[6]*Nuclear Disaster in the Urals*, by Zhores A. Medvedev. Vintage Books, Random House, 1980.

[7]*Hiroshima and Nagasaki: The Physical, Medical and Social Effects of Atomic Bombings*, by the Committee for the Compilation of Materials on Damage Caused by the Atomic Bombs.

[8]A global collective dose of 8 x 10^8 to 16 x 10^8 (including carbon 14) has been estimated by UNSCEAR 1977 (9) for the world population from nuclear weapon testing between 1945 and 1976; and *Sources and Effects of Ionizing Radiation*, United Nations Scientific Committee on the Effects of Atomic Radiation, 1977 Report to the General Assembly, with annexes. United Nations, New York, 1977. N.B. This report gives estimates of global nuclear pollution for commercial nuclear industries.

[9]*Risikoorientierte Analyse zum SNR-300*, C.IV, Institute fur Energie und Umwelrforschung, Heidelberg e.v., August 1982, Table 2-4, Page 2-34, R. Bertell et al. and supporting text (basis of cancer estimates); and Genetic and Teratagenic Effects of Ionizing Radiation, R. Bertell, for: Forshungs — und Entwicklungsvertrag der Zuwendung-sempfanger und Aufragnehmer des Bundesministers fur Forshung und Technologie. Oko Institute, Freiburg, F.D.R. In Press (Basis for genetics and teratagenic disease estimates).

[10]*Sources and Effects of Ionizing Radiation.*

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Making Peace with the Environment:

Why Ecology Needs Feminism

by Patsy Hallen

The 'control of nature' is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man. The concepts and practices of applied entomology for the most part date from that Stone Age of science. It is our alarming misfortune that so primitive a science has armed itself with the most modern and terrible weapons, and that in turning them against the insects, it has also turned them against the earth. —Rachel Carson, *Silent Spring*

This paper aspires to illuminate pathways of making peace with the environment. This is not an easy task since everywhere we are so much at war with the earth, from DDT to deforestation, from acid rain to radioactive fallout.

My central thesis is that the current ecological crisis has psychosexual roots. The ecological crisis has many other causes as well (economic and political), but we have underplayed, even ignored the psychosexual causes until feminist theory invited us to investigate this dimension.[1]

The Domination of Nature Spells Destruction. Following feminist writers I will argue that sexism is the expression of a basic psychology of domination and repression. Ecological imbalance is, in part, due to our mistaken belief that we can successfully dominate nature.[2] So sexism (mind and body pollution) is fundamentally linked to ecological destructiveness (environmental pollution).

I will argue that ecology as a *science* needs feminism to balance a myopic, mechanical world-view which has fundamentally influenced scientific development; ecology as a *life science* needs feminism to reveal how patriarchal thinking contributes to environmental destruction; ecology as a *practice* needs feminism to ensure that shallow ecology is transformed into a deep ecological perspective. The shallow/deep distinction was coined by the Norwegian philoso-

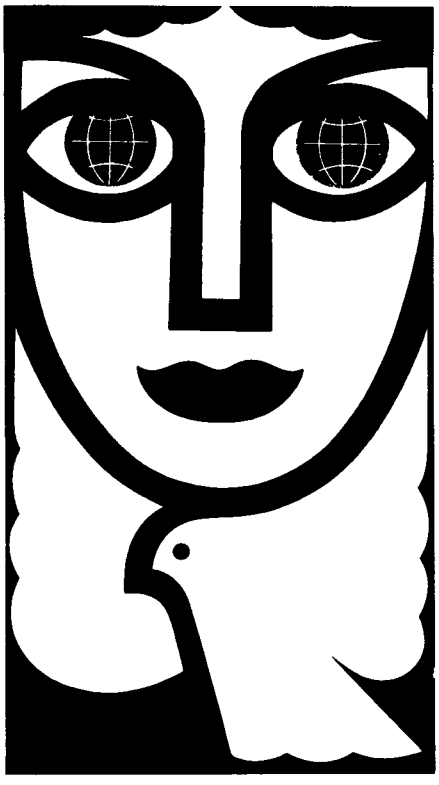
Illustration by Gareth Davies,15; from Psychologists for Peace Newsletter, England

pher, Arne Naess, to contrast reform environmentalism with deep ecology: reform environmentalism aims to manage the environment based on its use-value, while deep ecology seeks to help us see and feel ourselves as intimately interrelated to an intrinsically valuable nature, so that when we harm nature we diminish ourselves.[3]

Hence I will argue that one of the pathways to making peace with the environment is through feminism. Feminism is helpful to ecology as a science, as a life science, and to its practitioners because feminism offers a new way of experiencing and understanding the world.

The Highest Common Factor of Feminism and how it Enlarges our Scientific Understanding. Despite their many theoretical differences, feminists adhere to a few basic tenets, as outlined by Marilyn French: that the two sexes are at least equal in all significant ways and that this equality must be publicly recognized; that the qualities traditionally associated with women (nurturing, receptivity) are at least equal in value to those traditionally associated with men (self-assertion, power-seeking) and that this equality must be publicly recognized — not ignored or viewed as irrelevant; and finally, that the personal is the political, the bedroom is as relevant as the boardroom.[4]

What I hope to show is that each of the feminist tenets can help to enlarge our scientific understanding of the environment. The first tenet will ensure that more women will participate in the scientific community. But this, while necessary, is not sufficient. We do not just need to get more women into science: we must challenge the whole nature of the system, the dominant ideology of science. By the very same token, we do not just need more ecologists: ecology can be exclusively reductionist, 'understanding' life (biology) in terms of non-life (physics, chemistry and mathematics), and so failing to see living things in process, in relation and in context, in terms of dynamic energy patterns. In addition, all-too-often environmental impact statements are fronts, hoaxes. As Neil Evernden points out,[5] universities willingly disgorge troops of environmental scientists and managerial environmentalists and while they appear to be tools of environmental defense, they ultimately



turn out — lo and behold! — to serve the interests of the developer. So the first tenet of feminism, more women ecologists, is not sufficient.

We need the second tenet of feminism whereby the so-called 'feminine' qualities will be cherished and female experience can be incorporated into explanations. This will serve to offset what Evelyn Fox Keller calls the "hegemony in science," the 'masculine,' virile, domineering nature of science, and to reclaim science as a human, not a masculine project, and so to, in Keller's words, "transform the very possibility of creative vision."[6] Despite the wide diversity in the practice of science, there is a monolithic ideology of detachment and domination which crystalized in the 17th century, and this ideology has deeply influenced the selection of goals, the methods, values and explanations that operate in contemporary science.

Finally, the third tenet of feminism — the personal is the political — announces a method. Feminism seeks to enlarge our understanding of nature and the world by including female experience in explanations, and by insisting on including those domains of *human* experience that have been relegated to women: namely the personal, the emotional, the sexual. An example of this method is Brian Easlea's book, *Fathering the Unthinkable: Masculinity, Science and the Nuclear Arms Race*,[7] which analyzes a scientific achievement — the building of the bomb — in psychosexual terms. Including the personal, emotional, sexual dimensions of experience in our explanations will and does make us better scientists because they enlarge our sense of what is possible.

A Relational View of Nature: We are Intimately Connected to Nature. Feminism speaks "in a different voice," to borrow Carol Gilligan's phrase,[8] different from the dominant ideology, and it offers us a different mode of thought. Its central ontological category is not substance, but relation. And, I surmise, this relational view might be easier for women to attain because of their gender identity. Psychologists and social theorists who have studied gender identity (as distinct from sexual identity) tell us that femininity is defined through attachment and connection, while masculinity is defined by independence and separation.[9] The male gender is threatened by intimacy; the female gender is threatened by separation. So gender-sensitive theories show us how to better relate to our environment, show us how to more fruitfully connect with nature.

It is no accident that ecology, which etymologically means 'a study of the household,' needs the experience of women. To see the earth as a life-sustaining home is a vision of ecology which, I believe, is accessible to women.

Feminism: A Scientifically Revolutionary Consciousness. Feminist consciousness is a scientifically revolutionary consciousness. I see feminism and ecology as sharing the same perspective, which represents a new way of seeing, a way of making peace with (rather than war on) the environment. Such a perspective is holistic: everything is connected to everything else and each aspect is defined by and dependent upon the whole, the total context. Life is interconnected and interdependent: we are not above nature, we are an intimate part of it.

We have been blinded to holism by the gender ideology of science, by our arrogance, by our false sense of superiority, by our incomplete notion of survival of the fittest with its resultant stress on competitiveness. Even David Attenborough's superb television series, 'Life on Earth,' was biased in this way. Its scenes of intense competition far outweighed its

scenes of cooperation in the evolutionary story. We have been blinded to holism by the spatial metaphor with which we grew up, God a ruling-class male above, then man with woman and nature (mythed as female) below. This hierarchical picture has dominated Western thought for hundreds of years and it is still very much alive despite the 20th-century revolutions in scientific thinking. I propose that we unconsciously imbibe this world view, that we smuggle it into our conscious mind and let it structure our thoughts.

No Free Lunch. Both ecology and feminism challenge this hierarchical picture. Both reject the divisive dualism that this world view implies: heaven/earth, male/female, mind/matter, reason/emotion, objective/subjective. To develop the masculine and the feminine in each of us, to become whole people, to be able to see objects as subjects, to see nature as a thou, to experience the earth as a live presence, to feel nature as part of ourselves — the visions of ecology and feminism dovetail. Cooperation is stressed (not competition); understanding is vital (not power); appreciation is important (not domination). The watchwords are solidarity and sharing, not rivalry and ruling. As Mary O'Brien puts it, what is important is "reciprocal intimacy and not conquest."[10] Both ecology and feminism share a non-hierarchical, egalitarian perspective. Both participate in a common philosophy whereby process and participation are primary. Both stress creative activity over inert matter, dynamic order over static laws, partial autonomy over determinism, relation over substance, objects as subjects over subjects as objects. Finally, for both ecology and feminism, as Carolyn Merchant points out, there is no free lunch.[11] This is also one of the four laws of ecology articulated by Barry Commoner.[12] We may think that we are getting a cheap digital watch at $4.99 but the real cost must include the Formosan women who go blind producing the liquid crystals. There *is* no free lunch. To produce organized matter, energy in the form of work is needed. Reciprocity and cooperation oiling the feedback loops and closing the energy circuits is what is needed, not free lunches.

A Striking Example of Reciprocal Intimacy in Science. Let me share with you a striking example of how science might be different, of how science based

on reciprocity and cooperation might look. This attitude of "reciprocal intimacy" in science is illustrated by Barbara McClintock, who in 1983 won a Nobel Prize for her work in Biology in the 1940s. Evelyn Fox Keller has written a moving biography of McClintock called *The Feeling for the Organism* and in it she asks:

> *What is it in an individual scientist's relation to nature that facilitates the kind of seeing that eventually leads to productive discourse? What enabled McClintock to see further and deeper into the mysteries of genetics than her colleagues?*

Her answer, Keller tells us, is simple:

> *Over and over again McClintock tells us one must have the time to look, the patience to hear what the material has to say to you, the openness to let it come to you. Above all one must have a feeling for the organism. And McClintock goes on: "No two plants are exactly alike. They are all different. And as a consequence you have to know the difference." She explains: "I start with a seedling and I don't want to leave it. I don't feel I really know the story if I don't watch the plant all the way along. So I know every plant in the field. I know them intimately and I find it a great pleasure to know them.*[13]

To Embrace the World, not to Conquer it. McClintock calls herself "a mystic in science," this woman whose work has been recognized with a Nobel Prize, and she says that her aim is "to embrace the world," according to Evelyn Keller, "in its very being, though reason, and beyond." Now to embrace the world is something very different, of course, from the desire to conquer it.

Barbara McClintock's articulated desire to respect and embrace the world stands in stark contrast to the early 17th-century scientist Francis Bacon's expressed desire to "put nature on the rack and torture her"[14] so that nature will reveal her secrets. Hence there is within science a very different tradition than that of domination, manipulation and control exemplified by Bacon, one of the founders of modern science. And it is this alternative tradition of science, represented by Barbara McClintock's love of plants, that we need to understand and emulate if we are going to have an ecologically sound and sustainable society.

McClintock shows us how to open our other eye, how to overcome our long history of one-sidedness; science is not premised on detachment, on domination, on a division between subject and object. In a more recent book, *Reflections on Gender and Science*, Keller states that McClintock's love of nature allowed for "intimacy without the annihilation of difference:" "division is relinquished without generating chaos." A vivid illustration of this love, this form of attention to things, comes from McClintock's own account of a breakthrough in one particularly recalcitrant piece of analysis. McClintock describes the state of mind accompanying the crucial shift in orientation that enabled her to identify chromosomes she had earlier not been able to distinguish:

> *I found the more I worked with them, the bigger and bigger the chromosomes got and when I was really working with them, I wasn't outside. I was part of the [system]...it surprised me because I actually felt as if I was right down there and these were my friends...As you look at these things they become part of you.*[15]

A Real Feeling for the Organism. This account of matter is a far cry from the dead inert matter of the mechanical model. As Keller points out, McClintock allows us to see the profound *kinship* between us and nature. She encourages us to witness the astonishing diversity and unimaginable resourcefulness of the natural order. She inspires a real feeling for the organism. McClintock sees nature not as blind, simple and obedient, but as self-generating, complex and resourceful. Nature, for McClintock, is not more complex than we know, but more complex than we *can* know. Nature is ingenious. "Anything you can think of, you will find," she declares.[16] For McClintock the goal of science is not the power to manipulate but *empowerment*, the power to understand, the power to appreciate, the power to be humble.

Different Voices Showing our Ideological Biases. There are real limitations in contemporary science, and women such as Keller and McClintock are helping us to see the ideological biases of science. What is encouraging is that there is a shift in emphasis in numerous fields which gives weight to the argument developed here.

Nel Noddings revolutionized ethics through her book, *Caring*, by showing how morality was dominated by certain values and concerns, by talk of principles and justification rather than by talk of caring and receptivity, relatedness and responsiveness. In her introduction she says:

> *One might say that ethics has been discussed largely in the language of the father: in principles and propositions, in terms such as justification, fairness and justice. The mother's voice has been largely silent. Human caring and the memory of caring and being cared for, which I shall argue form the foundation of ethical behaviour, have not received attention, except as outcomes of ethical behaviour.*[17]

Likewise, Erazim Kohak in *The Embers and the Stars*,[18] states that the aim of the book is to shift the burden of philosophizing from the making of arguments to the aiding of vision.

We urgently need these different voices. Theories can be very influential but, as Herbert Marcuse argued in *Eros and Civilization*,[19] they must delve into the deepest biological layers of human energies, the well-springs of human action. Otherwise our theories of political, economic, social or ecological change are rootless; we are picking up litter rather than attacking the production of unusable waste in the first place. And this delving into the biological layers is precisely what feminist theory is doing.

Birth Without Women. Is it an accident that the telegram relating the first successful test of the hydrogen bomb read "it's a boy?" The release of a monstrous force of destruction is represented as the birth of a boy, birth without a woman. Is it an accident that Edward Teller was called 'father' of the H-bomb? Is it an accident that the first atomic bombs were called, 'Little Boy,' 'Fat Boy,' 'George and Mike'? Is it an accident that the names that the military use are laden with psychosexual overtones: 'missile erector,' 'deep penetration,' 'soft lay downs'? The real reason Trident was purchased by the British, said historian E.P. Thompson, with a smile, was because we are in a "post imperial phallic system" and there is a need to show we British can "still get it up." Dr. John Gilbert, the British Labour backbench Defence Minister, referred critically to the "Trident Virility Symbol." The Chairman of the Committee on Public Information during WWI compared military training to national virility.[20]

Helen Caldicott's book, *Missile Envy*, explores this theme and Brian Easlea, for better or worse, takes these images literally in his book *Fathering the Unthinkable*.[21] Why? Because if you look at the nuclear arms race, the intensity can not be explained purely by economic factors. It *is* intense. According to the Swedish Peace Research Foundation, it is an enterprise that engages over 45% of all scientists and technologists alive. To Easlea something else is going on: male-female factors are engaged. Men play a relatively small part in the creation of life in our culture, so do they try and overcompensate elsewhere? "Not in creating life, but in risking it — *This* is the key," says Simone de Beauvoir, "it is why superiority has been given not to those who bring forth life, but to those who kill..."[22]

The Masculine Nature of Science. Brian Easlea begins *Fathering the Unthinkable* simply but powerfully:

> *The single most important issue facing human-kind today is surely the nuclear arms race. It prevents other problems being addressed, like the eradication of desperate poverty, and it will sooner or later lead to unmeasurable catastrophe both for humanity and for much of the wild life with whom we ought to share this planet.*[23]

The aim of Easlea's book is to investigate *one* determinant, not the only determinant, but one insufficiently examined determinant of this insane race, namely the overall 'masculine' nature of modern science and weapons science.

Easlea was a nuclear physicist. While working as an English expatriate in Brazil in the 1960s he became aware of the futility of making nuclear weapons. So he switched fields, from science to the history and philosophy of science; this new discipline led him to study the persecution of witches in the 17th century. "I came to believe," Easlea remarks, "that economic causes were not sufficient to explain the intensity and brutality of many of these persecutions."[24]

As E.W. Monter has pointed out, witchcraft was by far the most important capital crime for women in early modern Europe.[25] More women were put to death between 1500 and 1700 for the crime of witchcraft than for all other crimes put together. Why? Of course, economic causes were operative — witches competed with the newly formed class of physicians and medical doctors. But the intensity and duration of these persecution compels us to search for additional motivations. Easlea argues that: "Non-economic factors such as gender identity and sexual attitudes were important to understand the ferocity of the persecutions and the underlying causes."[26] By the same token if one investigates the nuclear arms race, one must look at the male-female factors involved in order to satisfactorily understand it.

The thesis I am defending is this: modern science is basically a masculine endeavour and as such it is one-sided. The whole nature of the scientific system and its assumptions needs to be challenged. One way to do this is to control 'normal' science with alternative traditions within science, such as McClintock's, in which science serves the interests of preservative love. Another way is to pinpoint alter-

native traditions within philosophy, such as Noddings' and Kohak 's, which take account of those areas of human experience deemed 'feminine.' A third way is to attempt to show how a psychosexual analysis of science such as Easlea's illuminates the patriarchal construction of knowledge and how this blocks our realization of a sound ecology.

Science Serving the Interests of Power, not Preservative Love.

> *All modern, scientific thinking is at bottom power thinking, that is to say, the fundamental human impulse to which it appeals is the love of power, or, to express the matter in other terms, the desire to be the cause of as many and as large effects as possible.*[27]

Ever since Bacon announced that knowledge is power, science has been dominated by a will to power and so has been domineering, as Bertrand Russell argues. