chemical products were deemed responsible for boosting

agricultural abundance and increasing the world food supply. There also was a strong belief that science and technology did not create problems, they solved them. Magazine articles always included the title "Miss" or "Mrs." when referring to a woman, and few women were depicted working outside the home in professional capacities.

In some regards, Carson did not fit this picture well. She never married nor became a housewife, instead earning a master's degree in biology in 1932 from Johns Hopkins, a credential attained by very few women at that time. Carson then worked as a staff zoologist at the University of Maryland for 5 years, did postgraduate work at Woods Hole Marine Biological Laboratory, and was employed by the Fish and Wildlife Service during 1936–1952, working her way up from aquatic biologist to biologist and chief editor. According to Rossiter (1982), Carson was probably the first female scientist hired by the Service; by 1938, women constituted less than 8% of the zoologists and naturalists working for the entire federal government (p. 226). Keller (1989) maintained that the mid-20th century represented the nadir for female scientists, who "effectively disappeared" from American science by the 1950s (p. 36).

In *Silent Spring*, Carson brought to light the failings of the inner circle of science and government charged with protecting the public against health threats. She questioned the "basic irresponsibility of an industrial, technological society toward the natural world" (Brooks, 1989, p. xiii). Already a celebrated author, Carson spent 4 years researching and writing *Silent Spring*, which was as eloquent as a chemistry primer as it was a lesson about the web of life in the biotic world. However, the word "ecology" was then unknown to the public at large and "environment" had few of its present connotations (Brooks, 1989). Although the message of *Silent Spring* resounded with conservationists, the existing groups (such as Audubon Society, Sierra Club, Izaak Walton League, and National Wildlife Federation) did not spring to Carson's defense. These groups did not possess the activist mentality that developed later in the 1960s and were not legitimized by the awareness the environmental movement would bring in the 1970s. In sounding the alarm, Carson was alone in many respects.

Theodora Colborn, on the other hand, entered the controversial emergent science of endocrine-disrupting chemicals along with a growing number of scientists worldwide. Before *Our Stolen Future* was written, Colborn had published peer-reviewed journal articles, edited a scientific book about the topic, and convened a scientific conference for researchers to compare their work on endocrine disruption. In drawing together the thousands of articles and research notes to write *Our Stolen Future*, Colborn utilized computers and the Internet, tools unavailable to Carson. Colborn also came to the subject with strong credentials, a PhD in zoology from the University of Wisconsin and a Congressional fellowship. Although women doctorates in the sciences were far more common in the 1990s, Colborn's distinction was that she earned it at age 58. Her current position is senior scientist at the World Wildlife Fund, a highly specialized position made possible by ever more bureaucratized environmental groups (Corbett, 1998).

Colborn was not the gifted writer that Carson was and enlisted two coauthors, an environmental journalist (Dianne Dumanoski) and a fellow zoologist whose

employer helped fund the book (John Myers of the W. Alton Jones Foundation). A political public relations firm, Fenton Communications, was hired to publicize the book. *Our Stolen Future* was billed as “a scientific detective story,” and in it Colborn played the role of chief detective, searching through the scientific data for clues and patterns. Its scientist-as-central-character style contrasts with the backseat role played by Carson in *Silent Spring*, and it served perhaps to both personalize and popularize what book publishers might have considered a dry topic.

Differences by Magazine Genre

By magazine genre, several interesting observations were made. First, “women’s” magazines printed just 2 of the 95 total articles. One was a dismissive article in *Better Homes & Gardens* (Mason, 1962, p. 6) that told readers to continue using chemicals in the home and garden—because “we must spray or dust”—but just to be careful. The other story was a sidebar in *McCall’s* (Amory, 1963) profiling Carson in its “celebrity register” that neither mentioned *Silent Spring* nor explained why Carson was being so listed.

Second, the most negative treatment in both time periods was in the news magazines. Numerous examples of this negativity are given throughout this article, but *Time* called *Silent Spring* an “emotional and inaccurate outburst” (“Pesticides,” 1962, p. 45), and *Newsweek* called endocrine disruption the “toxic scare du jour” (Begley, 1996, p. 48). The negative coverage given by news magazines in both time periods perhaps can be attributed to the threat that Carson’s and Colborn’s claims presented to the magazines’ target audience of conservative business and middle-class interests.

Finally, coverage by environmental magazines was curious. Two magazines printed articles about Carson, *Audubon* and *National Parks*, the latter of which printed a supportive review of *Silent Spring* (Ernst, 1963) and later an obituary (1964, May). Although *Audubon* serialized portions of the book in 1962 (as did *National Parks* and *The New Yorker*) and included frequent updates in its monthly president’s column, the Audubon Board did not adopt an anti-DDT position until 1967 (Graham, 1990). One month before Carson died, *Audubon* printed a story of her receiving the Audubon Medal, the first woman upon whom the honor was bestowed (“Rachel Carson,” 1964, p. 98). Coverage given Colborn by environmental magazines was meager by today’s standards, particularly because many more environmental magazines existed in the 1990s than in the 1960s. In March 1996, *Natural History* excerpted *Our Stolen Future*, ran a sidebar on Colborn, and printed a positive editorial. *Audubon* ran an extensive feature in 1995 (before *Our Stolen Future* was published) called “Havoc in the Hormones” that cited Colborn and her work, but the following May the magazine ran a negative, one-page book review, calling it “a long article in search of a book” (1996, May, p. 112). It wasn’t until 1997—long after all other magazines had ceased paying attention to the book—that any other environmental magazine wrote about Colborn or the book. The tardy attention given by environmental magazines may be due to the fact that the issue was framed as a scientific problem, not an environmental one, a point discussed later.

Frequent but Shallow Comparisons

Despite these vastly differing historical contexts, comparisons between the two women and their books were made freely when *Our Stolen Future* was released. The comparisons were even encouraged in the book's forward (written by Vice President Al Gore) and within several chapters. Two thirds of the magazine articles (18 of 27) about Colborn contained some type of reference or comparison to Carson or *Silent Spring*. Common references were how Colborn was taking up where Rachel Carson left off (Carpenter, 1996, p. 30 ; Zeeman, 1996, p. 542), filling the shoes of Rachel Carson (Pinchbeck, 1996, p. 81), or as "the Rachel Carson of the '90s" (Snell, 1998, p. 28). *Business Week* (Raeburn, 1996, p. 42) labeled *Our Stolen Future* the sequel to *Silent Spring* whereas *Sierra* (Helvarg, 1997, p. 31) concluded it was the biggest threat to the chemical industry since *Silent Spring*. A few Colborn articles, such as one appearing in *Natural History* (Stutz, 1996a, p. 2) evoked phrases or sentences from *Silent Spring*, such as "our fate is connected with the animals."

By and large, the comparisons made between the women were not based on their scientific arguments but on the rather topical comparison of the role they played: women bringing an environmental danger to the public's attention and of ringing alarm bells, as mentioned in *Macleans* (Nichols, 1996, p. 51) and *New Scientist* (Bonner, 1996, p. 46); presenting an "evocative call to the public" (Raeburn, 1996, p. 542); and being attacked or dismissed for playing this role.

Lacking in the magazine articles were substantive, deeper comparisons of the science both books discussed: bio-accumulation of chemicals, environmental dispersion, harm to entire biotic systems, reproductive effects, and even discussion of the very same chemicals. Both women also argued that the burden of proof needed to be shifted from the government demonstrating damage from chemicals after the fact to industry demonstrating complete safety before use. Perhaps authors of the 1990s magazine articles, like many Americans, remember *Silent Spring* as the book that got DDT banned (only for use in the U.S., not for U.S. manufacturing) and are less familiar with the substance of Carson's work.

In two key respects, Colborn's work did take up where Carson's left off, although magazines infrequently noted it. First, Colborn argued that risk assessment of chemicals needed to get beyond the "cancer paradigm" and recognize that some chemicals can cause other kinds of harm. Second, Colborn maintained that testing must move beyond dose-response assessments, which assume that increased doses cause increased effects and which has been used for decades to determine acceptable levels of exposure, particularly to known carcinogens. Colborn cited numerous studies that demonstrated how extremely small amounts of synthetic chemicals could cause great harm, harm that often was not noticeable until later generations, such as from DES.

Gender, Science, and Nature

What Carson and Colborn have in common as agitators are their roles as women and as scientists working on environmental problems. It is important to investigate how these attributes distinguished them as agitators and affected the media coverage they received.

Nobel Prize-winning geneticist Barbara McClintock said that science was a place where “the matter of gender drops away” (Keller, 1989, p. 37). There is a great deal of evidence in the practice of science, however, to suggest the contrary. Some scholars claim our understandings of “feminine” and “scientific” have been historically constructed in opposition to each other (Keller, 1989, p. 37), with “scientific” constructed as objective, universal, impersonal, and masculine. Western philosophical traditions from which science developed take shape as a series of masculine/feminine dualities (Schiebinger, 1987)—reason as opposed to feeling, fact to value, culture to nature, science to belief, and public to private. Schiebinger argued that, “One set of qualities—reason, fact, object—came to represent rational discourse and scientific knowledge. The other set of qualities—feeling, value, subject [self]—have been defined as unpredictable and irrational. . . . Femininity became synonymous with feeling and subjectivity” (p. 33).

Some scholars maintain that today’s science evolved in a patriarchal society with a decidedly masculine tone, excluding women (Namenwirth, 1986) and supporting the superior position of White, Western males. Others argue that because science has traditionally been considered a masculine pursuit in our culture, science being done by women is often defined as nonscience (Rosser, 1989) or that women practicing science are nonfeminine.

Another question considered by scholars is whether or not women do science differently from men. That is, do women bring more feminine-associated qualities (feeling, intuition, relatedness, connectedness) to science and therefore practice or approach it differently? For example, even though McClintock believed that “gender falls away,” she spoke of her scientific practice as rich with what could be considered feminine qualities: a less distant and more intimate relationship with her objects of study, intuition, and with a “feeling for the organism” (Keller, 1983). Others argue that good science is gender-neutral (Keller, 1989), and that intellectual qualities associated with gender lack a strong biological basis and are more closely associated with activities than with individuals.

Regardless of whether women practice a more feminine or feminist science, women scientists work in a field that has historically favored men and scientific values that reward the masculine. Women scientists must mediate between two worlds with a dual identity: “To be a ‘real woman’ is to be nonscientific, to be a ‘real scientist’ is to be non-feminine” (Fee, 1986, p. 45). Alice Hamilton, the first woman professor at Harvard, concluded that the dual identities of marriage and a scientific career were simply incompatible. The opposed constructions of “feminine” and “scientific” can therefore amount to a no-win situation: Any acknowledgment of gender-based differences can be used either to exclude women from science or brand them as “not-women” (Keller, 1989, p. 35). As Keller concluded:

For women who have managed to obtain a foothold within the world of science, the situation is particularly fraught. Because they are “inside,” they have everything to lose by a demarcation along the lines of sex that has historically only worked to exclude them. And precisely because they are rarely quite fully inside, more commonly somewhere near the edge, the threat of such exclusion looms particularly ominously. At the same time, as scientists, they have a vested interest in defending a traditional view of science—perhaps, because of the

relative insecurity of their status—even more fiercely than their relatively more secure male colleagues. On two counts then, it is hardly surprising that most women scientists . . . vehemently resist the notion of a feminist/feminine science. (p. 41)

This literature suggests that although Carson and Colborn were credentialed scientists, they held a less powerful position within the social institution of science as women. Because science has been considered a masculine pursuit, Carson and Colborn's dual identities as women and scientists may lead critics to charge that their work was nonscience or they were nonfeminine. The following sections discuss how coverage portrayed this dual identity and how it worked with the additional identity of agitators.

Portrayal as Women

The most common portrayal of Carson was as an emotional woman. By labeling her and her work as emotional and fear-provoking, the work was separated from fact-based science. In contrast, articles infrequently depicted Colborn as a woman, emotional or otherwise.

The primary word used to describe Carson or her book was indeed "emotional." *Time* ("Pesticides," 1962) called the book an "emotional and inaccurate outburst," full of "emotion-fanning words" and "hysterically over-emphatic" (p. 45). *National Review* (Tulock, 1962) called *Silent Spring* "simply a long emotional attack" (p. 398), "emotional and one-sided," and "an obscurantist appeal to the emotions" (p. 399). *Popular Mechanics* (Hicks, 1963) referred to the controversy surrounding the book as an "emotional hassle," a "squabble," and a "feud" (p. 85). *Today's Health* (Earle, 1963) said the book was Carson's "current outburst" (p. 58). *Newsweek* ("Judgment," 1963) noted that the chemical industry accused Carson of "emotionalism and one-sidedness" (p. 69). *Chemical & Engineering News* (Darby, 1962) said Carson got an "emotional call" (p. 62) to write the book and wrote with "high-pitched sequences of anxieties" (p. 60). Emotions were often presented as polar opposite to "facts," the substance of science. For example, *Popular Mechanics* (Hicks, 1963) commented that "Emotions are running so high that it is difficult to uncover the facts" (p. 86). This emotional depiction of Carson supports the historic pattern in the West of viewing women as inherently hysterical (a word derived from the Latin word "hyst" for womb).

Emotion-based words also were used frequently to describe the general public, including "hysteria," "fear," or "paranoia." *Saturday Evening Post* (Diamond, 1963) wrote that "Thanks to a woman named Rachel Carson, a big fuss has been stirred up to scare the American public out of its wits" (p. 16). *Time* ("For many a spring," 1964) noted in Carson's obituary that *Silent Spring's* "emotional tone played on the vague fears of city dwellers" (p. 73).

Numerous stories focused on Carson's marital status and personal style, references that were used to devalue her and dismiss her work. Carson was often described as "unmarried" or "never married," and later articles, including one published in *Newsweek* ("Life in Nature," 1964), quoted her as saying she didn't marry "because I didn't have time" (p. 95). Other common descriptors were "gentle" or "shy," or "extremely shy." (About Carson's reported shyness, Brooks [1989] retorted that it

certainly did not get in the way of her rise through the ranks of the Fish and Wildlife Service.) *Life* ("The gentle," 1962) called her a "soft-spoken woman miscast in the role of crusader" and "unmarried but not a feminist" (p. 105). In its obituary, *Time* ("For many," 1964) gave the impression that Carson was reclusive and rather strange, particularly in a quote from a friend who called Carson a "nun of nature" (p. 73). These references serve to desex Carson and brand her as not-quite-woman (Keller, 1989). (Interestingly, McClintock also did not fit the feminine stereotype as a single and childless woman; she also maintained that she wasn't a feminist.)

Collectively, many of the words used to describe Carson had to do with voice and being heard. She was described as "gentle," "quiet," "soft-spoken," even naive. *Saturday Review* (Harvey, 1962) called Carson a "young-voiced, gentle lady who has never married or been out of the country" and said "she dreads public speaking and will probably lose up to 30 pounds during the coming ordeal" (p. 18). *McCalls* (Amory, 1963) said Carson was "a small but determined woman—she keeps quietly talking, despite interruptions, until she gets her point across" (p. 188). In a later *Saturday Review* ("Patroness," 1963) article, she was a "shy female bachelor biologist" (p. 45). The contrast between quiet-voiced and the "noise" she made with *Silent Spring* is striking, a contrast that did not escape one writer: "The *Silent Spring* of author Rachel Carson has been followed by a noisy fall and winter" ("Judgment," 1963, p. 69).

Until her death, the picture painted of her as a woman was of an emotional, rather unstable, and reclusive woman—not someone to whom the men of science needed to pay much attention. Although an *Atlantic Monthly* (VanFleet, 1963) article attempted to support Carson, it devoted much space recapping attacks made on her: "She was described as an overzealous nature lover and bird lover, slightly unbalanced. . . . She is simply classed as a crackpot" (pp. 81–82). It presented a tale of her "seriously tarnished" image (p. 82), her being "belittled" (p. 84), and how PR men hooted at her.

Both Carson and Colborn were sometimes described as having "passion" for their work and the natural world—Carson in *The New Yorker* for her "warm passion" ("Talk of the Town," 1964, p. 35) and Colborn in *Natural History* for her passion to return to graduate school and for discovery (Dumanoski, 1996). Their passion also was used to criticize and dismiss their work as not "objective." As noted earlier, a separation of self (passion and emotion) from science (objectivity and nonemotion) is a hallmark of the sciences. Like Barbara McClintock (Keller, 1983), Carson and Colborn expressed a unity with and deep reverence for nature. McClintock's genetic research was characterized "not by the conventional practice of distinguishing sharply between subject and object but, rather, by a merging of self with the material" (Schiebinger, 1987, p. 16). As passionate women, Carson and Colborn saw few distinctions in their books between the human and nonhuman worlds in terms of the harmful effects of chemicals.

Other than publicizing Colborn's passion, the magazine articles largely avoided evaluating her as a woman. Several book reviews of *Our Stolen Future* did not mention her at all (4 of the 27 articles), and several identified her solely as one of the three authors (another 4 of 27). Articles in *New Scientist* and *Natural History* described the same facts about her: how she returned to graduate school "midlife" as a 51-year-old grandmother, having been a pharmacist in New Jersey and a

sheep rancher in Colorado, earning her PhD at 58. *Esquire* (Pinchbeck, 1996) presented a physical description of Colborn, but did so for males as well. A handful of articles used masculine-valued words to describe her, such as tough, determined, persistent, intelligent, and with a sense of adventure or discovery. *Natural History* (Dumanoski, 1996) noted how she fought both sex and age discrimination in graduate school: "Although some male advisors had been skeptical about investing energy in a 50-something graduate student, Colborn persisted and won a slot as a Congressional Fellow" (p. 50). Coming to science late in life as a grandmother (perhaps the sexless equivalent of a "nun of nature") presents an impression of being little threat to the scientific community or not being as serious as men who have devoted much more of their adult lives to science.

Stronger, more masculine-associated words were attributed to Carson only after she received a great deal of legitimation. In May 1963, the President's Science Advisory Committee (PSAC), appointed by President Kennedy to investigate the claims in *Silent Spring*, issued its report. In June 1963, a Senate subcommittee held hearings to debate the pesticide issue. In a story in *Newsweek* about her testimony before the subcommittee ("Pests," 1963, p. 86), Carson was portrayed as a strong personality who "demanded," "warned," and "insisted." After Carson died the following April, descriptions of her included "rational," "sensible," "scientific," "reasoned," "strength," "wisdom," "courage," and "conviction." Some descriptions also gracefully blended feminine- and masculine-associated qualities: "the power of her knowledge and the beauty of her language," said *Audubon* (Buchheister, 1964, p. 209), "combining the scientist's eye and the poet's sense," said *Saturday Review* ("The legacy," 1964, p. 23), and "combining skills of a high order as a natural scientist and a communicator," according to *American Forests* ("The Weisner report," 1964, p. 8).

Although Colborn's qualities as a woman were given slight notice, the gender implications of her research were not. Colborn's scientific argument concerned potential disruption to both human and nonhuman endocrine and reproductive systems. The greatest danger for exposure to endocrine-disrupting chemicals is prenatal exposure in the womb or during breast feeding, times when chemicals most disrupt hormonal messages, even though the disruption might not manifest for a generation in females or males. However, a number of magazines—*Esquire* (Pinchbeck, 1996), *U.S. News & World Report* (Carpenter, 1996), *Time* (Lemonick, 1996), *Maclean's* (Nichols, 1996), and *Business Week* (Carey, 1996)—turned this thesis from exposure dangers to women into dangers most affecting men: stories about declining human sperm counts and documented penis abnormalities in animals and humans. *Whole Earth* (Lerner, 1997) criticized the male emphasis, but nevertheless focused on it. *Esquire* wondered, "Is nature somehow trying to shut men down?" (p. 79). The field of medicine historically has placed more value or attention on men's health. A special issue of *Science* noted that for decades women were not included in major epidemiological and clinical studies or dedicated research funds (until recently) to study women's diseases (Mann, 1995; see also Corbett, 1999).

In summary, although Carson was dismissed initially as an emotional woman, articles written after she was legitimized and after she died recognized both the

feminine- and masculine-associated qualities she possessed. As the theoretical framework suggests, it was only after legitimation that media coverage ceased using Carson's gender as a primary reason to dismiss her claims. Coverage of Colborn did not use her gender as a primary way to dismiss her; however, her work itself was subject to a gender-biased presentation. The focus on male reproductive ills and on Colborn's age perhaps reflect the subtlety that has entered contemporary gender discrimination. At times, both women were desexed, Carson as an unmarried "nun of nature" and Colborn as a grandmother beyond the fertile years of womanhood and, as we shall see, beyond the age of serious scientists.

Portrayal as Scientists

Although Carson and Colborn were credentialed scientists, they often were not identified as scientists by the magazines. Carson was identified as a biologist, having an MA and additional postgraduate work, or as having scientific credentials in only one third of the stories. Colborn was identified in just 60% of stories as a scientist, having a PhD, as a zoologist, and rarely as having published peer-reviewed work in scientific journals. Instead, they were referred to simply as "authors" and only occasionally as "biologist turned author" or "scientist-author." *Farm Journal* (Davids, 1962, p. 29) said simply of Carson, "A woman has written a book."

The manner in which each woman was marginalized as a scientist differed. Carson was treated simply as a nonscientist whose work was emotional rather than factual. *Atlantic Monthly* (VanFleet, 1963) wrote, "The author is a professional journalist—not a scientist in the field" (p. 81). Colborn was treated more often as a scientist, but as one who was biased, conjecturing, and putting forth an "unproven theory" as fact. Although Colborn was frequently identified as a "senior scientist with the World Wildlife Fund," only twice was she overtly dismissed as an environmentalist. *Business Week* (Carey, 1996) called her science "slanted interpretations" and put Colborn in "the environmentalist camp" (p. 18). *Scientific American* (Kamrin, 1996) said the work "falls short of the scientific ideal in a number of ways" (p. 178) and that "many environmental groups have made claims in which policy masquerades as science." It was all just "scare-mongering," said the review (p. 180).

Praise for or criticism of *Our Stolen Future* typically was blended with praise or criticism of its science. Several articles noted the promotion and "relentless hype" accompanying the book. *Science* (Hirshfield, Hirshfield, & Flaws, 1996) said the book's tone was "irritating and distracting" and the writing possessed a "breathless, often clumsy, literary style" (p. 1444). The *Science* reviewer admitted that the "mass of accumulated evidence" in the book had "cumulative power," but then proceeded to quote a critic who said, "Something is missing in *Our Stolen Future* and that's called science" (p. 1445). *BioScience* (Zeeman, 1996) called the book "readable, compelling, well-written and intriguing" though "not without flaws," calling one statement "factual nonsense, even if it is a good slogan" (p. 542). *The Library Journal* (Maret, 1996) did grant that what "author Colborn" unearthed "revolutionized the way scientists now think about chemical exposure" (p. 172). The *Sierra* (Helvarg, 1997) article spent most of its space detailing how Colborn had been attacked by industry, yet called her research a remarkable accomplishment.

Few articles mentioned that Colborn's work received important legitimation from several sources: In addition to the support of Gore, the EPA announced it was greatly expanding research in the area and the National Academy of Sciences launched an independent study.

Science traditionally has valued masculine ways of knowing (Schiebinger, 1987), such as through numerous tightly controlled, discrete studies that are statistically evaluated and undergo rigorous peer review. Such studies are thought to be objective, unbiased, and accurate reflections of the discrete conditions present, such as the stimulus, treatment, and response. Carson and Colborn, in many respects, violated this traditional scientific way of knowing by putting forth a more holistic, ecosystem perspective. Without using additive statistical procedures like meta-analysis, they brought a host of individual scientific studies together, connecting them and noting the patterns. They noted numerous similarities between documented effects in laboratory studies, in the natural world (such as in wildlife), and anecdotal or case history effects in humans. In suggesting that problems seen in other animals could easily be manifested in humans, Carson and Colborn were not abiding by the nature/culture demarcations set by traditional science.

Although neither Carson nor Colborn identified herself or her work as feminist, they were essentially espousing what Bleier (1984) said a feminist science might look like: a rejection of dualisms such as subject/object, rational/emotional, and nature/culture. Fee (1986) argued that a feminist science does not demarcate between nature and culture to legitimize domination of nature, a nature that is conceptualized by feminist science as active and not passive. A feminist scientist is not an impersonal authority outside and above nature and human concerns, but a person whose thoughts and feelings are relevant and involved in the discovery process and who seeks to use knowledge for liberation, not domination.³ McClintock likewise brought both her thoughts and feelings to her research, and without her Nobel Prize achievement might have been "dismissed as a romantic with a poetic involvement in the natural world, a woman incapable of maintaining a proper distance from the object of her study" (Fee, p. 48).

Carson and Colborn's holistic science strayed too far from accepted scientific practice and coverage criticized them. A common complaint lodged against both women was that their holistic conclusions were "flawed," "slanted," and "unsubstantiated," even though their discrete "facts" were correct. Stories frequently criticized Colborn's science rather than her personally as a scientist, calling into question her "proof," her hypotheses regarding cause and effect, the magnitude of the risk, and for extrapolating risk from animals to humans. The most frequently quoted critic of Colborn was Stephen Safe, a toxicologist at Texas A&M University who criticized her extrapolation from animals to humans (even though "acceptable"

³ This conceptualization bears similarities to various ecofeminist philosophies, particularly regarding the nature/culture dualism. Ecofeminists assume that the oppression of women, races, classes, and nonhuman nature are interconnected parts of the same dynamic (Bullis, 1996) and that there are important connections between the domination of women and the domination of nature (Warren, 1996). Although Carson and Colborn did see overlap and interdependence between natural ecosystems and human health, they did not identify themselves or their work (at least overtly or in these texts) with the political aspects of ecofeminism.

exposure to carcinogens is established in exactly the same way). Safe, in *Time*, called Colborn's link between wildlife and humans "debatable and unproved" ("What's wrong," 1996, p. 79). Even the *Audubon* (Beatty, 1996) reviewer said Colborn was forced to retreat from her claims at "the first blow of the bugle of proof" (p. 112). As Colborn herself was quoted as saying in *Mother Jones*, "We're never going to be able to prove a causal relationship of anything in a human being because we can't feed chemicals to human beings and wait for them to grow up" (Snell, 1998, p. 29). For "ethical" reasons, science tests effects in nonhuman animals and extrapolates the results to humans, but only when a connection between animals and humans is seen as advantageous to science.

In one story in *E* magazine, Colborn acknowledged her holistic approach to science:

Maybe we [females] have a better feel for systems. We look at things more holistically. The literature claims women have more intuition than men, which broadens our scope of thinking and leaves us with more open minds. Women have more feeling for how things interrelate than men. (Motavalli, 1997, p. 30)

(As a parallel, Carson was planning to write a book on ecology before the need to write *Silent Spring* arose.)

There was, however, some validation for Carson and Colborn's approach to science. Numerous articles after the PSAC report and Senate hearing said that Carson had been "vindicated"—not for her holistic approach but because discrete scientific studies that supported her claims had come to the foreground. Two articles specifically validated Colborn's lack of fine distinctions in the nature/culture dualism. The reviewer in *Science* (1996, June 7) took a thoughtful approach regarding the role of science and scientists, acknowledging that science cannot be divorced from public policy: "Do we have the luxury of waiting another 30 years to determine if Colborn and her colleagues are overstating their case?" The reviewer argued that real-world cases in the environment should be evaluated on "the weight of the evidence rather than on the scientific ideals of proof that are more appropriate to controlled laboratory experiments . . . than to problem-solving and protecting the public health in the real world" (p. 203). (His review, incidentally, was attacked by colleagues in subsequent issues and was called in a Knight-Ridder newspaper story "a breathlessly admiring review," Avery, 1996, p. 624.)

The other review that validated Colborn's approach was in the *London Review of Books* (Giddens, 1996), which thoroughly recognized that the chemistry of endocrine disruption is uncertain science and is therefore controversial:

Science is supposed to make the world more predictable. Often it does. At the same time, it creates new uncertainties—many of them global in character—which by and large we cannot use past experience to resolve. . . . All forms of risk calculations . . . imply a consideration of values and desired ways of life. They also have a critical bearing on systems of power and vested interests. . . . We must cope with the shifting and contested character of scientific knowledge, and with the media hype which accompanies the diagnosis of new risks. . . . The scientific evidence that Colborn has gathered is partial and inconclusive,

as she herself stresses. Critics will say, and have already said: don't scare the public when your findings are incomplete. She answers: we have to scare people, because otherwise nothing will get done, and because we have to be safe rather than sorry. So far as I can see, there is no easily available exit from this conundrum. (p. 20)

Scientific uncertainty, according to Friedman, Dunwoody, and Rogers (1999), is the uncertainty brought about either by a lack of scientific knowledge or disagreement over the knowledge that exists. In new or controversial science, it is the uncertainty itself that can become the public focus. In presenting that uncertainty to the public, journalists play a key role in influencing public perception of the science by downplaying certain aspects or constructing their stories in certain ways. Pitting experts against one another, for example, can heighten perceptions of uncertainty. Media are unlikely to view risk stories dispassionately because risk perceptions relate to health, safety, and environmental quality (Gregory, 1991).

Carson and Colborn were, therefore, not only stepping on the toes of traditional science, they also were calling into question the values espoused by the power and influence centers in the social system. The response given them by these power centers, as reflected in the magazine coverage, was that they were inadequate as scientists. Often these women were not identified as scientists, and it was said that science was missing in their books.

Demarcation between science and nonscience is as much a practice of exclusion and polarization as the demarcation between the masculine and feminine in science. The question then becomes not why some women (and also some men) scientists rely on intuition, feeling, connectedness, and relatedness, but why these resources are repudiated by stereotypic science. At stake is the "epistemic authority of scientists" (Keller, 1989, p. 40) and the truth claims they make. If scientific truth is acknowledged as relative (rather than absolute) and linked to "interests" (rather than objective accounts of natural phenomenon), the privileged status of scientific authority is undermined. Masculine/feminine and science/nonscience dualisms are as firmly rooted in politics as they are in biology, caught up in an ongoing contest for power. Media coverage of these scientific conflicts reflects existing power relationships, that is, the legitimacy and privileged status of traditionally conducted, masculine science.

The magazine portrayal of Carson and Colborn, therefore, used aspects of their gender and nontraditional scientific approach to marginalize the women and their books in a struggle over scientific authority. As Longino argued (1989), value-free science (from which scientific authority is derived) is a function of the communal structure of scientific inquiry, not a property of individual scientists. Even the best procedures of scientific inquiry cannot produce value-free science because they ignore contextual values—the social, cultural, and political values present when science is done (p. 48). Because science works under the pretext of intervention and manipulation of natural processes, it is loathe to admit that contextual values color objective inquiry or scientific authority.

Carson and Colborn entered this power struggle over scientific authority by publishing controversial books for a nonscientific audience, violating traditional venues for scientific knowledge and internal controls. Although a great deal of

scientific funding is affected by public policy and public opinion (Corbett, 1999), scientific practice is perceived as somehow untainted by policy decisions. Carson's and Colborn's books made the link explicit, advocating for specific policy actions based on scientific knowledge or, in essence, agitating for social change. To better understand this power struggle, we turn to the literature of social change.

Portrayal as Agitators

Many people, including many scientists, assume science to be objective and neutral, having no social agenda of its own. However, some feminists argue that scientific knowledge cannot be neutral because it is structured by power relations (Schiebinger, 1987). Stocking (1999) added that objectivism

tends to operate on assumptions that scientific ignorance and uncertainty, like scientific knowledge, are givens in nature, unproblematic, and except in the case of bad science, uncontaminated by social factors . . . [But] scientists' claims are just that—claims that are subject to social interpretation and negotiation. (p. 37)

If scientific work is structured by power relations and makes negotiable claims, from where in the social system do challenges to scientific interpretation come, and where are they aired? Some scholars argue that challengers most often come from intellectual elites within power and influence centers, including science (Olien, Tichenor, & Donohue, 1989; Hilgartner & Bosk, 1988), and these challenges are aired in specialized scientific media and also on occasion in mass media. When an individual steps forward with a claim about uncertain science, various scientific factions may use the uncertainty as a rhetorical tool and invite journalists to play a part (Dunwoody, 1999). One group of scientists may interpret their own work as well-grounded but may depict the inherent uncertainties in the work of others as unmanageable. Hilgartner (1990) said that scientists interpret rather flexibly what is appropriate simplification and what is distortion, and naturally judge their own simplifications as appropriate and dismiss those of “nonscience” or “pop science” as distorted. This serves scientists “as a powerful tool for sustaining the social hierarchy of expertise” (p. 519).

As a challenger, Colborn was better positioned in the scientific hierarchy than was Carson because she had published in scientific journals, but she was less well positioned as a scientist for an environmental group rather than an academic institution or even private industry. Because both women were calling for change from within the power and influence structure—not only from science but also from industry and government—they qualified as agitators and targets for marginalization (McLeod & Hertog, 1999). Articles from both time periods mentioned how the chemical industry launched massive attacks to discredit the books, including the formation of front groups, extensive media relations, and entire public relations campaigns.⁴

⁴ *New Republic* noted that two chemistry associations had been sending out newspaper feature stories stressing the “positive side” of pesticide use, and one of those associations doubled its public relations budget to counter *Silent Spring* (“Those Pesticides,” 1963, p. 6). *Consumer Reports* (“Pesticides,” 1963)

A count of quoted sources gives an indication of the dominant influence structures upon which media relied in each time period, as well as the source of many attacks. In articles about Carson, 30 of the 68 identified sources (44%) were officials in state or federal government, with heavy representation from the U.S. Public Health Service and the U.S. Department of Agriculture, which was called the official guardian of food by *Today's Health* (Earle, 1963, p. 20). University representatives accounted for 31%; industry spokespeople, 9%; and private health entities, 6%. (As Carson pointed out in *Silent Spring*, the chemical industry had strong ties with government and academics, where it funded large amounts of university research.) Carson was quoted just four times (6%), twice in response to attacks, once in her Senate testimony, and once at the Audubon awards dinner.

For Colborn, a total of 50 sources were concentrated in a third of the 27 stories. Overall dependence on government sources decreased, representing 22% (11). The number of university sources remained about the same (34%), industry sources doubled (20%), health sources were 8%, and the authors were quoted more frequently, seven times, or 14%. The change in sourcing possibly reflects the growing vocalicity of industry in matters of dispute, and perhaps a decrease in the dominance of a government that has grown more cognizant of public opinion and leery of legal challenges. Notably absent as sources in the 1960s were wildlife sources and environmental sources; in the 1990s, wildlife researchers at universities were more commonly used as sources, but only one source represented an environmental group.

Different "solutions" were presented in the articles to the problems addressed in *Silent Spring* and *Our Stolen Future*. In the latter, the solution was clear: more research. Leave the matter to the scientists, it is too early to make decisions, and it is therefore not a matter for public policy debate.

Two primary solutions were presented regarding chemical dangers raised by *Silent Spring*. One solution was safety and education in pesticide application, illustrated by comparing common activities that were far more dangerous and by noting a lack of "proof" of pesticide dangers. Mentioned several times was a study in which prison inmates were fed diets laced with DDT with no apparent ill effects. A metaphorical example used several times was that automobiles killed a few animals on the highway, but overall autos did far more good than harm, so it was nonsensical to think of banning autos or, by extension, chemicals. A frequent, similar example was that aspirin killed more people every year than did pesticides (although the tallied pesticide deaths included only those killed directly and immediately, not from long-term consequences). *Senior Scholastic*, *National Review*, *New York Magazine*, *Saturday Evening Post*, and *Sports Illustrated* all mentioned the aspirin comparison, causing one to speculate that a certain source was "placing" this information. *Science* (Baldwin, 1962) wrote, "There are no harmless chemicals, only harmless use of chemicals. The recent case in which the death of several

commented on the formidable financial resources of the pesticide industry and their use in "organizing" opinions of its members, producing "The Desolate Year" parody, and distributing countering "educational" materials. A *Sierra* article (Helvarg, 1997, p. 31) noted that PR expert E. Bruce Harrison made his reputation coordinating attacks on Carson and pioneered use of industry-funded front groups and "third party experts," techniques the chemical industry used again against Colborn. For an extended discussion of PR efforts to counter *Silent Spring*, see Stauber and Rampton (1995).

infants in a hospital was caused by the inadvertent use of salt instead of sugar comes to mind" (p. 1042). *Senior Scholastic* ("The Furor," 1962) concluded, "The real question then is not: Should we or should we not use chemical pesticides? It is rather: How can we use chemical pesticides more safely?" (p. 20). Even articles that discredited Carson and dismissed her as a woman begrudgingly thanked her for alerting the public to the danger of careless chemical use. Although Carson's goal also was safety, for she did not advocate a sweeping ban on pesticides, she strongly advocated biological controls (which were wholeheartedly dismissed in the articles as impractical) and a much more stringent margin of error in application.

The second solution presented in response to chemical danger, which gained favor after legitimating acts and public support made it less popular to attack and belittle Carson, was to praise pesticides as "indispensable" (*Scientific American*, 1963, p. 64) and illustrate the doomsday scenario that would arise without them. Monsanto released a parody of *Silent Spring* called "The Desolate Year" that was mentioned by numerous magazines. *American Forests* ("The Weisner Report," 1963) reminded readers that the use of chemicals has "helped to free mankind of communicable diseases and has enabled us to make spectacular gains in agriculture" (p. 11). *Reader's Digest* (Strohm & Ganschow, 1963) claimed that *Silent Spring* was "exaggerating a molehill of danger while ignoring the mountain of benefit" from pesticides (p. 123). Other articles, particularly by 1964, were warning consumers what to expect if pesticides were banned or restricted; *U.S. News & World Report* ("Poison Sprays," 1964) said without pesticides, "Americans would have to adjust to a diet more meager, more expensive and less exciting" (p. 50).

Carson and Colborn argued that the public deserved entry into the world of science and policy making, particularly when it impacted public and environmental health. Carson, however, was portrayed first as an emotional, "noisy" agitator, and later as a "vindicated" and appreciated heroine. After she was legitimized, articles suggested that she may have overstated her case and overstepped scientific boundaries, but it was a good cause, and she alerted and educated the public. She was, at the time of her death, considered a good little agitator. Interpreting this shift according to the theoretical framework suggests that vindication and legitimation can go a long way in shifting media support.

Positive media attention, however, may signal opponents to shift their strategies. Colborn was treated as a scientist-agitator conjecturing unproved theories, although her environmental group employment made her advocacy role obvious. Although portraying her as a question-raising scientist appears more supportive, it kept her questions corralled within the hierarchy of scientific expertise and removed from public debate or immediate governmental or industry change. Scientific ignorance became a justification for isolating the issue within science, rather than exploring it within multiple centers of the social system. The implication for social change advocates is that a measure of success can also mean a degree of co-optation and support of the status quo.

Portrayal of Environment

In some respects it is difficult to compare environmental perspectives across these two time periods because ideologies have shifted. The word "ecology" was not a

common part of the lexicon in the 1960s; in the 1990s, we had deep ecology, social ecology, and various forms of ecofeminism, to name a few. However, a comparison is possible of how articles in each time period viewed humans in relation to other living things. An "anthropocentric" perspective views humans as the most important species and at the center of the natural world. In contrast, an "ecocentric" perspective views humans as just one species in the biotic community, and all species as equally important and intrinsically valuable. If one views anthropocentric and ecocentric as opposite ends of a spectrum, a perspective somewhere in the middle might be called "conservation," recognizing humans' stewardship but also dominance of the natural world (at least of species considered the most significant to humans).

Although Carson in *Silent Spring* was very much concerned for humans and human health, she also eloquently expressed a deep reverence and appreciation for the entire biotic community, warning that the fate of humans and other species was inextricably linked. Yet, in the early articles about Carson, the natural world was portrayed not so much as a circle or web of life as it was a pyramid with man [sic] on top, an anthropocentric view.

Insects received the brunt of the attention even though the chemicals Carson discussed were a variety of insecticides, herbicides, fungicides, and fumigants. In most articles, little value was placed on "bugs" of any kind, labeled a noxious and undesirable life form, "pests," even "insect hoards." Without pesticides, bugs were poised to "wipe him [man] from the face of the earth" (*Today's Health*, 1963, p. 58), for "while there is only one species of man, there are well over a million species of insects" (Davis, 1962, p. 290). It was believed that banning pesticides (which is not something Carson advocated) would wipe out decades of agricultural progress and bring back disease. *Today's Health* (Earle, 1963) was one of six different magazines that quoted George Decker, a strident chemical supporter and economic entomologist at the University of Illinois. Decker claimed that some individuals "thoughtlessly advocated" adopting a policy of "let nature take its course." If that were the case, Decker warned, "Then these same experts would have to dispose of 200 million human corpses, instead of surplus crops" (p. 60). *Sports Illustrated* (Craft, 1963) also painted a doomsday picture of a dangerous environment without chemicals, full of fever-carrying ticks, rodents, weeds, plant diseases, and rats that would eat as much food as 10 million people.

As frequently attacked as bugs was the "balance of nature" about which Carson wrote. There was no longer any such thing, many magazines argued, and we are even better off without it. *The American Home* (Wescott, 1963) claimed that "man has been upsetting nature as long as he has existed, and . . . pesticide use is only a small element in his present vast program of upsetting nature to provide for his own welfare and increase" (p. 12). After all, "Nature . . . will always keep us on our toes searching for means of controlling forms of life that are undesirable to man" (p. 88). *Time* ("Pesticides," 1962) wrote that, "Many scientists sympathize with Miss Carson's love of wildlife, and even her mystical attachment to the balance of nature. But they fear her emotional and inaccurate outburst in *Silent Spring* may do harm by alarming the nontechnical public, while doing no good for the things she loves" (p. 48).

Upsetting the balance of nature was portrayed as an acceptable cost for the benefits it brought humans. *Saturday Evening Post* (Diamond, 1963) concluded that “Nature has been altered by man ever since he first stood upright. If DDT kills some cats but saves many humans, if weed killer destroys a pocket of wildlife shelter but increases highway safety, so much the better” (p. 17). *Senior Scholastic* (“The Furor,” 1962) asked its readers:

Would Miss Carson have us go back to an age when the average life span was 35 years, when 20 out of every 100 children die before their fifth birthday, when mothers died in their 20s from childbed fever and TB, when famine followed crop failure, and when vermin and filth infested homes, stored foods and even people, asks an American Cyanamid researcher. Man has upset the balance of nature to improve his lot, just as all living things attempt to improve theirs. Nature is a relentless struggle between all kinds of life, each attempting to survive, say these scientists. Man is a part of nature and he is involved in the struggle. He should use every advantage he has—including science—to work for his survival. If he doesn’t, the insects will eventually inherit the world. (p. 12)

The approach to other wildlife (deemed more valuable than insects) was typically utilitarian and conservation oriented. Articles in *Reader’s Digest* reassured readers that wildlife losses from chemical spraying were “insignificantly small” and that damaged wildlife populations “bounce back quickly” (Strohm & Ganschow, 1963, p. 127). *Time* reported that wildlife generally recovered in a few years (“Pesticides,” 1962). As *Time* reasoned, “Sometimes it may be necessary to choose between elms and robins, both of which have their partisans” (p. 48).

From 1962 to 1964, there was a dramatic shift in the environmental perspective in the Carson articles. During what could be called the “attack stage” (from release of the book until legitimation in the spring of 1963), 57% of the articles were strongly anthropocentric in nature. During the second stage of legitimation (from the release of the PSAC report and Senate hearing up until Carson’s death), anthropocentric stories decreased to 38%. During the last stage beginning with Carson’s death, anthropocentric stories had decreased to 15%. Meanwhile, ecocentric stories had increased from 11% during the attack stage to 46% of the stories during the last stage. These ecocentric stories discussed the natural world as a web of life with humans as just one portion of how all parts of the environment—human and nonhuman—could be harmed by chemicals. Numbers of stories that were conservation oriented remained fairly constant, accounting for about one third of the stories at each of the three stages. This dramatic shift from heavily anthropocentric toward more ecocentric is evidence of the tremendous impact that *Silent Spring* had on American ideology toward the natural world.

The most eloquent expression of an ecocentric philosophy during the attack stage was in *The Nation* (Bates, 1962) titled “Man and Other Pests”:

[F]rom the point of view of the biosphere, of the complex web of living things . . . man often looks more like an evolutionary mistake than a crowning glory. . . . Modern man has got the idea that he can rearrange nature for his own immediate purposes—this brash newcomer regards this ancient planet and its persisting web of life as purely a ‘resource’ for his species (p. 202).

A statement by *Audubon* (Carson, 1963) during the legitimation stage expressed the concept of biodiversity, without using the term: "The world is inhabited by living species that are not only beautiful but full of meaning and significance. . . . What right do we have to destroy the scientific record contained in living species? How do we know that we may not have great need of what it has to tell us—or of the function it performs?" (p. 262).

During the final stage after Carson's death, many writers seemed to fully understand the deeper, significant lessons of *Silent Spring*. Stewart Udall (1964), then Secretary of the Interior, eulogized Carson in *Saturday Review*. He spoke of her love of all living things and the fabric of life and repeated Carson's words from the Senate hearing: "I deeply believe that we in this generation must come to terms with nature" (p. 23). In an obituary in *American Forests* (Editorial, May 1964), the writer said Carson "encouraged all mankind to reexamine their role in nature. . . . Like Aldo Leopold, she saw man as an integral part, but not the master, of the environment he shares with other living things" (p. 8). A *Consumer Reports* obituary ("Another Silent Spring," 1964) quoted Carson as saying, "Man is a part of nature and his war against nature is inevitably a war against himself . . . we're challenged as mankind has never been challenged before to prove our maturity and our mastery, not of nature, but of ourselves" (p. 271).

One might expect that this dramatic shift to ecocentrism would be evident in the 1990s Colborn articles, particularly given the environmental awareness and knowledge gained over 34 years. That, however, was not the case. (No particular stages were discernable to separate the 27 stories.) Only 16% of the stories were classified as ecocentric, with 44% conservation and 40% anthropocentric. Anthropocentric stories focused on human health, first and foremost, and denied that wildlife data or problems had significant connection to human health. Conservation stories recognized the probable links between humans and the environment in terms of health effects, but treated wildlife as "sentinel" species, valuable primarily for their ability to alert us to potential human dangers. Ecocentric stories treated all species, human and nonhuman, as valuable and deserving protection from harm, recognizing common air, water, habitats, and even similar endocrine systems.

Typical anthropocentric philosophies were apparent in stories focusing on the uncertain science and what it could and could not tell us about risks to humans.⁵ Several of these stories didn't mention the nonhuman world at all, focusing instead on the issue of declining human sperm counts. Other anthropocentric stories separated the biotic community into discrete, hierarchical categories, denying that problems in wildlife species had any bearing on human health or that extrapolations were possible. The last sentence in a *Business Week* (Raeburn, 1996) article was typical of a focus on humans above all else: "In *Silent Spring*, Carson worried

⁵The packaging and marketing of *Our Stolen Future* perhaps contributed to the anthropocentric, science-oriented coverage that it received. Although the writing clearly does not conform to the nature/culture dualism and treats human and nonhumans with equal weight and value, the book cover and subtitle suggest something different. Below the main title is a photo of a tiny human fetus, and below that is the subtitle: "Are we threatening our fertility, intelligence, and survival? A scientific detective story." Perhaps realities of the publishing world dictated this approach, but it is unfortunate that the "next Rachel Carson" could not have sold the book based on the still-threatened legacy of *Silent Spring*.

about the disappearance of birds. Now the issue is the possible disappearance of our own unconceived offspring and the fear that the latest endangered species could be us” (p. 42).

Conservation stories valued the nonhuman world for its practical value to humans in terms of advance warnings or “omens for men” (Lerner, 1997). *BioScience* (Zeeman, 1996) said we should pay more attention to what “wildlife species are telling us” about possible human health effects. Lacking in these stories, though, was a sense that the nonhuman world was intrinsically valuable, regardless of how well it warned or informed humans.

Ecocentric stories did not exhibit a nature/culture dualism and portrayed all living things equally as potential targets of environmental hazards. *Natural History* (Stutz, 1996) portrayed wildlife health and human health as one and the same, and *Discover* (Dold, 1996) noted that all populations—“fish, wildlife, and people”—had harmful chemicals in them. The magazine said that “the same estrogen that is present in the body of a fish, frog, reptile, human, or bird . . . hasn’t changed in the course of 300 million years of evolution” (p. 52).

Overall, Colborn stories did not have a strong focus on the environment, focusing instead on human health and the uncertain science. In some ways, *Our Stolen Future* was treated primarily as a science story, not an environmental one. Both professional and popular science magazines gave much greater coverage of the book throughout the time period than did environmental magazines that largely granted attention over a year after the book first appeared.

Carson is credited with ushering in what are called “second-generation” environmental issues (Mitchell, Mertig, & Dunlap, 1992), issues that are neither simple nor specific to a species or geographic area, but instead have subtle, delayed consequences. As Shabecoff (1993) explained, *Silent Spring* “demonstrated how the destruction of nature and the threat to human health from pollution were completely intertwined. . . . It made it frighteningly clear that they were all skeins of a large web of environmental evil settling over the nation and the world” (p. 110). Yet, after 3 decades of tremendous growth in governmental environmental bureaucracy, in the environmental movement, and in general public awareness about the environment, the chemical approach to pest control remains basic social policy. When value-laded public issues such as this are placed solely within the domain of objective, value-free science, it is not surprising that nature/culture demarcations obscure an ecocentric depiction of the natural world.

Discussion

The research question concerned whether, based on the media’s role in the reporting of conflict, media coverage of a female scientist warning of environmental dangers would differ from the 1960s to the 1990s, particularly with the ensuing social change regarding women and the environment. From 1962 to 1964, magazine depiction of Carson changed (primarily due to legitimation she received) from an emotional, overzealous “nun of nature” to a crusader respected for her intelligence and feminine passions. Three decades later, some magazines portrayed Colborn

as a credentialed scientist, but she was also the target of subtle age and gender discrimination, the latter evident in stories about health implications for men, which removed the focus from women's bodies where chemical exposure occurred.

The implications of this study extend beyond the historical comparison of two women scientists sounding an environmental alarm to the bigger picture of the media's role in perpetuating and reifying what counts as real science, who counts as a real scientist, and media treatment of an agitator who steps outside the boundaries of authoritative science. Because media are dependent on dominant institutions for news, they tend to treat conflict directed at those institutions cautiously, erring on side of the status quo. When existing power relationships shift—whether because of social change produced by social movements or because of additional evidence supporting the agitator's claims—media reporting will reflect that. For example, it was less acceptable to categorically dismiss a female scientist as hysterical and emotional in the 1990s, but it was still acceptable to marginalize her in other ways if her claims threatened the authority or legitimacy of existing social conditions. Although mass media often report on agitators' calls for social change, coverage will nevertheless support established institutions and existing power relationships, performing a social control function.

Although the social movement literature has acknowledged that key agitators are typically intellectuals who emerge from social institutions (such as academia or science), the literature has not fully considered gender of the agitator as a variable. It is reasonable to predict that because women even today generally hold less power in the social system (e.g., economically and politically), female agitators may be more intense targets of marginalization, but the relationship between "agitator" and "woman" deserves closer scrutiny by researchers. The matter of legitimation, recognized as a key factor in social movement mobilization, may be of special importance to female agitators in social change efforts. As noted, a Nobel Prize was a crucial legitimating event for McClintock, just as the PSAC report was to Carson and the involvement of EPA and National Academy of Sciences was to Colborn. Legitimation from powerful institutions and individuals is important to all challengers and their groups, but it may prove even more important to women who lack equivalent power in the social system.

In this study, to be an agitator was to be neither feminine nor scientific. When Carson and Colborn breached scientific protocol and controls with their books, scientific authorities criticized them in the media, labeled their work as nonscience, and slighted their methods. Even today, a woman who rocks the boat of dominant power institutions may be labeled as unfeminine (as numerous prominent female public officials have discovered). Scientist-agitator Colborn ostensibly faded into the background as a woman, even as a person. For Carson, being a female scientist-agitator in the 1960s was particularly nonfeminine, and coverage noted how her claims turned a "silent spring" into a noisy outburst.

Carson's and Colborn's scientific work also was criticized for what might be called its feminist qualities: lacking nature/culture demarcations, embracing cognition and emotion, and refusing to position science (and the scientist) as an

impersonal authority above human and nature concerns. The epistemic authority of science does not recognize constraints on objectivity that contextual values bring to complex and interactional scientific practice (Longino, 1989). To accept Carson's and Colborn's holistic scientific claims would be to relinquish traditional scientific authority. Demarcations of science/nonscience and masculine/feminine are firmly rooted in a political contest over scientific authority and public policy, a contest in which mass media clearly play a part.

In the language of social change (such as Gamson, 1990), Carson and Colborn and their alarms were co-opted. Authorities co-opt a call for social change by convincing agitators (and policy makers and the public) that demands are being met, thereby diffusing the challenge and exerting social control. A dominant institution (such as science or government) may embrace nonthreatening challenger demands, yet suppress or ignore demands considered threatening or oppositional. As Olien and colleagues (1989) point out, the regulatory agencies of government are established by, and serve the interests of, the industries that are regulated, not the consuming public. After *Silent Spring*, scientists (and journalists) called for more safety in pesticide use, not a fundamental reconsideration of their use. In the 1990s it was far easier for scientists (and journalists) to agree that more research was needed without accepting Colborn's calls for restrictions in chemical use. Although Carson's message raised environmental awareness in a way few other books in this century have, and although others like Colborn continue to sound alarms, the solution of "safety, not restriction" of chemical use is still accepted as social policy.

Labeling Colborn's claim of widespread ecosystem danger as an uncertain scientific problem rather than an environmental one essentially co-opted the issue and removed it from public debate. Such social control supports a status quo view of the natural world, which is essentially anthropocentric, despite the dramatic awakening of ecocentric philosophies in the 1960s and 1970s after *Silent Spring*.

Sobering evidence as to the degree of co-optation to all challengers' warnings regarding chemical use is the fact that today "American farmers are spraying two to five times more [pesticides and herbicides] than they did 30 years ago" and "more than 67 million birds are killed each year by pesticides applied legally to U.S. farmland" (Bourne, 1999, p. 72). In addition, the pesticide-resistant "superbugs" that Carson presaged "now include more than 535 insects" (p. 72). Today a handful of companies are experimenting with biological controls (which were dismissed when Carson proposed them) because chemical-resistant insects require ever increasing amounts of chemicals.

Accepting certain portions of Carson's and Colborn's arguments was far easier than recognizing that negotiating uncertain science and calculating risk are not objective, dispassionate activities. As Carson and Colborn argued, these activities involve consideration of core values and desired ways of life, in essence, a countering of the passionless values of traditional science. These women issued public appeals for both scientific reason and emotion, and for a recognition that nature/culture dualisms are short-sighted in safeguarding all living things: bugs, bald eagles, beluga whales, alligators, and, indeed, humans.

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