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FEMINIST PERSPECTIVES ON SCIENCE

Implications for an Ecological Theology of Creation

Anne M. Clifford, C.S.J.

As man proceeds toward his announced goal of the conquest of nature, he has written a depressing record of destruction, directed not only against the earth he inhabits but against the life he shares with it.

—Rachel Carson, *Silent Spring*

Ecology was once discussed by only a handful of scientists, but that began to change when Rachel Carson wrote *Silent Spring* thirty years ago. Her book grew out of her desire to communicate to the public the destructive ecological effects of indiscriminate use of pesticides. *Silent Spring* brought concern for ecology into the homes of millions in the United States, and to distant parts of the world as well.¹ Since Carson first sounded the warning of the irreversible consequences of environmental exploitation, ecology has become a broadly shared concern. This was apparent in 1990 when the twentieth anniversary of Earth Day was celebrated as a media event to usher in “the decade of the environment.”

In spite of the efforts of numerous concerned persons around the world, humans continue to inflict on our planet pollution, deforestation, ozone destruction, endangerment of plant and animal species, and resource depletion. To remedy these ills, a full-scale collaborative effort is needed. Recognition of this is growing, as the United Nations Conference on Environment and Development (popularly known as the “Earth Summit”) held at Rio De Janeiro in June 1992 made evident.

In the midst of rising concern for the environment, ecofeminism has drawn attention to the interconnectedness of the domination of women and

¹ Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin, 1962). This work also has been published in Great Britain, France, Spain, Norway, Sweden, Holland, Japan, Israel and Yugoslavia.

the denomination of nonhuman nature that has resulted in the ecological crisis.² Most ecofeminists would agree with Rosemary Radford Ruether's articulation of this connection.

Women must see that there can be no liberation for them and no solution to the ecological crisis within a society whose fundamental model of relationships continues to be one of domination. They must unite the demands of the women's movement with those of the ecological movement to envision a radical reshaping of the basic socio-economic relations and the underlying values of . . . society. The concept of domination of nature has been based from the first on social domination . . . starting with the basic relation between men and women.³

In the nearly two decades since Ruether's words appeared in print, feminist scientists and philosophers have done a considerable amount of critical research into the foundations of modern science. My purpose here is to explore possible intersections between feminist perspectives on science and an ecological theology of creation. My guiding questions for this exploration are: (1) How has science, especially traditional—male—epistemologies of science, contributed to the ecological crisis? (2) What can feminist perspectives on science offer as a viable alternative? (3) What are the implications of these findings for an ecological theology of creation?

Theologians and scientists, male and female, need to become companions in responding to the ecological crisis, if nature, human and nonhuman, is to survive on this planet. Since both the drive for scientific progress through domination over nature, and the theological retreat from nonhuman nature into a personal faith in salvation have contributed to the crisis, alternatives to these stances must be explored, and appropriate transformations of discourse and practice must be implemented.

Faith in a Creator God is deeply connected to ecology, but this connection, like the one cited by Ruether, has not been as obvious in the past as it is today. The manner in which the Genesis creation stories have been abused as proof texts for the domination of nature (Gen. 1) and of women (Gen. 2–3) makes it all the more difficult to see this connection. Biblically rooted beliefs about creation have had a profound impact on the thinking and practice of Western society. But Western thinking and practice have also had an impact on the interpretation of biblical texts. At this point of global crisis the meaning of biblical creation must be explored in tandem with

² Françoise d'Eaubonne introduced the term *écoféminisme* in *Le féminisme ou la mort* (Paris: Pierre Horay, 1974). Since the term was first coined it has been used in a variety of ways. It is beyond the scope of this paper to address these differences.

³ Rosemary Radford Ruether, *New Women/New Earth: Sexist Ideologies and Human Liberation* (New York: Seabury Press, 1975), 204.

ecology, a branch of science that is often highly critical of the thinking and practices of much of Western science and technology.

The term *ecology* has been in existence for well over a century; historians of science trace it to German biologist Ernst Haeckel's *The Natural History of Creation* (1868). Haeckel proposed the term *ecology* for a subdiscipline of zoology that would investigate the totality of relationships between an animal species and its inorganic and organic environment.⁴ Haeckel's definition of ecology is flawed by today's standards because he gave preference to animal species over plants, and macroorganisms over microorganisms. Today, ecology studies the interrelationships among all forms of life. Its goal is the understanding of the mutual interdependence of species and the promotion of a balance among all the inhabitants of the complex ecosystem called earth.

Although Haeckel is credited with coining the term *ecology*, in the nineteenth century, groundbreaking work in this field was done by a woman at MIT. Ellen Swallow did an extensive study of water, air and food purity, sanitation and industrial waste disposal. This was an important ecological study for the time, because it dealt with these areas, not as discrete questions, but rather as a mosaic of intertwined problems that adversely affect human beings. At the time Swallow's work was classified as "home economics" rather than as science, probably because it was done by a woman.⁵ The classification of her work in a field regarded as proper to women served to trivialize her research. It illustrates gender bias and male social domination in the scientific community and society at large. In the late nineteenth century the "cult of domesticity" influenced all aspects of North American culture; science was no exception.

In the 1960s Rachel Carson's work in ecology was similarly subject to gender bias and attempts to trivialize her contribution. Initially, Carson had major difficulties finding publishers for her works. After the publication of *Silent Spring*, spokespersons for the pesticide industry claimed that Carson's study should be disregarded because she lacked a doctorate and was not affiliated with a major research institution.⁶ While it is true that Carson did not have a doctorate, she did, however, have an undergraduate degree in

⁴ Hans Magnus Enzensberger, "A Critique of Political Ecology," in *Ideology of the Natural Sciences*, ed. Hilary Rose and Steven Rose (Cambridge, Mass.: Schenkman Publishing Co., 1980), 136.

⁵ Sue V. Rosser, "Feminist Scholarship in the Sciences: Where Are We Now and When Can We Expect a Theoretical Breakthrough?" in *Feminism and Science*, ed. Nancy Tuana (Bloomington: Indiana University Press, 1989), 4.

⁶ Hilary Rose argues that the initial dismissal of Rachel Carson and the ecology movement shows the reluctance of masculine science to give over its domination. See "Beyond Masculinist Realities: A Feminist Epistemology for the Sciences," in *Feminist Approaches to Science*, ed. Ruth Bleier (New York: Pergamon Press, 1986), 59.

biology from Chatham College and a master's degree in zoology from John Hopkins University, where she also taught. It was not in the artificial environment of the university laboratory, but rather in the natural habitats of plants and animals as an employee of the Fish and Wildlife Service, that Carson formulated her scientific questions and pursued her ecological research.

Aside from Rachel Carson, there are few women of note in the field of ecology and in the natural sciences. Since so few women have been full players in scientific fields, women have been unable to develop alternatives to the paradigms of the male-dominated scientific community. *Normal science*, to borrow a term coined by Thomas S. Kuhn, is the practice of science that is accepted by a particular scientific community.⁷ Kuhn points out that to be a participant in the scientific community and gain the status of "scientist," the student "joins men who learned the bases of their field from the same concrete models."⁸ The use of "men" here is not just a generic term for persons accepted into the scientific community. Traditionally, membership in the scientific community involved mentoring of men by men. As a result, women could not set the boundaries of what counts as scientific knowledge or decide how that knowledge would be articulated, nor could they contribute significantly to the decisions about what questions were to be researched.⁹

I draw attention to this fact because it is germane to the critical appraisal of traditional epistemologies of science by women scientists and philosophers of science today. These women speak from an awareness that few women have ever been in a position to influence science in theory or in practice. Many women in the sciences are asking, Is women scientists' approach to science different from that of men? Some have responded to this question with a resounding yes; others with more qualified positive responses. Still

⁷ Thomas S. Kuhn, *The Structure of Scientific Revolutions*, vol. 2, *The International Encyclopedia of Unified Science*, 2nd ed. (Chicago: University of Chicago Press, 1970), 10.

