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Environmental Ethics
The Big Questions

Edited by

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described as that of moral agent to rights holders. In relationships involving mere property, those relationships might be correctly described as that of moral agent to objects having only instrumental value, "relationships of instrumentality." In comments on an earlier draft of this paper, West suggested that possessive individualism, for instance, might be recast in such a way that an individual is defined by his or her property relationships.

24 Cheney, "Eco-Feminism and Deep Ecology," p. 144.

25 One might object that such permission for change opens the door for environmental exploitation. This is not the case. An ecofeminist ethic is anti-naturist. Hence, the unjust domination and exploitation of nature is a "boundary condition" of the ethic; no such actions are sanctioned or justified on ecofeminist grounds. What it *does* leave open is some leeway about what counts as domination and exploitation. This, I think, is a strength of the ethic, not a weakness, since it acknowledges that *that* issue cannot be resolved in any practical way in the abstract, independent of a historical and social context.

26 Nathan Hare, "Black Ecology," in *Environmental Ethics*, ed. K. S. Shrader-Frechette (Pacific Grove, Calif.: Boxwood Press, 1981), pp. 229–36.

27 For an ecofeminist discussion of the Chipko movement, see my "Toward an Ecofeminist Ethic," and Shiva's *Staying Alive*.

28 See Cheney, "Eco-Feminism and Deep Ecology," p. 122.

36 Feminism and the Philosophy of Nature

Carolyn Merchant

Ecofeminism and Feminist Theory

The term *ecofeminisme* was coined by the French writer Françoise d'Eaubonne in 1974 to represent women's potential for bringing about an ecological revolution to ensure human survival on the planet.[1] Such an ecological revolution would entail new gender relations between women and men and between humans and nature. Liberal, radical, and socialist feminism have all been concerned with improving the human/nature relationship, and each has contributed to an ecofeminist perspective in different ways.[2] Liberal feminism is consistent with the objectives of reform environmentalism to alter human relations with nature through the passage of new laws and regulations. Radical ecofeminism analyzes environmental problems from within its critique of patriarchy and offers alternatives that could liberate both women and nature. Socialist ecofeminism grounds its analysis in capitalist patriarchy and would totally restructure, through a socialist revolution, the domination of women and nature inherent in the market economy's use of both as resources. While radical feminism has delved more deeply into the woman/nature connection, I believe that socialist feminism has the potential for a more thorough critique of the domination issue.

Liberal feminism characterized the history of feminism from its beginnings in the seventeenth century until the 1960s. Its roots are liberalism, the political theory that incorporates the scientific analysis that nature is composed of atoms moved by external forces with a theory of human nature that views humans as individual rational agents who maximize their own self-interest and capitalism as the optimal economic structure for human progress. Historically, liberal feminists have argued that women do not differ from men as rational agents and that exclusion from educational and economic opportunities have prevented them from realizing their own potential for creativity in all spheres of human life.[3]

For liberal feminists (as for liberalism generally), environmental problems result from the overly rapid

From Irene Diamond and Gloria Orenstein, *Reweaving the World: The Emergence of Ecofeminism* (San Francisco, CA: Sierra Club Books, 1990), pp. 100–5. © 1990 by Irene Diamond and Gloria Feman Orenstein. Reprinted with permission from Sierra Club Books and Carolyn Merchant. And from Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (New York: HarperCollins, 1989), pp. xix–xx, xxi, 1–4, 164, 172, 188–9, 189–93, 290–1. © 1980 by Carolyn Merchant. Reprinted by permission of HarperCollins Publishers.

Table 36.1 Feminism and the Environment

	Nature	*Human nature*	*Feminist critique of environmentalism*	*Image of a feminist environmentalism*
Liberal feminism	Atoms Mind/body dualism Domination of nature	Rational agents Individualism Maximization of self-interest	"Man and his environment" leaves out women	Women participate in natural resources and environmental sciences
Marxist feminism	Transformation of nature by science and technology for human use Domination of nature as a means to human freedom Nature is material basis of life: food, clothing, shelter, energy	Creation of human nature through mode of production, praxis Historically specific – not fixed Species nature of humans	Critique of capitalist control of resources and accumulation of goods and profits	Socialist/communist society will use resources for good of all men and women Resources will be controlled by workers Environmental pollution will be minimal since no surpluses will be produced Environmental research by men and women
Radical feminism	Nature is spiritual and personal Conventional science and technology problematic because of their emphasis on domination	Biology is basic Humans are sexually reproducing bodies Sexed by biology/Gendered by society	Unaware of interconnectedness of male domination of nature and women Male environmentalism retains hierarchies Insufficient attention to environmental threats to women's reproduction (chemicals, nuclear war)	Woman/nature both valued and celebrated Reproductive freedom Against pornographic depictions of both women and nature Radical ecofeminism
Socialist feminism	Nature is material basis of life: food, clothing, shelter, energy Nature is socially and historically constructed Transformation of nature by production	Human nature created through biology and praxis (sex, race, class, age) Historically specific and socially constructed	Leaves out nature as active and responsive Leaves out women's role in reproduction and reproduction as a category Systems approach is mechanistic not dialectical	Both nature and human production are active Centrality of biological and social reproduction Dialectic between production and reproduction Multileveled structural analysis Dialectical (not mechanical) systems Socialist ecofeminism

development of natural resources and the failure to regulate environmental pollutants. Better science, conservation, and laws are the proper approaches to resolving resource problems. Given equal educational opportunities to become scientists, natural resource managers, regulators, lawyers, and legislators, women like men can contribute to the improvement of the environment, the conservation of natural resources, and the higher quality of human life. Women, therefore, can transcend the social stigma of their biology and join men in the cultural project of environmental conservation.

Radical feminism developed in the late 1960s and 1970s with the second wave of feminism. The radical form of ecofeminism is a response to the perception that women and nature have been mutually associated and devalued in Western culture and that both can be elevated and liberated through direct political action. In prehistory an emerging patriarchal culture dethroned the mother Goddesses and replaced them with male gods to whom the female deities became subservient.[4] The scientific revolution of the seventeenth century further degraded nature by replacing Renaissance organicism and a nurturing earth with the metaphor of a machine to be controlled and repaired from the outside. The Earth is to be dominated by male-developed and -controlled technology, science, and industry.

Radical feminism instead celebrates the relationship between women and nature through the revival of ancient rituals centered on Goddess worship, the moon, animals, and the female reproductive system. A vision in which nature is held in esteem as mother and Goddess is a source of inspiration and empowerment for many ecofeminists. Spirituality is seen as a source of both personal and social change. Goddess worship and rituals centered around the lunar and female menstrual cycles, lectures, concerts, art exhibitions, street and theater productions, and direct political action (web weaving in antinuclear protests) are all examples of the re-visioning of nature and women as powerful forces. Radical ecofeminist philosophy embraces intuition, an ethic of caring, and weblike human/nature relationships.

For radical feminists, human nature is grounded in human biology. Humans are biologically sexed and socially gendered. Sex/gender relations give men and women different power bases. Hence the personal is political. Radical feminists object to the dominant society's perception that women are limited by being closer to nature because of their ability to bear children. The dominant view is that menstruation, pregnancy, nursing, and nurturing of infants and young children should tie women to the home, decreasing their mobility and inhibiting their ability to remain in the work force. Radical feminists argue that the perception that women are totally oriented toward biological reproduction degrades them by association with a nature that is itself devalued in Western culture. Women's biology and nature should instead be celebrated as sources of female power.

Turning the perceived connection between women and biological reproduction upside down becomes the source of women's empowerment and ecological activism. Women argue that male-designed and -produced technologies neglect the effects of nuclear radiation, pesticides, hazardous wastes, and household chemicals on women's reproductive organs and on the ecosystem. They argue that radioactivity from nuclear wastes, power plants, and bombs is a potential cause of birth defects, cancers, and the elimination of life on Earth.[5] They expose hazardous waste sites near schools and homes as permeating soil and drinking water and contributing to miscarriage, birth defects, and leukemia. They object to pesticides and herbicides being sprayed on crops and forests as potentially affecting children and the childbearing women living near them. Women frequently spearhead local actions against spraying and power plant siting and organize others to demand toxic cleanups. When coupled with an environmental ethic that values rather than degrades nature, such actions have the potential both for raising women's consciousness of their own oppression and for the liberation of nature from the polluting effects of industrialization. For example, many lower-middle-class women who became politicized through protests over toxic chemical wastes at Love Canal in New York simultaneously became feminists when their activism spilled over into their home lives.[6]

Yet in emphasizing the female, body, and nature components of the dualities male/female, mind/body, and culture/nature, radical ecofeminism runs the risk of perpetuating the very hierarchies it seeks to overthrow. Critics point to the problem of women's own reinforcement of their identification with a nature that Western culture degrades.[7] If "female is to male as nature is to culture," as anthropologist Sherry Ortner argues,[8] then women's hopes for liberation are set back by association with nature. Any analysis that makes women's essence and qualities special ties them to a biological destiny that thwarts

the possibility of liberation. A politics grounded in women's culture, experience, and values can be seen as reactionary.

To date, socialist feminists have had little to say about the problem of the domination of nature. To them, the source of male domination of women is the complex of social patterns called capitalist patriarchy, in which men bear the responsibility for labor in the marketplace and women for labor in the home. Yet the potential exists for a socialist ecofeminism that would push for an ecological, economic, and social revolution that would simultaneously liberate women, working-class people, and nature.

For socialist ecofeminism, environmental problems are rooted in the rise of capitalist patriarchy and the ideology that the Earth and nature can be exploited for human progress through technology. Historically, the rise of capitalism eroded the subsistence-based farm and city workshop in which production was oriented toward use values and men and women were economic partners. The result was a capitalist economy dominated by men and a domestic sphere in which women's labor in the home was unpaid and subordinate to men's labor in the marketplace. Both women and nature are exploited by men as part of the progressive liberation of humans from the constraints imposed by nature. The consequence is the alienation of women and men from each other and both from nature.

Socialist feminism incorporates many of the insights of radical feminism, but views both nature and human nature as historically and socially constructed. Human nature is seen as the product of historically changing interactions between humans and nature, men and women, classes, and races. Any meaningful analysis must be grounded in an understanding of power not only in the personal but also in the political sphere. Like radical feminism, socialist feminism is critical of mechanistic science's treatment of nature as passive and of its male-dominated power structures. Similarly, it deplores the lack of a gender analysis in history and the omission of any treatment of women's reproductive and nurturing roles. But rather than grounding its analysis in biological reproduction alone, it also incorporates social reproduction. Biological reproduction includes the reproduction of the species and the reproduction of daily life through food, clothing, and shelter; social reproduction includes socialization and the legal/political reproduction of the social order.[9]

Like Marxist feminists, socialist feminists see nonhuman nature as the material basis of human life, supplying the necessities of food, clothing, shelter, and energy. Materialism, not spiritualism, is the driving force of social change. Nature is transformed by human science and technology for use by all humans for survival. Socialist feminism views change as dynamic, interactive, and dialectical, rather than as mechanistic, linear, and incremental. Nonhuman nature is dynamic and alive. As a historical actor, nature interacts with human beings through mutual ecological relations. Socialist feminist environmental theory gives both reproduction and production central places. A socialist feminist environmental ethic involves developing sustainable, nondominating relations with nature and supplying all peoples with a high quality of life.

In politics, socialist feminists participate in many of the same environmental actions as radical feminists. The goals, however, are to direct change toward some form of an egalitarian socialist state, in addition to resocializing men and women into nonsexist, nonracist, nonviolent, anti-imperialist forms of life. Socialist ecofeminism deals explicitly with environmental issues that affect working-class women, Third World women, and women of color. Examples include support for the women's *Chipco* (tree-hugging) movement in India that protects fuel resources from lumber interests, for the women's Green Belt movement in Kenya that has planted more than 2 million trees in 10 years, and for Native-American women and children exposed to radioactivity from uranium mining.[10]

Although the ultimate goals of liberal, radical, and socialist feminists may differ as to whether capitalism, women's culture, or socialism should be the ultimate objective of political action, shorter-term objectives overlap. In this sense there is perhaps more unity than diversity in women's common goal of restoring the natural environment and quality of life for people and other living and nonliving inhabitants of the planet.

Women and Ecology

Women and nature have an age-old association – an affiliation that has persisted throughout culture, language, and history. Their ancient interconnections have been dramatized by the simultaneity of two recent social movements – women's liberation,

symbolized in its controversial infancy by Betty Friedan's *Feminine Mystique* (1963), and the ecology movement, which built up during the 1960s and finally captured national attention on Earth Day, 1970. Common to both is an egalitarian perspective. Women are struggling to free themselves from cultural and economic constraints that have kept them subordinate to men in American society. Environmentalists, warning us of the irreversible consequences of continuing environmental exploitation, are developing an ecological ethic emphasizing the interconnectedness between people and nature. Juxtaposing the goals of the two movements can suggest new values and social structures, based not on the domination of women and nature as resources but on the full expression of both male and female talent and on the maintenance of environmental integrity.

New social concerns generate new intellectual and historical problems. Conversely, new interpretations of the past provide perspectives on the present and hence the power to change it. Today's feminist and ecological consciousness can be used to examine the historical interconnections between women and nature that developed as the modern scientific and economic world took form in the sixteenth and seventeenth centuries – a transformation that shaped and pervades today's mainstream values and perceptions.

Feminist history in the broadest sense requires that we look at history with egalitarian eyes, seeing it anew from the viewpoint not only of women but also of social and racial groups and the natural environment, previously ignored as the underlying resources on which Western culture and its progress have been built. To write history from a feminist perspective is to turn it upside down – to see social structure from the bottom up and to flip-flop mainstream values. An egalitarian perspective accords both women and men their place in history and delineates their ideas and roles. The impact of sexual differences and sex-linked language on cultural ideology and the use of male, female, and androgynous imagery will have important places in the new history.

The ancient identity of nature as a nurturing mother links women's history with the history of the environment and ecological change. The female earth was central to the organic cosmology that was undermined by the Scientific Revolution and the rise of a market-oriented culture in early modern Europe. The ecology movement has reawakened interest in the values and concepts associated historically with the premodern organic world. The ecological model and its associated ethics make possible a fresh and critical interpretation of the rise of modern science in the crucial period when our cosmos ceased to be viewed as an organism and became instead a machine.

[. . .]

In investigating the roots of our current environmental dilemma and its connections to science, technology, and the economy, we must reexamine the formation of a world view and a science that, by reconceptualizing reality as a machine rather than a living organism, sanctioned the domination of both nature and women. The contributions of such founding "fathers" of modern science as Francis Bacon, William Harvey, René Descartes, Thomas Hobbes, and Isaac Newton must be reevaluated. The fate of other options, alternative philosophies, and social groups shaped by the organic world view and resistant to the growing exploitative mentality needs reappraisal. To understand why one road rather than the other was taken requires a broad synthesis of both the natural and cultural environments of Western society at the historical turning point. [. . .]

Nature as Female

The world we have lost was organic. From the obscure origins of our species, human beings have lived in daily, immediate, organic relation with the natural order for their sustenance. In 1500, the daily interaction with nature was still structured for most Europeans, as it was for other peoples, by close-knit, cooperative, organic communities.

Thus it is not surprising that for sixteenth-century Europeans the root metaphor binding together the self, society, and the cosmos was that of an organism. As a projection of the way people experienced daily life, organismic theory emphasized interdependence among the parts of the human body, subordination of individual to communal purposes in family, community, and state, and vital life permeating the cosmos to the lowliest stone.

The idea of nature as a living organism had philosophical antecedents in ancient systems of thought, variations of which formed the prevailing ideological framework of the sixteenth century. The organismic metaphor, however, was immensely flexible and

adaptable to varying contexts, depending on which of its presuppositions was emphasized. A spectrum of philosophical and political possibilities existed, all of which could be subsumed under the general rubric of *organic*.

Nature as Nurture: Controlling Imagery

Central to the organic theory was the identification of nature, especially the earth, with a nurturing mother: a kindly beneficent female who provided for the needs of mankind in an ordered, planned universe. But another opposing image of nature as female was also prevalent: wild and uncontrollable nature that could render violence, storms, droughts, and general chaos. Both were identified with the female sex and were projections of human perceptions onto the external world. The metaphor of the earth as a nurturing mother was gradually to vanish as a dominant image as the Scientific Revolution proceeded to mechanize and to rationalize the world view. The second image, nature as disorder, called forth an important modern idea, that of power over nature. Two new ideas, those of mechanism and of the domination and mastery of nature, became core concepts of the modern world. An organically oriented mentality in which female principles played an important role was undermined and replaced by a mechanically oriented mentality that either eliminated or used female principles in an exploitative manner. As Western culture became increasingly mechanized in the 1600s, the female earth and virgin earth spirit were subdued by the machine.[11]

The change in controlling imagery was directly related to changes in human attitudes and behavior toward the earth. Whereas the nurturing earth image can be viewed as a cultural constraint restricting the types of socially and morally sanctioned human actions allowable with respect to the earth, the new images of mastery and domination functioned as cultural sanctions for the denudation of nature. Society needed these new images as it continued the processes of commercialism and industrialization, which depended on activities directly altering the earth – mining, drainage, deforestation, and assarting (grubbing up stumps to clear fields). The new activities utilized new technologies – lift and force pumps, cranes, windmills, geared wheels, flap valves, chains, pistons, treadmills, under- and overshot watermills, fulling mills, flywheels, bellows, excavators, bucket chains, rollers, geared and wheeled bridges, cranks, elaborate block and tackle systems, worm, spur, crown, and lantern gears, cams and eccentrics, ratchets, wrenches, presses, and screws in magnificent variation and combination.

These technological and commercial changes did not take place quickly; they developed gradually over the ancient and medieval eras, as did the accompanying environmental deterioration. Slowly over many centuries early Mediterranean and Greek civilization had mined and quarried the mountainsides, altered the forested landscape, and overgrazed the hills. Nevertheless, technologies were low level, people considered themselves parts of a finite cosmos, and animism and fertility cults that treated nature as sacred were numerous. Roman civilization was more pragmatic, secular, and commercial and its environmental impact more intense. Yet Roman writers such as Ovid, Seneca, Pliny, and the Stoic philosophers openly deplored mining as an abuse of their mother, the earth. With the disintegration of feudalism and the expansion of Europeans into new worlds and markets, commercial society began to have an accelerated impact on the natural environment. By the sixteenth and seventeenth centuries, the tension between technological development in the world of action and the controlling organic images in the world of the mind had become too great. The old structures were incompatible with the new activities.

Both the nurturing and domination metaphors had existed in philosophy, religion, and literature. The idea of dominion over the earth existed in Greek philosophy and Christian religion; that of the nurturing earth, in Greek and other pagan philosophies. But, as the economy became modernized and the Scientific Revolution proceeded, the dominion metaphor spread beyond the religious sphere and assumed ascendancy in the social and political spheres as well. These two competing images and their normative associations can be found in sixteenth-century literature, art, philosophy, and science.

The image of the earth as a living organism and nurturing mother had served as a cultural constraint restricting the actions of human beings. One does not readily slay a mother, dig into her entrails for gold or mutilate her body, although commercial mining would soon require that. As long as the earth was considered to be alive and sensitive, it could be considered a breach of human ethical behavior to carry out destructive acts against it. For most traditional cultures, minerals and metals ripened in

the uterus of the Earth Mother, mines were compared to her vagina, and metallurgy was the human hastening of the birth of the living metal in the artificial womb of the furnace – an abortion of the metal's natural growth cycle before its time. Miners offered propitiation to the deities of the soil and subterranean world, performed ceremonial sacrifices, and observed strict cleanliness, sexual abstinence, and fasting before violating the sacredness of the living earth by sinking a mine. Smiths assumed an awesome responsibility in precipitating the metal's birth through smelting, fusing, and beating it with hammer and anvil; they were often accorded the status of shaman in tribal rituals and their tools were thought to hold special powers.

The Renaissance image of the nurturing earth still carried with it subtle ethical controls and restraints. Such imagery found in a culture's literature can play a normative role within the culture. Controlling images operate as ethical restraints or as ethical sanctions – as subtle "oughts" or "ought-nots." Thus as the descriptive metaphors and images of nature change, a behavioral restraint can be changed into a sanction. Such a change in the image and description of nature was occurring during the course of the Scientific Revolution.

[. . .]

Dominion over Nature: Bacon's Mechanistic Philosophy of Nature

[. . .] Francis Bacon (1561–1626), a celebrated "father of modern science," transformed tendencies already extant in his own society into a total program advocating the control of nature for human benefit. Melding together a new philosophy based on natural magic as a technique for manipulating nature, the technologies of mining and metallurgy, the emerging concept of progress and a patriarchal structure of family and state, Bacon fashioned a new ethic sanctioning the exploitation of nature.

[. . .]

Scientific method, combined with mechanical technology, would create a "new organon," a new system of investigation, that unified knowledge with material power. The technological discoveries of printing, gunpowder, and the magnet in the fields of learning, warfare, and navigation "help us to think about the secrets still locked in nature's bosom." "They do not, like the old, merely exert a gentle guidance over nature's course; they have the power to conquer and subdue her, to shake her to her foundations." Under the mechanical arts, "nature betrays her secrets more fully . . . than when in enjoyment of her natural liberty."[12]

Mechanics, which gave man power over nature, consisted in motion; that is, in "the uniting or disuniting of natural bodies." Most useful were the arts that altered the materials of things – "agriculture, cookery, chemistry, dying, the manufacture of glass, enamel, sugar, gunpowder, artificial fires, paper, and the like." But in performing these operations, one was constrained to operate within the chain of causal connections; nature could "not be commanded except by being obeyed." Only by the study, interpretation, and observation of nature could these possibilities be uncovered; only by acting as the interpreter of nature could knowledge be turned into power. Of the three grades of human ambition, the most wholesome and noble was "to endeavor to establish and extend the power and dominion of the human race itself over the universe." In this way "the human race [could] recover that right over nature which belongs to it by divine bequest."[13]

[. . .]

Human dominion over nature, an integral element of the Baconian program, was to be achieved through the experimental "disclosure of nature's secrets." Seventeenth-century scientists, reinforcing aggressive attitudes toward nature, spoke out in favor of "mastering" and "managing" the earth. Descartes wrote in his *Discourse on Method* (1636) that through knowing the crafts of the artisans and the forces of bodies we could "render ourselves the masters and possessors of nature."[14] Joseph Glanvill, the English philosopher who defended the Baconian program in his *Plus Ultra* of 1668, asserted that the objective of natural philosophy was to "enlarge knowledge by observation and experiment . . . so that nature being known, it may be mastered, managed, and used in the services of humane life." To achieve this objective, arts and instruments should be developed for "searching out the beginnings and depths of things and discovering the intrigues of remoter nature."[15] The most useful of the arts were chemistry, anatomy, and mathematics; the best instruments included the microscope, telescope, thermometer, barometer, and air pump.

[. . .]

The new image of nature as a female to be controlled and dissected through experiment legitimated the exploitation of natural resources. Although the

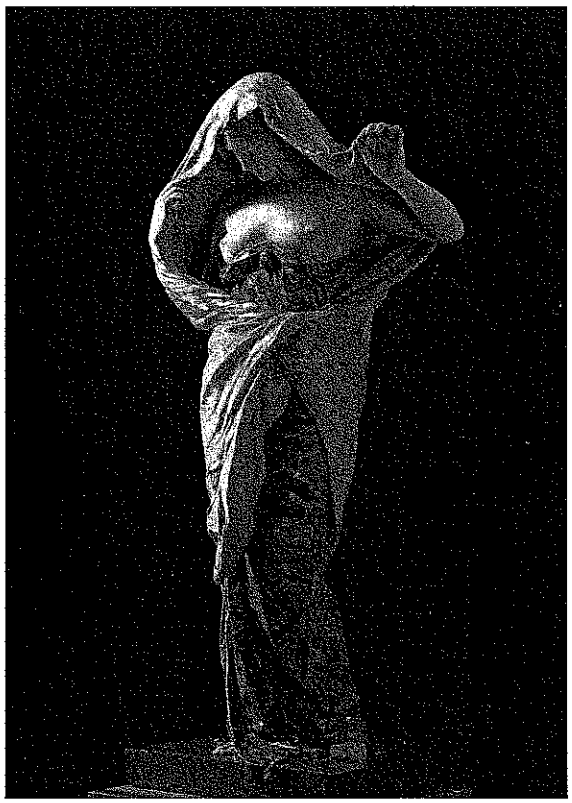

Figure 36.1 *Nature Reveals Herself*, sculpture by Louis-Ernest Barrias (French, 1841–1905), Musée d'Orsay, Paris. This sculpture suggests the sexuality of nature in revealing her secrets to science. A similar statue by the same sculptor in the Ecole de Médecine, Paris, bears the inscription, "La Nature se dévoilant devant la Science" ("Nature Revealing Herself to Science").
Source: Réunion des Musées Nationaux/Art Resource, NY.

image of the nurturing earth popular in the Renaissance did not vanish, it was superseded by new controlling imagery. The constraints against penetration associated with the earth-mother image were transformed into sanctions for denudation. After the Scientific Revolution, *Natura* no longer complains that her garments of modesty are being torn by the wrongful thrusts of man. She is portrayed in statues by the French sculptor Louis-Ernest Barrias (1841–1905) coyly removing her own veil and exposing herself to science [see fig. 36.1]. From an active teacher and parent, she 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.

The Mechanical Order

The fundamental social and intellectual problem for the seventeenth century was the problem of order. The perception of disorder, so important to the Baconian doctrine of dominion over nature, was also crucial to the rise of mechanism as a rational antidote to the disintegration of the organic cosmos. The new mechanical philosophy of the mid-seventeenth century achieved a reunification of the cosmos, society, and the self in terms of a new metaphor – the machine. Developed by the French thinkers Mersenne, Gassendi, and Descartes in the 1620s and 1630s and elaborated by a group of English emigrés to Paris in the 1640s and 1650s, the new mechanical theories emphasized and reinforced elements in human experience developing slowly since the late Middle Ages, but accelerating in the sixteenth century.

New forms of order and power provided a remedy for the disorder perceived to be spreading throughout culture. In the organic world, order meant the function of each part within the larger whole, as determined by its nature, while power was diffused from the top downward through the social or cosmic hierarchies. In the mechanical world, order was redefined to mean the predictable behavior of each part within a rationally determined system of laws, while power derived from active and immediate intervention in a secularized world. Order and power together constituted control. Rational control over nature, society, and the self was achieved by redefining reality itself through the new machine metaphor.

As the unifying model for science and society, the machine has permeated and reconstructed human consciousness so totally that today we scarcely question its validity. Nature, society, and the human body are composed of interchangeable atomized parts that can be repaired or replaced from outside. The "technological fix" mends an ecological malfunction, new human beings replace the old to maintain the smooth functioning of industry and bureaucracy, and interventionist medicine exchanges a fresh heart for a worn-out, diseased one.

The mechanical view of nature now taught in most Western schools is accepted without question as our everyday, common sense reality – matter is made up of atoms, colors occur by the reflection of light waves of differing lengths, bodies obey the law of inertia, and the sun is in the center of our solar system. None of this was common sense to our seventeenth-century counterparts. The replacement of the older, "natural" ways of thinking by a new and "unnatural" form of life – seeing, thinking, and behaving – did not occur without struggle. The submergence of the organism by the machine engaged the best minds of the times during a period fraught with anxiety, confusion, and instability in both the intellectual and social spheres.

The removal of animistic, organic assumptions about the cosmos constituted the death of nature – the most far-reaching effect of the Scientific Revolution. Because nature was now viewed as a system of dead, inert particles moved by external, rather than inherent forces, the mechanical framework itself could legitimate the manipulation of nature. Moreover, as a conceptual framework, the mechanical order had associated with it a framework of values based on power, fully compatible with the directions taken by commercial capitalism.

Concluding Remarks

The mechanistic view of nature, developed by the seventeenth-century natural philosophers and based on a Western mathematical tradition going back to Plato, is still dominant in science today. This view assumes that nature can be divided into parts and that the parts can be rearranged to create other species of being. "Facts" or information bits can be extracted from the environmental context and rearranged according to a set of rules based on logical and mathematical operations. The results can then be tested and verified by resubmitting them to nature, the ultimate judge of their validity. Mathematical formalism provides the criterion for rationality and certainty, nature the criterion for empirical validity and acceptance or rejection of the theory.

The work of historians and philosophers of science notwithstanding, it is widely assumed by the scientific community that modern science is objective, value-free, and context-free knowledge of the external world. To the extent to which the sciences can be reduced to this mechanistic mathematical model, the more legitimate they become as sciences. [. . .]

The mechanistic approach to nature is as fundamental to the twentieth-century revolution in physics as it was to classical Newtonian science, culminating in the nineteenth-century unification of mechanics, thermodynamics, and electromagnetic theory. Twentieth-century physics still views the world in terms of fundamental particles – electrons, protons, neutrons, mesons, muons, pions, taus, thetas, sigmas, pis, and so on. The search for the ultimate unifying particle, the quark, continues to engage the efforts of the best theoretical physicists.

Mathematical formalism isolates the elements of a given quantum mechanical problem, places them in a latticelike matrix, and rearranges them through a mathematical function called an *operator*. Systems theory extracts possibly relevant information bits from the environmental context and stores them in a computer memory for later use. But since it cannot store an infinite number of "facts," it must select a finite number of potentially relevant pieces of data according to a theory or set of rules governing the selection process. For any given solution, this mechanistic approach very likely excludes some potentially relevant factors.

Systems theorists claim for themselves a holistic outlook, because they believe that they are taking into account the ways in which all the parts in a given system affect the whole. Yet the formalism of the calculus of probabilities excludes the possibility of mathematizing the gestalt – that is, the ways in which each part at any given instant takes its meaning from the whole. The more open, adaptive, organic, and complex the system, the less successful is the formalism. It is most successful when applied to closed, artificial, precisely defined, relatively simple systems. Mechanistic assumptions about nature push us increasingly in the direction of artificial environments, mechanized control over more and more aspects of human life, and a loss of the quality of life itself.

Notes

1 Françoise d'Eaubonne, "Feminism or Death," in Elaine Marks and Isabelle de Courtivron (eds.), *New French Feminisms: An Anthology* (Amherst: University of Massachusetts Press, 1980).

2 See Karen Warren, "Feminism and Ecology: Making Connections," *Environmental Ethics* 9 (no. 1: 1981): 3–20.
3 See Alison M. Jaggar, *Feminist Politics and Human Nature* (Totowa, NJ: Rowman and Allanheld, 1983).
4 Merlin Stone, *When God Was a Woman* (New York: Harcourt Brace Jovanovich, 1976).
5 See Dorothy Nelkin, "Nuclear Power as a Feminist Issue," *Environment* 23 (no. 1: 1981): 14–20, 38–9.
6 Carolyn Merchant, "Earthcare: Women and the Environmental Movement," *Environment* 22 (June 1970): 7–13, 38–40.
7 Donna Haraway, "A Manifesto for Cyborgs," *Socialist Review* 15 (no. 80: 1985): 65–107.
8 Sherry Ortner, "Is Female to Male as Nature Is to Culture?" in Michelle Rosaldo and Louise Lamphere (eds.), *Woman, Culture, and Society* (Stanford, CA: Stanford University Press, 1974), pp. 67–87.
9 Carolyn Merchant, "The Theoretical Structure of Ecological Revolutions," *Environmental Review* 11 (no. 4: Winter 1987): 265–74.
10 See Jeanne Henn, "Female Farmers – The Doubly Ignored," *Development Forum* 14 (nos. 7 and 8: 1986); and Gillian Goslinga, "Kenya's Women of the Trees," *Development Forum* 14 (no. 8: 1986): 15.
11 On the tensions between technology and the pastoral ideal in American culture, see Leo Marx, *The Machine in the Garden* (New York: Oxford University Press, 1964). On the domination of nature as female, see Annette Kolodny, *The Lay of the Land* (Chapel Hill: University of North Carolina Press, 1975); Rosemary Radford Ruether, "Women, Ecology, and the Domination of Nature," *The Ecumenist* 14 (1975): 1–5; William Leiss, *The Domination of Nature* (New York: Braziller, 1972). On the roots of the ecological crisis, see Donald Hughes, *Ecology in Ancient Civilizations* (Albuquerque: University of New Mexico Press, 1976); Lynn White, Jr., *Medieval Technology and Social Change* (New York: Oxford University Press, 1966); and L. White, Jr., "Historical Roots of Our Ecologic Crisis," in White, Jr., *Machina ex Deo* (Cambridge, MA: MIT Press, 1968), pp. 75–94; Reijer Hooykaas, *Religion and the Rise of Modern Science* (Grand Rapids, MI: Eerdmans, 1972); Christopher Derrick, *The Delicate Creation: Towards a Theology of the Environment* (Old Greenwich, CT: Devin-Adair, 1972). On traditional rituals in the mining of ores and in metallurgy, see Mircea Eliade, *The Forge and the Crucible*, trans. Stephan Corrin (New York: Harper & Row, 1962), pp. 42, 53–70, 74, 79–96. On the divergence between attitudes and practices toward the environment, see Yi-Fu Tuan, "Our Treatment of the Environment in Ideal and Actuality," *American Scientist* (May–June 1970): 246–9.
12 Bacon, "Thoughts and Conclusions on the Interpretation of Nature or A Science of Productive Works," trans. Farrington, *The Philosophy of Francis Bacon* (Liverpool: Liverpool University Press, 1964), pp. 96, 93, 99.
13 Bacon, "De Augmentis," *Works*, vol. 4, p. 294; "Parasceve," *Works*, vol. 4, p. 257; "Plan of the Work," vol. 4, p. 32; "Novum Organum," *Works*, ed. James Spedding, Robert Leslie Ellis, Douglas Heath, 14 vols. (London: Longmans Green, 1870), vol. 4, pp. 114, 115.
14 René Descartes, "Discourse on Method," Part 4, in E. S. Haldane and G. R. T. Ross, eds., *Philosophical Works of Descartes* (New York: Dover, 1955), vol. 1, p. 119.
15 Joseph Glanvill, *Plus Ultra* (Gainesville, Fla.: Scholar's Facsimile Reprints, 1958; first published 1668), quotations on pp. 9, 10, 13, 56, 87, 104.

37 Nature, Self, and Gender: Feminism, Environmental Philosophy, and the Critique of Rationalism

Val Plumwood

Environmental philosophy has recently been criticized on a number of counts by feminist philosophers. I want to develop further some of this critique and to suggest that much of the issue turns on the failure of environmental philosophy to engage properly with the rationalist tradition, which has been inimical to both women and nature. Damaging assumptions from this tradition have been employed in attempting to formulate a new environmental philosophy that often makes use of or embeds itself

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