⁸ Kuhn, 11.

⁹ The National Science Foundation provides statistical reasons why women scientists have not played a role in establishing the reigning paradigms in scientific communities. According to a 1980 NSF report, of the people who received their doctorates in the natural sciences in the 1960s 62.8 percent of the men were full professors, while only 36.5 percent of the women were. While the ladder for men is graduate student, post-doctoral fellow, research associate, assistant professor, associate professor and full professor, most of the women, who had not abandoned their fields, were hired as research associates and remained at that level. This NSF study is cited by Vivian Gornick in *Women in Science, Portraits from a World in Transition* (New York: A Touchstone Book, 1983), 73-75. A 1986 NSF report, *Women and Minorities in Science and Engineering*, indicates that women's participation in the sciences has increased somewhat, but women still face lower salaries, and lower rates of promotion and tenure than men, 86-300.

others have said no. It is not possible to survey these differences here; however, I will note the significance of the locus of this question. It is being asked by women from within a traditionally androcentric community of discourse that has placed the scientific and the feminine in opposition.¹⁰ Further, the ambiguity and complexity of the question emerges when one considers that in the past women scientists often disavowed their gender as a variable in their scientific performance in the hope of gaining equity with men. In the patriarchal political climate of the scientific community, difference could easily translate into inequality and therefore, exclusion from the community of scientists.¹¹

Epistemologies of Science: A Feminist Appraisal

Epistemology is concerned with ways of knowing and explaining phenomena, rather than with particular research questions. In scientific fields, epistemology is attentive to how scientists go about theorizing. The obvious role of an epistemology is explanatory, but it also serves to justify theories and the metaphors chosen to articulate them. In traditional epistemologies of science, rigid boundaries are placed around science, in a way that sets it apart from other disciplines and from the broader culture and its values. These boundaries are based on the conception of science as an objective knowledge about nature. This empiricist conception still manages to persist, even in an era in which quantum physics and the principle of indeterminacy have thrown into question a mechanistic or positivistic world view. In the objectivist conception, the scientist as agent entirely disappears. The result is that scientific language endows science with an aura of depersonalized authority. Furthermore, the way language often is used in scientific writing denies the relevance of time, place, social context, authorship and personal responsibility.¹²

Feminist philosophers of science have taken issue with this approach to science. They argue that an epistemology will be incomplete and seriously flawed, unless it gives attention to the presuppositions and biases that are at work in what counts as "normal science." One result of the claim of science

¹⁰ Evelyn Fox Keller, "The Gender/Science System: or, Is Sex to Gender as Nature Is to Science?" in *Feminism and Science*, 37.

¹¹ *Ibid.*, 35.

¹² For insightful treatments see Ruth Hubbard, "Introductory Essay: The Many Faces of Ideology," in *Ideology of/in the Natural Sciences*, xiv-xv; Kathryn Pyne Addleson, "The Man of Professional Wisdom," in *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodology, and Philosophy of Science*, ed. Sandra Harding and Merrill B. Hintikka (Boston: D. Reidel Publishing Co., 1983), 165-186 and Lynn Hankinson Nelson, *Who Knows: From Quine to a Feminist Empiricism* (Philadelphia: Temple University Press, 1990).

to objectivity is that it renders gender difference invisible. Philosopher of science Sandra Harding critically appraises the pseudo-gender-neutrality in science by drawing attention to some major questions. For example, if scientific methodology is intent on eliminating gender bias from the results of its research, why has it left undetected so much sexist and androcentric bias?¹³ Evelyn Fox Keller provides a response: the exclusion of the feminine from science has been historically constitutive of the standard definition of science as objective, universal, impersonal and masculine.¹⁴ This definition allows science to maintain its epistemic authority and to insure its power in the broader society.

Harding also raises a question about the very idea of woman as scientist, as knower.¹⁵ Feminist epistemology asks: in a male-dominated field is this not a contradiction in terms? If knowledge is supposed to be based on experience, and male dominance of science has insured that women's experience is viewed as different from men's and not as a subject of consideration, then women's experience does not count as fruitful grounds from which to generate scientific problems or test scientific evidence. As long as scientific epistemology does not attend to gender as a social construction with major consequences for what counts as scientific knowledge and what questions are addressed, it will continue a false universalizing of male experience.

Until recently gender questions have been absent from discussions about what counts as scientific knowledge or how scientific paradigms operate in practice. Attention to gender difference indicates that the boundaries used to set science apart from other realms of our societal and cultural life are artificial and misleading. Science is a socially constructed human activity that is not only decided through interaction among the community of scientists, but is also formed by interaction with the broader social order, a social order that determines the authority given to knowledge and to the meaning and significance of gender, race, and class.

Feminist Appraisal of the Root Metaphors of Science

A critical appraisal of the root metaphors that are standard in "normal science" requires an examination of both the origins of what counts as scientific knowledge and the attitudes of scientists toward nonhuman nature. This examination will take the form of an exercise in deconstruction that scrutinizes the beginnings of modern science, in order to identify the gender biases on what would be included and excluded from scientific knowledge, and on how that knowledge would be expressed in scientific discourse. This

¹³ Sandra Harding, "Is There a Feminist Method?" in *Feminism and Science*, 23.

¹⁴ Evelyn Fox Keller, "The Gender/Science System," 42.

¹⁵ Harding, "Is There a Feminist Method?" 23–24.

exercise will illustrate the historical interconnectedness of the social construction of gender and of science.

Of particular interest for the topic of ecology are Francis Bacon, often characterized as the “father of modern science,” and Charles Darwin, the “father of evolutionary biology.” The purpose of examining the science of Bacon and Darwin is to show how the scientific theories and epistemologies of these significant figures were influenced by the attitudes of the societies in which they participated. These societies not only shaped how Bacon and Darwin engaged in scientific inquiry, they also affected how they articulated their findings.

Francis Bacon (1561-1626), a scientist and philosopher of science, received the title “father of modern science” for his role in the development of scientific methodology. Bacon, perhaps more than any other scholar of his era, helped to set the scientific revolution in motion. Rejecting the authority of traditional philosophy, Bacon wanted to replace speculative metaphysical thought about the nature of reality with a mode of inquiry that would allow people to verify the truths of science by reading nature’s books. Bacon likened his method of scientific research to a kind of mechanical engine of discovery, fueled by experiment and observation.¹⁶

The goal of Bacon’s new experimental science was the competence to dominate and control nature. Why did domination and control become the goal of Bacon’s science? Carolyn Merchant, in *The Death of Nature*, provides a response by examining the linguistic metaphors of Bacon’s scientific treatises in the context of his social and political world.¹⁷ A metaphor is a figure of speech that conjoins the semantic fields of unrelated words in such a way as to create new meaning. According to Merchant, Bacon extensively used gender metaphors in a patriarchal manner and conjoined them to natural science. Bacon gave a new twist to patriarchal thought patterns that can be traced to the ancient Greeks: woman represented the body, the natural, the disordered, the emotional, the irrational; man represented the soul, epitomizing objectivity, rationality, culture and control. Bacon pushed these gender stereotypes still further. He viewed nature not only as female, but as a wild and uncontrollable female to be subdued and controlled. This attitude of dominance contrasted with gender stereotyping of a different form found in the literature of the Renaissance which viewed nature as an organism to be revered. The organic metaphor for nature as nurturing mother, common in sixteenth-century England, found itself in competition in the seventeenth century with the metaphor of a wayward woman who

¹⁶ Peter Urbach, *Francis Bacon’s Philosophy of Science: An Account and a Reappraisal* (La Salle, Ill.: Open Court, 1987), 1–20.

¹⁷ Carolyn Merchant, *The Death of Nature: Women and the Scientific Revolution* (New York: Harper and Row, 1980), 164–190 and passim.

needed to be subdued. Although the image of nurturing earth did not vanish, it was superseded by new imagery which emphasized domination. The witch, symbol of the violence of nature, raised storms, caused illness, destroyed crops, obstructed generation, and killed infants. Disorderly woman, like chaotic nature, needed to be controlled.¹⁸ The male biases prevalent in seventeenth century England affected the assumptions, methods and interpretations of Bacon's science. During Bacon's time religiously motivated witch trials were commonplace. Suspected witches were tried for copulating with the devil. Determining whether or not a woman was guilty of this crime required a thorough physical examination. In England several hundred women were identified as witches and were put to death in 1644-45. Merchant argues that one plausible reason for witch trials was the maintenance of control over women by men in power in the society.¹⁹

There is ample evidence for arguing that the metaphors for nature in Bacon's epistemology originated, at least in part, in the witchcraft trials of his day. Bacon's mentor was King James I, a strong supporter of antiwitchcraft legislation in both England and Scotland. Influenced by the witch trials ordered by James I, Francis Bacon transformed tendencies already in existence in his own society into a total program advocating the control of nature for the benefit of "man." Bacon formulated a new ethic sanctioning the exploitation of nature. Through the methods of scientific inquiry Bacon envisioned that disorderly, active nature would be forced to submit to the questions and experimental techniques of his new science, just as the suspected witches had been forced to submit to the probing of their accusers.²⁰ The practices associated with the inquisition of witches permeated his description of nature and his metaphorical style, and were instrumental in his transformation of the earth, as nurturing mother and womb of life, into a source of secrets to be extracted for economic advance.

Bacon supported his emphasis on the control of nature through an interpretation of chapter two of Genesis, the second story of creation. Merchant draws from several of Bacon's works for his theological interpretation of the role of science.²¹ She points out that Bacon interpreted the fall from the garden of Eden (caused by the temptation of a woman), as the human race's loss of its dominion over creation. Before the Fall, there was no need for

¹⁸ Merchant, 127.

¹⁹ Merchant, 138-140.

²⁰ Merchant, 164.

²¹ Merchant, 170. Merchant cites "Novum Organum," part 2 in Francis Bacon, *Works*, 4:247 and "Valerius Terminus," *Works*, 3:217, 219, ed. James Spedding, Robert Leslie Ellis and Douglas Heath (London: Longmanns Green, 1870), and "The Masculine Birth of Time," in *The Philosophy of Francis Bacon*, ed. Benjamin Farrington (Liverpool, England: Liverpool University Press, 1964), 62; 317 n.13.

power or dominion, because Adam and Eve had been made sovereign over all other creatures. In the state of dominion man was like unto God. Only by digging further into the mine of natural knowledge could mankind recover that lost dominion. Although woman's inquisitiveness may have caused man's fall from his God-given dominion, man's relentless interrogation of another female, nature, could be used to regain it. Bacon wrote: "I am come in very truth leading to you nature with all her children to bind you to her service and make her your slave."²² We have no right to expect nature to come to us. Instead she must be taken and subdued by force.

Bacon's choice of sexist metaphors served to establish male authority as integral to the practice and the epistemology of science. The gender terms chosen by Bacon resulted in science assuming the role of a dominating patriarchal male and nature a subordinate female. These ideas were not generated in a cultural vacuum and have had a far-reaching impact. Bacon's bold sexual imagery is a key feature of the modern experimental method—the constraint of nature in the laboratory, dissection by hand and mind, and the penetration of nature's hidden secrets. Merchant illustrates how scientists still use gender imagery today in such phrases as "the hard facts," "the penetrating mind," and "the thrust of the argument."²³ Merchant concludes that Bacon's image of nature as a female to be controlled and penetrated has served to legitimate the exploitation and the rape of the earth's natural resources by science and technology.

Nature, as active teacher and parent has become a mindless, submissive body. Not only did this new image function as a sanction, but the new conceptual framework of the Scientific Revolution—mechanism—carried with it norms quite different from the norms of organicism. The new mechanical order and its associated values of power and control would mandate the death of nature.²⁴

Sandra Harding, in her comments on Merchant's analysis of the paradigmatic metaphors of Baconian science, contends that there is reason for considerable concern about the intellectual and moral structures of modern science when we think about how misogynous it is in its inception. Both nature and scientific inquiry have been conceptualized in ways modeled after rape and torture—on men's most violent and misogynous relationships to women—and this modeling has been advanced as a reason to value science.²⁵ The result is the ecological crisis.

²² Merchant, 170. This quote is from Bacon, "The Masculine Birth of Time," 62.

²³ Merchant, 171.

²⁴ Merchant, 190.

²⁵ Sandra Harding, *The Science Question in Feminism* (Ithaca, N.Y.: Cornell University Press, 1986), 116.

Evelyn Fox Keller finds Bacon's sexual metaphors more subtle than do Merchant and Harding. Keller argues that for Bacon the aim of science is not to violate, but rather to master nature by following its dictates. Keller states, however, that "these dictates include the requirement, even demand, for domination" of nonhuman nature by scientists.²⁶

The obvious conclusion from the analysis of Merchant and the reflections of Harding and Keller is that modern science, which traces its origins to Bacon, was influenced by the patriarchal biases prevalent in the broader society. The result has been a promotion of the domination of nature in both the metaphors of scientific theory and in candidates for scientific research, with devastating implications for nature. This antagonistic relationship is evident in science as a whole and particularly in biology. Since ecology is directly related to the biological sciences and the question of the survival of plant and animal species, an examination of the linguistic constructs that Charles Darwin used to explain his findings is crucial.

Charles Darwin (1809-82) developed the almost universally accepted theory of the evolution of species. Darwin is often portrayed as an innovative thinker who swam against the social stream. His theory of evolution ran counter to the determinism of the science of his day, because it included chance and change. It also conflicted with the interpretation of origins in the first chapters of Genesis, widely accepted by nineteenth-century British Christians. Although revolutionary from some perspectives, his theory of the process of evolution through the "natural selection" of characteristics that contribute to the survival of the fittest, exhibits substantial congruence with the social, economic and political ideology of his time.²⁷

Darwin's evolutionary theory, presented in *The Origins of Species* (1859), highlights two themes: scarcity and competition. He borrowed these themes from Thomas Malthus's *An Essay on the Principle of Population* (1789), which Darwin read in 1838.²⁸ From Malthus, Darwin accepted an analysis of the effects of scarcity of resources on British society. Malthus reasoned that scarcity of food would result in competition among people which would affect the composition of successive generations. In this idea, Darwin found a basis for his evolutionary theory. He expanded Malthus's human populations theory and reconceptualized it as a principle about the rest of the natural world. Following Malthus's logic, Darwin reasoned that in the course of competition among individuals, those best suited to an environment would be able to produce healthy offspring. Through inheri-

²⁶ Evelyn Fox Keller, *Reflections on Gender and Science* (New Haven: Yale University Press, 1985), 37.

²⁷ Ruth Hubbard, "Have Only Men Evolved?" in *Discovering Reality*, 45.

²⁸ Hubbard, 51. Hubbard indicates that she found this information in Darwin's autobiography.

tance their characteristics would predominate in the next generation.²⁹ Darwin's theory of "natural selection" is a transformation of Malthus's socio-economic theory.

Michael Gross and Mary Beth Averill draw attention to the specific classist purposes of Malthus's work. Malthus opposed the movement to better the economic lot of the poor by means of proposed "poor laws." He argued that such generosity allowed the unfit (the poor) to reproduce, indeed to reproduce faster than the upper class which showed more moral restraint. He predicted that as a consequence humanity would deteriorate.³⁰

In their commentary on Darwin's appropriation of Malthus's positions, Gross and Averill note that Malthus's beliefs were sustained by what they believe to be a typical attribute of patriarchal thought: objectification of, rather than identification with, the "other," in this instance the members of the poorer classes. While the exigencies of survival were a source of dismay for Malthus, who saw in scarcity and competition the decline of English aristocracy under the provisions of the "poor laws," for Darwin they were positive in their consequences for the evolution of plant and animal populations. Darwin saw struggle and competition as essential facts of nature. Gross and Averill observe that

Darwin thus employed struggle rhetorically "for convenience sake," casting every significant interaction in nature in the language of competition within and among the species, and the struggle between organism and its environment.³¹

The theory of evolution based on struggle and competition among species is widely accepted today. The interpretation of nature as battleground, and life as essentially a competitive struggle with limited places at the top, results in a hierarchically ordered world. Evolutionary theory not only changed the course of biology, but also shaped notions of how science progresses. Its influence on fields ranging from sociology, political science, and anthropology to philosophy and Protestant liberal theology is beyond dispute. Given its wide acceptance, does Darwinian evolution adequately account for the data in nature? Or is it an attempt to impose a particular notion of economic and political order on nature in keeping with the perspectives of nineteenth-century Victorian society?

Gross and Averill argue that evolutionary theory centered on struggle for the survival of the fittest does not adequately represent the complex interrelationships among all forms of life. Darwin's evolutionary theory is a

²⁹ Michael Gross and Mary Beth Averill, "Evolution and Patriarchal Myths of Scarcity and Competition," in *Discovering Reality*, 75.

³⁰ Gross and Averill, 74.

³¹ Gross and Averill, 75.

cultural product of nineteenth-century British society's patriarchal concern with the problem of disorder in the reproductive process of the poor and the desire to control it.³²

In analyzing the linguistic metaphors chosen by Bacon and Darwin, I do not mean to imply that all science since their groundbreaking work has completely accepted these metaphors. There are dissenting voices among scientists. But these metaphors have often been used without question, and, as a result, have been given a certain elevated status of empirical objectivity, where none is warranted.

Feminist Epistemology for Reconstructing Science

Through critical analyses of the linguistic patterns of Baconian and Darwinian science, feminist thinkers have brought to light the patriarchal and androcentric biases in their assumptions, methods and interpretations. These exercises in deconstruction make it clear that science is a socially produced body of knowledge and a cultural institution. An important question remains: How can we make science a holistically human, rather than an androcentric project? The response to this question requires a reconstruction that incorporates aspects of women's experience. Obviously, what is involved in this process is not only a challenge to "normal science" in the Kuhnian sense, but also an argument for revolutionary reformulation of what constitutes science. Clearly, an exhaustive reformulation is beyond the scope of this paper, or the expertise of this writer. Nevertheless, I would like to suggest the question that needs to be addressed in carrying out this task: What is required in scientific inquiry to incorporate women's experience into a more adequate and holistic epistemology?

This question is not an easy one to answer. One problem of course is that there is no clear consensus among feminist thinkers in science and the academic disciplines as a whole, on what constitutes "women's experience." Debates center on what is particular to biological sex and what is due to gender as it has been constructed by society. What does seem to be widely accepted by feminist scientists and philosophers of science is the need to reconceptualize science, its methods, theories and goals in a way that places the scientist on the same plane as the questions being researched.

Feminist philosophers of science who subscribe to this stance argue that scientific research designed and practiced by women (and by feminist men) would be different from science which is done in the Baconian and Darwinian paradigms. Obviously, a scientist or philosopher of science who identifies herself (himself) as a feminist is explicitly taking a critical stance vis-a-vis

³² Gross and Averill, 81.

androcentric bias in science. Evelyn Fox Keller and Ruth Bleier critique Baconian scientific methodology and metaphors by attacking any science that assumes a dualistic, detached, attitude about the object of study. Rather than avoid subjectivity, scientists who incorporate a feminist approach are explicit about their personal assumptions, methods and values.³³ In a reconstructed feminist epistemology of science, the scientist is not an impersonal authority standing outside and above nature and human concerns, but a person whose thoughts and feelings, logical capacities and intuitions are all relevant and involved in the process of discovery.

In company with Keller and Bleier, Elizabeth Fee proposes that the incorporation of a feminist epistemology in science would result in the removal of the rigid boundaries that separate the subject of knowledge (the knower) and the object of that knowledge. The elimination of the subject/object dualism, used to legitimate the domination of nature would result in a change in the goals of science.³⁴ Rather than seeking to dominate and control nature, goals which have resulted in ecological disaster, science would concern itself with listening to nature, guided by questions about how human society can restore harmony with its natural environment.

It follows that in a feminist epistemology, nature is conceptualized as active rather than passive, a dynamic and highly complex totality requiring human cooperation and understanding. Recognition of the complexity of nature is a good starting point for reconstructing evolutionary theory to counter Darwin's emphasis on scarcity and competition. Unfortunately, the limitations of the underlying principles of Darwin's thought have seldom been criticized by scientists. Gross and Averill's survey of literature in the field of ecology indicates that current research projects rarely challenge the fundamental principles of scarcity and competition.³⁵ This selective bracketing out of other factors is a consequence of the androcentrism of the biological sciences.

A major manifestation of androcentric bias is the emphasis on the role of dominant males in biologically determining the survival of mammals. While it is true that in many species of mammals mating is determined by fierce struggle among males, it is not true for all species, especially for primates. Female researchers are gathering new data guided by questions that were previously not raised. For example, Elizabeth Fisher's observa-

³³ Evelyn Fox Keller, *Reflections on Gender and Science*, 7-12; and Ruth Bleier, Introduction to *Feminist Approaches to Science*, ed. Ruth Bleier (New York: Pergamon Press, 1986), 1-17, *passim*.

³⁴ Elizabeth Fee, "Critiques of Modern Science: The Relationship of Feminism to Other Radical Epistemologies," in *Feminist Approaches to Science*, 47.

³⁵ Gross and Averill draw attention to several ecological research projects carried out in the late 1970s, "Evolution and Patriarchal Myths of Scarcity and Competition," 76-80.

tions have led her to challenge conceptions of population regulation among higher primates which assume competition among dominant males. Fisher notes that in animals where reproduction involves complex social interactions, females play a role equal to or greater than that of males in determining the genetic constitution of the next generation. Generally, the females determine which males they will accept as mates.³⁶

Data on primates, such as that gathered by Fisher, challenge the assumption that the survival of all mammal species depends on competition among males for dominance. The universalizing of the pattern of male dominance and female subordination is an example of the androcentrism of evolutionary theory. Harding points out that it is men who have been preoccupied with finding the continuities between men and males in other species, and between women and females in other species. This has provided men with a basis for linking evolutionary hypotheses with biological determinist claims about the roles appropriate for each gender in society.³⁷

Furthermore, competition cannot account for variations in specific characteristics in species that arise continually—both through the recombination of genetic characteristics during sexual reproduction and by the introduction of altogether new variations by mutation. Darwinian evolution is one-dimensional and linear. It imposes a static explanation of winners and losers on fundamentally dynamic and complex processes. What evolutionary theory based on competition ignores is a number of other processes: nurturance, tolerance, and collectivism. Environments are constantly undergoing change, and both species' characteristics and population distribution respond and lead to further change. What is needed is better models for evolutionary change, models that will be more responsive to the data and will better facilitate new ways of addressing ecological problems.³⁸

One such model is that of Barbara McClintock, a biologist who was awarded a Nobel Prize in medicine and physiology in 1983. McClintock's major contribution was her theory of transposition, which she developed from her research into the cytogenetics of corn plants. Evelyn Fox Keller captures McClintock's model for doing science in the phrase "a feeling for the organism."³⁹ McClintock describes her work as an attempt to listen to

³⁶ Gross and Averill, 84, cite the research of Elizabeth Fisher, author of *Women's Creation* (Garden City, N.Y.: Anchor/Doubleday, 1979).

³⁷ Harding, *The Science Question in Feminism*, 100.

³⁸ Gross and Averill suggest that a more reliable understanding of nature would be gained by thinking in terms of concepts central to feminist thought which would accurately reflect the natural order. They suggest plentitude and cooperation, "Evolution and Patriarchal Myths," 81–86. I have not included a treatment of their suggestion in this paper, because I believe that what they propose may be a too facily constructed female myth to replace the male myth which they have demythologized.

³⁹ Keller indicates that McClintock often used this phrase in describing her conception

what an organism has to say. McClintock cautions scientists to resist the temptation to impose an answer on their research. The scientist must listen by identification with the organism. To do this the scientist needs to develop a capacity for an empathetic union with that which is to be known.⁴⁰

Integral to McClintock's unique approach to scientific research is her conception of nature. She does not view nature as a passive, mechanical object ruled by externally imposed law, but as alive, growing, internally ordered and resourceful. In a sense McClintock's understanding of nature presupposes an organic model with multiple patterns of interrelationships. McClintock's attitude toward nature sharply contrasts with the rigid dualism of subject and object.

Keller believes that had it not been for her scientific accomplishment, McClintock may have been dismissed as a romantic. Instead she discovered a different approach to genetics, one that recognizes the complexity of interacting systems, including the interrelationships of observer to observed, cell to organism, and organism to environment. Her theory of transposition brought the problem of genetic inheritance into dialogue with the problem of the development of organisms in response to their environments.⁴¹ To understand the life of an organism one must understand not only its genetic blueprint (DNA) but also the relationship of the organism's genes to the environment. Every organism is a complex interdependent relationship—an interaction of individual cell and organism and of the organism and its environment. There is nothing static and linear about the development of organisms: the environment affects them and they in turn affect their environment.

Keller points out that McClintock has never identified herself as a feminist. Born in 1902, McClintock did much of her groundbreaking research in the 1930s and 1940s. Typical of women scientists of her era, she viewed science as a gender-free undertaking. But in doing scientific research she relied on intuition, feeling, and a sense of connectedness and relatedness, attitudes that are repudiated by stereotypic (male) science.⁴²

In particular, McClintock's perspective has important implications for science in an era of heightened awareness of our ecological crisis. "Feeling for the organism" rules out an objectivist conception of science and exhorts

of scientific research. *A Feeling for the Organism* (San Francisco: W. H. Freeman and Co., 1983), 198. McClintock died on September 2, 1992; she was ninety years old.

⁴⁰ Keller, *A Feeling for the Organism*, 198–204.

⁴¹ Keller, *Reflections on Gender and Science*, 167–172.

⁴² Keller notes that whether or not McClintock identified herself as a feminist, she does display attitudes many feminists associate with the female gender, attitudes, Keller argues, she likely internalized along with her core gender identity. "The Gender/Science System: or, Is Sex to Gender as Nature Is to Science?" 37–38.

the scientist to adopt a more holistic approach to scientific research. Her reconstructed understanding of the scientist's relationship to nature is founded on respect for difference among individual subjects. It offers clues about how to promote the survival of species through active empathy, rather than contribute to their demise through control and domination.

"Feeling for the organism" rejects domination as the role of science. It lends itself to ecology because it focuses on forms of interrelatedness, emphasizing harmony and complexity. It attempts not only to transcend the dualism of subject/object, but also insists on the need to unite the two. In addition, I believe that research guided by feeling for the organism avoids the Kantian dichotimization of reason and emotion. While it argues for the recognition of the scientific validity of the subjective, it also unites the cognitive and affective domains in scientific inquiry.

Implications For an Ecological Theology of Creation

What are the implications of feminist critical appraisals of traditional—male—science and the manner in which women, such as Barbara McClintock, engage in scientific research, for an ecological theology of creation? One obvious implication is the removal of the rigid boundaries that separate the scientific community from the other communities that make up society, including theologians. One possible outcome of the removal of these boundaries could be fruitful and transforming dialogue among scientists, philosophers of science, and theologians. Such a dialogue would be historically significant, when one reflects on the fact that Darwin's theory of evolution led many scientists and theologians to treat each other as adversaries. This adversarial relationship contributed to the separation of science and theology in the twentieth century. Theologians relinquished nonhuman nature to scientists, who in turn viewed theology as having no relevance for the study of nature. As a result, the majority of theologians focused their attention on theological anthropology or theology of history and neglected creation.⁴³

The separation of science and theology into distinct epistemic communities took place after Bacon had interpreted the Genesis creation texts in a manner that gave religious legitimation to science's domination of nature, the unruly female. The use of Genesis to rationalize the domination of

⁴³ Within the limits of this essay it is not possible to delve into the relationship between science and theology. It is important, however, to note that the adversarial relationship I speak of was focused on Darwin's evolutionary theory, because it was perceived to be in conflict with the first chapters of Genesis. For more, see my "Creation" in *Systematic Theology: Roman Catholic Perspectives*, vol. 1, ed. Francis Schüssler Fiorenza and John P. Galvin (Minneapolis: Fortress Press, 1991), 219–246.

nature has been criticized by historian Lynn White in an essay that is widely regarded as a classic in ecological literature.⁴⁴ According to White, the Christian doctrine of creation is at the root of the ecological crisis caused by Western science and technology. The Genesis creation texts authenticate humanity's dominance over nature as part of God's plan. As a result, Christianity not only established a dualism of humanity and nature, but it also fostered science and technology as instruments for the exploitation of nature.

White's position has some obvious resonance with the feminist critique of Bacon's use of patriarchal metaphors. Both critique the relationship of domination and its legitimation on either religious or gender-related grounds.

The text that has been most often cited as a charter or proof text for human domination of nature is Genesis 1:26-30. Why has this been the case? According to Dorothee Soelle, Christianity tends to interpret this text as symbolizing God's complete separateness from the world (nature) and, as a result, has elevated God's transcendence to an extreme. God's immanence in the world has been downplayed in order to eliminate any form of pantheism. In Soelle's judgment, the distant, transcendent God is a projection of a patriarchal world view and its ideal of an independent and self-sufficient king. In the modern period, emphasis on divine transcendence has contributed to human domination of nature by science and technology. The human, as made in the image of a transcendent God, is depicted as radically different from nature. This distinction has contributed to humanity's loss of awareness of and reverence for what humans share with earth's other life forms.⁴⁵

A close examination of Genesis 1:1-2:4a is called for to see if the text itself necessarily sanctions scientific domination of nature. At the outset it is important to note that there is no Hebrew word for *nature* in the Tanakh. The idea of nature as a unity first appeared in classical Greek thought. In its modern usage, *nature* refers to the natural order outside of humanity. This understanding of nature would have been completely foreign to the authors of Genesis 1.

Biblical scholars widely agree that the first chapter of Genesis comes from the Priestly tradition and was composed during the Babylonian Exile

⁴⁴ Lynn White, Jr. "The Historical Roots of Our Ecological Crisis," in *Ecology and Religion in History*, ed. David Spring and Eileen Spring (New York: Harper and Row, 1974), 24-28. This essay was first published in *Science* 155 (1967). It has been republished many times in environmental and ecological literature.

⁴⁵ Dorothee Soelle with Shirley A. Cloyes, *To Work and to Love: A Theology of Creation* (Philadelphia: Fortress Press, 1984), 14-19. This insight has been highlighted by many feminist theologians, including Rosemary Radford Ruether who draws attention to the transcendence and separateness of God from creation in *Sexism and God-Talk: Toward a Feminist Theology* (Boston: Beacon Press, 1983), 76-79.

(ca. 550 B.C.E.). The text emphasizes God creating the world by bringing order out of chaos.⁴⁶ Its six-day structure was adapted from the Babylonian myth *Enuma elish*, but given a unique accent by the Jews, expressed in the words, "And God saw that this was good." Nahum M. Sarna argues that the significance of this text is that the world is declared to be a "very good world." This "very good world" is ordered by God in such a way that the interrelationship of organisms with their environment and with each other is harmonious and mutually beneficial.⁴⁷ In his judgment, the original condition of the earth has a great deal to do with humanity's special charge to fill the earth and master it (v. 28).

In Genesis 1:26-27, on the sixth day of creation the human (*'adam*) is created, following the animals. Sarna interprets the significance of humans' sharing the sixth day of creation with animals as underscoring the earthiness of humans and their solidarity with other forms of animal life.⁴⁸ This earthy kinship is also symbolized in the second Genesis story of creation by the formation of humans and other animals from the same element, the earth (2:7, 19).

In Genesis 1 humans not only are created in solidarity with animal life, they are also created in the image and likeness of God. Sarna argues that there is a connection between resemblance to God and the gift of human dominion of the earth's resources. The terminology "in our image, after our likeness" used to describe humanity is derived from Middle Eastern regal vocabulary. Humans image God by carrying out the function of God's representative. The charge to rule the earth and its life forms is in keeping with humans as "the image of God." What does it mean for humans to rule as God's representative? Sarna provides a response to this question that challenges human domination.

This power, however, cannot include the license to exploit nature banefully, for the following reasons: the human race is not inherently sovereign, but enjoys its dominion solely by the grace of God. Furthermore, this model of kingship here presupposed is Israelite, according to which the monarch does not possess unrestrained power and authority; the limits of his rule are carefully defined and circumscribed by divine law, so that kingship is to be exercised with responsibility and is subject to accountability.⁴⁹

⁴⁶ John L. McKenzie, "Aspects of Old Testament Thought," in *The New Jerome Biblical Commentary*, ed. Raymond E. Brown, Joseph A. Fitzmyer and Roland E. Murphy (Englewood Cliffs, N.J.: Prentice Hall, 1990), 1292-1293.

⁴⁷ Nahum M. Sarna, *The JPS Torah Commentary of Genesis: The Traditional Hebrew Text and the New JPS Translation* (Philadelphia: Jewish Publication Society, 5749/1989), 13.

⁴⁸ Sarna, 13.

⁴⁹ Sarna, 12-13.

In Sarna's commentary on Genesis 1, concern for the environment is very much in evidence. This same concern has also prompted some Christian theologians to interpret dominion as "stewardship" rather than domination of creation. At the core of this interpretation is the idea that to be God's representative is to act as the Divine King's steward, like a trustee of property.

A chief proponent of this view of dominion is Douglas John Hall. He interprets the Genesis 1 *imago Dei* symbol in terms of the categories of identification and differentiation.⁵⁰ He explains identification as the solidarity of humans with all earth's creatures. His approach is similar to Sarna's interpretation of the significance of animals and humans being created on the sixth day. Differentiation is the category Hall uses to highlight *imago Dei*, as indicating human transcendence over nonhuman creation. He develops the latter by proposing that inherent to the human being as *imago Dei* is not the sanction to dominate nature, but rather the God-given vocation of stewardship of the environment.

Hall proposes a radically Christocentric interpretation of *imago Dei* and stewardship by focusing on the Lordship of Christ as the exemplar for human beings' relation to the world.⁵¹ He stresses that Christ's Lordship is expressed, not as mastery over creation, but as the service of sacrificial love. Christ, in his exercise of dominion, is what the human, as created in the image of God, is called to enact.

This interpretation of dominion as stewardship focused on Christ is thought-provoking and worthy of consideration. It offers a corrective to conceptions of God as sovereign King and dominating Other associated with Genesis 1. I do not believe, however, that it sufficiently reconceives humanity's relationship with nonhuman nature. I find Hall's proposal to be problematic on several fronts: (1) The Lordship of Christ has a history of imperial interpretation that has often muted its association with Jesus' sacrificial love. To his credit, Hall recognizes this difficulty and gives it attention, but I don't believe that he sufficiently resolves it. Since human imperialism vis-a-vis nature has resulted in the ecological crisis we are now facing, the imperialism associated with the symbol of Christ's Lordship deserves more serious consideration than Hall gives it. (2) In Hall's interpretation, humanity is placed in a type of redeemer role where nonhuman nature is concerned. Although Hall does argue for humanity's identification (solidarity) with the rest of creation, identification with Christ, the Lord and Savior of the world, lends itself to a triumphalistic otherness. If the human vocation is conformity

⁵⁰ Douglas John Hall, *Imaging God: Dominion as Stewardship* (Grand Rapids: Wm. B. Eerdmans Publishing Co.; New York: Friendship Press, 1986), 178–183. (Readers will, no doubt, recognize the Hegelian roots of his categories.)

⁵¹ Hall, 183–187.

to Christ's saving Lordship, are humans still really in solidarity with nonhuman nature? It seems to me that nonhuman nature remains unavoidably subordinate and other in its relationship to its human saviors. (3) In my reading of Hall's argument for dominion as stewardship, I do not find that he sufficiently attends to the fact that we humans *are* the ecological crisis; it is we who are the major cause for the imbalances in the ecosphere. This is the legacy of the paradigm of control of nature through science and technology. By what right do we envision ourselves as the stewards of creation, when nonhuman nature could take care of itself without us? In addition, emphasis on human stewardship of creation can too easily imply instrumental management of nonhuman nature, as if it were property primarily for human use and benefit.

As a first step in the search for an ecological theology of creation responsive to feminist perspectives on science, I propose that Genesis 1:1–2:4a be examined as a part of the eleven-chapter introductory unit of the Torah. Perhaps more light can be shed on the biblical understanding of "dominion" in this context. In the account of Noah and the flood (Gen. 6:9–9:29),⁵² we find another type of creation story. In this story human wickedness creates an ecological disaster of worldwide proportions. The just man Noah, along with his wife and family, are chosen to act as God's representatives in a special exercise of dominion. In this context, dominion means attending to the survival of the animals who are also beloved creatures of God. After the flood, God indicates that a reckoning will be required from humans and the same will also be required from every beast (9:1–4). God establishes a covenant with Noah's family and their descendants and also with every living creature that is with them—birds, cattle and every wild beast (9:9–11).⁵³ There is an inherent relational interdependence in this covenant. The Noachic covenant is a symbol of the unbreakable bonds among all creatures and their Creator. The perpetual sign of the covenant is God's "bow in the clouds" (9:13). Consequently, humans and animals are covenant partners with God and are ever-reminded of this with the appearance of a rainbow.

Is there anything in this interpretation that responds to White's critique? First of all, the exploitation of nonhuman nature and the resulting destruction of the balance of nature at human hands are not the result of the gift of dominion, but of humanity's disregard for the order of the universe which has its source in God. Secondly, the central affirmation that the Cre-

⁵² This story is a combination of the Yahwist and Priestly traditions redacted into a coherent unity; chapter 9:1–17 is believed to have Priestly origins. See Richard J. Clifford, "Genesis," in *The New Jerome Biblical Commentary*, 15.

⁵³ Richard J. Clifford has drawn attention to the extension of the covenant to animal life in Genesis 9 in providing a negative response to the question raised in the title of a recent article, "Genesis 1–3: Permission to Exploit Nature?" *Bible Today* 26 (1988): 135.

ator is the God of the covenant contains an inherent critique of God as a dominating transcendent Other, and places God's dominion in the context of a mutual relationship. The language of covenant is in tension with the language of domination. In a covenant relationship God is not a dominating ruler outside the world; rather God is intimately connected to the world and to its inhabitants.

Practically speaking, what does being a covenant partner with other life forms mean for us today? To truly be a covenant partner with nonhuman nature rules out a stance of domination. In an age of ecological crisis, I believe that creation theology can be transformed by bringing mutual covenant partnership into dialogue with the understanding of nature operative in some scientific work. I have already noted that McClintock's research tenet, "feeling with the organism," reflects an understanding of nature that presupposes an organic model with multiple patterns of interrelationships that include the scientific researcher. The organic model of science offers a corrective to human imperialism over nonhuman nature and provides rich prospects for theological understanding of the human as a covenant partner with the rest of creation.

Sally McFague, a feminist theologian who has made ecology her focal concern, describes an organic ecological model as "one that unites entities by symbiotic, mutual interdependencies, creating a pattern of internal relations."⁵⁴ McFague's model stands in contrast to objectivist models that separate entities dualistically and hierarchically. Her organic model is predicated on a mutuality that recognizes all entities as having intrinsic worth and not only instrumental value for humans.

McFague theologizes about this organic model in the evocative metaphor, "the world as God's body."⁵⁵ In the light of the dominant image of God as sovereign over creation, this is a radical metaphor for re-envisioning the relationship between God and the world. In this metaphor the entire universe is envisioned as expressive of God's very being: "the 'incarnation'."⁵⁶ It is this metaphor that she believes best expresses the God-world relationship for our time.

McFague's proposal is a critique of the monarchical understanding of the God-world relationship which puts distance between God and the world. The embodiment of God as the world overcomes that distance, and the emphasis on control and the God-world dualism that accompanied it. McFague is cautious not to give a pantheistic understanding to this meta-

⁵⁴ Sally McFague, *Models of God: Theology for an Ecological, Nuclear Age* (Philadelphia: Fortress Press, 1987), 11. McFague mentions White's critique in n. 10 on p. 68, but she does not address it in depth.

⁵⁵ McFague, 61.

⁵⁶ McFague, 62.

phor. God cannot be reduced to the world, any more than we humans can be reduced to our bodies.

To ground the metaphor of the “world as God’s body” biblically, McFague proposes a remythologizing of the suffering love of the cross of Jesus⁵⁷ and the risen Jesus as “a permanent presence in our present.”⁵⁸ She argues that these are signs of the abiding and caring presence of God in the world.

This does not mean, however, that McFague neglects the biblical doctrine of creation. In the context of her reflections on God as mother she gives some attention to creation and some to the problems with modern biblical interpretation. The Enlightenment era interpretation of the Genesis creation texts is defective because it supports dualism and hierarchy. God is distinct from the world, and spirit is superior to matter. She finds the image of God as fashioning the world, either intellectually by word or aesthetically by craft, to be inadequate for it depicts God as totally different and totally distant from creation. As an alternative model she images creation as a physical event in which the universe is “bodied forth” from the womb of God.⁵⁹ If we were to follow the logic of this image, however, it seems that the world is God’s child and not actually God’s body.⁶⁰ So has McFague really overcome the distance between God and the world that she believes is so important in an ecological age?

In the context of her treatment of God as Mother-Creator McFague briefly notes that the biblical Wisdom literature depicts Wisdom as a female figure involved in creation.⁶¹ She indicates that in Sophia she does not see the dualism that later became dominant in the tradition. However, she does not develop the God-Sophia-creation theme.

As a basis for an ecological theology of creation, I propose to explore what the biblical Wisdom literature might have to offer. I see this as an important supplement to the creation-covenant theme of Genesis 9 that I have already treated. In Wisdom literature there are several passages that describe wisdom as intimately connected with creation. For example, Proverbs declares that by wisdom God founded the earth (3:19). Although the female character of wisdom is not evident in this text, in many of the Wisdom literature’s creation texts wisdom is presented as a female with strong intima-

⁵⁷ McFague, 72.

⁵⁸ McFague, 59.

⁵⁹ McFague, 110.

⁶⁰ McFague, herself, notes this problem with her interpretation of creation as being bodied forth from God; see 110–11.

⁶¹ McFague, 115.

tions of divinity. For this reason, I will render wisdom as Sophia, the Greek term that makes the female character explicit.⁶²

The association of Sophia and creation is developed in detail in Proverbs 8:22–31. In this text creation is the arena where God's presence is revealed. Here Sophia replaces the royal representative imagery of Genesis 1.⁶³ It is Sophia who is the source for the order and meaning of the world. In this poem, Sophia speaks in the first person and describes herself as the very first of God's works, brought forth before the creation of any reality (vs. 22–26). Further, when God performed the work of the world's creation, Sophia was present. Sophia in this passage is presented in a way that is unique in Wisdom literature. Preexistent Sophia is not of the ordinary created order. Paradoxically, she is both outside creation and also within it, as the instrument of the production of creation.⁶⁴ She participates in the activity of creation: "When he marked out the foundations of the earth, then I was beside him . . ." (v. 29–30).⁶⁵ In further probing Sophia's role in creation, we find that she is the model or exemplar of Yahweh's works. This is what it means for Sophia to be the "master worker" (v. 30).⁶⁶

The poem concludes with Sophia rejoicing in God, the world and the human race. This makes Sophia the center of a threefold relationship. In a sense, it is she who is the bow in the sky, for she spans the distance between

⁶² In focusing on the divine Sophia, I find myself at odds with Rosemary Radford Ruether's rejection of Sophia. Ruether believes that the Hebrew tradition has limited Sophia to the status of an attribute of the male God (*Sexism and God-Talk*, 57). My position is more in keeping with that of Elisabeth Schüssler Fiorenza whose research has led her to conclude that Sophia is the God of Israel expressed in the imagery of a goddess. See *In Memory of Her* (New York: Crossroad, 1983), 133–35.

⁶³ For a thorough survey of the question of female personification of Wisdom in the book of Proverbs see Claudia V. Camp, *Wisdom and the Feminine in the Book of Proverbs* (Decatur, Ga.: Almond Press, 1985). Camp's research notes that the feminine Wisdom figure in Proverbs 8:22–31 may be patterned after the Egyptian goddess Maat. This goddess is the favorite child of the god Re; she came down to earth at the beginning of time as the embodiment of cosmic order and the preserver of the law. During the Hellenistic period, Maat became identified with the Egyptian goddess Isis, 29–41.

⁶⁴ Bruce Vawter, "Proverbs 8:22, Wisdom and Creation," *Journal of Biblical Literature* 99 (1980): 214–15.

⁶⁵ This text and subsequent biblical passages cited are taken from the *New Revised Standard Version: The New Oxford Annotated Bible*, ed. Bruce M. Metzger and Roland Murphy (New York: Oxford University Press, 1991).

⁶⁶ The Hebrew term is 'mwn. Its meaning has been a subject of debate. It has sometimes been rendered as crafts[wo]man, as darling, or even as nursling. See Roland E. Murphy, *The Tree of Life: An Exploration of Biblical Wisdom Literature* (New York: Doubleday, The Anchor Bible Reference Library, 1990), 136. Murphy indicates that, in his opinion, the author of the Wisdom of Solomon understands 'mwn of Proverbs 8:30 as "artisan or crafts[wo]man, or maker of all." Thus she is identified with God, 143.

God, the world and human beings. Claudia Camp points out that any hint of dichotomizing between God and nature, and sacred and profane are overcome in the female imagery for wisdom.⁶⁷ Sophia goes on to give a clear directive: "Hear instruction and be wise, and do not neglect it" (v. 33). Listening to her instructions is the key to finding wisdom.

The preexistence of Sophia and her participation in the creation of the world are themes also found in Job 28 and Sirach 24. Job 28 raises the question ". . . where shall wisdom be found?" (v. 12). The theme of personified wisdom's participation in the work of creation is hinted at. The hiddenness of Sophia within creation is stressed (vs. 20–22). It is God who has placed her within creation (vs. 23–27). Sophia cannot be gotten for gold or silver (v. 15). To find her it is necessary that one depart from evil (v. 28). In Sirach 24 the origins of Sophia are described in a manner similar to that of Proverbs 8:22–31. "I came forth from the mouth of the Most High" (Sir. 24:3). She describes herself as very ethereal: "mistlike" she covers the earth (24:3), much as the spirit of God came over the waters of chaos (cf. Gen. 1:2). However, what is unique about Sophia in Sirach is her identification with the Torah (24:23). Ben Sira links creation with the Law and therefore with the covenant relationship.

In the Wisdom of Solomon, the Sage begins by saying explicitly that wisdom inheres in creation (1:7). In a later lengthy passage Sophia is presented as a divine character with a cosmic function (6:12–11:1). She is not just the Creator at the beginning. She is part of the ongoing creative process. In Wisdom 7:22–8:1, it is Sophia, who acts as the artisan who fashions all things (cf. Prov. 8:30), and teaches humanity about the structure of the world, the nature of animals and the varieties of plants (7:17–22). Her teachings, therefore, are broader than the Law (cf. Sir. 24:23); they take on encyclopedic proportions. Further, Sophia penetrates all spirits (v. 23) and indeed all things because of her purity (v. 24). In reflecting on this passage, Roland Murphy points out that in this text her "cosmological ubiquity comes into play."⁶⁸ Sophia is the way in which God is present to the world and to humans.

The close relationship of Sophia to creation is further spelled out in Wisdom 8:1: ". . . She orders all things well." She is immanent in creation. In the opening verses of the chapter that follows, we find a prayer directed to God with this address.

O God of my ancestors and Lord of Mercy,
 who have made all things by your word,
 and by your wisdom have formed humankind

⁶⁷ Camp, 289.

⁶⁸ Murphy, 143.

to have dominion over the creatures you have
made . . . (9:1–2).

As the prayer unfolds the reader is reminded of Sophia's immanence in creation. It is Sophia who knows God's works and who was present when God made the world. Therefore, she understands what is pleasing in God's sight and what is right according to God's design. It is to her that we are to look for the meaning of "dominion." It is by her that people will be saved (v. 18). Perhaps there is some justification for asserting that it is also by her that creation, as a whole, will be restored to ecological harmony.

Conclusions

I realize that what I have presented does not adequately address the immensity of the ecological crisis that we face. What has been accomplished in this essay is far more modest. I hope I have succeeded in initiating a process of further dialogue and collaboration that will contribute to the more radical transformation that is needed.

No solution to our ecological crisis will be forthcoming until sexism is rooted out of our patterns of thinking and acting. The critical feminist appraisals of the metaphors and concepts of traditional Baconian science and Darwinian evolution theory have brought to light how pervasive the androcentric bias of traditional science is. In Bacon's conceptualization of science, the domination of nonhuman nature and of women are arbitrarily linked. In Darwin's theory of "natural selection" both sexist and classist biases are in evidence.

An alternative to these androcentric perspectives is Barbara McClintock's approach to biological research—"a feeling for the organism." While McClintock does not provide us with a complete epistemology of science, she does provide a viable method of research that makes empathetic listening to nonhuman nature central. Learning to listen from within nature is basic to true ecological consciousness.

In exploring the possible connections between the feminist perspectives on science and creation theology, I began with Genesis 1:1–2:4a, the creation text that is most often cited as a proof text for human domination (exploitation) of nonhuman nature. As a corrective to approaches that lend themselves to human mastery of nonhuman nature in the name of God or of Christ, I have proposed the covenant partnership of humans with nonhuman nature in the story of the Noachic covenant (Gen. 9:8–17), because it emphasizes the solidarity of human and nonhuman nature in relationship to God. For a further basis for an ecological theology of creation I have looked to Sophia creation texts. The Divine Sophia is often at the heart of creative activity in biblical Wisdom literature. The Sophia creation texts provide a corrective to the dualistic/dominating conceptions of the relationship be-

tween the divine and creation, and human and nonhuman nature commonly associated with Genesis 1. In making this proposal, I do so with the recognition that Sophia is a complex and somewhat ambiguous figure. In some texts she is present at the beginning of creation, but she is neither clearly distinct from the Creator nor from creation. In other texts, Sophia inheres in Creation; it is she who makes all things new, and orders existence.

In closing, it seems fitting to note that in the biblical Wisdom literature Sophia is found primarily through effort and discipline (Sir. 4:17; 6:18–36; Prov. 4:10–27; 6:6; Wis. 1:5; 7:14). This effort and discipline requires that we conceive of reality in new ways and make choices in our lives that will embody those new conceptions. In our present era, if we are to find Sophia in our world, new root metaphors must be sought for making the divine order intelligible. I believe that the admonition to listen to Sophia and to study her ways is very much akin to McClintock's empathetic "feeling for the organism." With willingness to be challenged beyond both traditional science and epistemology and traditional interpretations of biblical texts, we must listen to nonhuman nature speak its wisdom of ecological harmony. It will take real discipline to listen to Sophia speak by allowing ourselves to "feel" with creation in a stance of prayerful openness to the discovery of divine order.

Listening to Sophia obviously requires of us an active commitment to restore the sacred covenant partnership with nature's life forms that we humans have broken. It requires us to abandon the dualistic and hierarchical understandings of reality that put us, as humans, in transcendent domination over (and against) nonhuman nature, as if we were its royal rulers. Nature is neither an unruly female to be tamed by science and technology for human benefit, nor an evolving saga of competition at the expense of others. Rather it is a complex web of life in which we humans are a vital thread. To really listen to Sophia immanent within nature as God's creation, demands we attempt to be attuned to the inner dynamism of our complex global ecosystem and discover ourselves as humans in continuity with it.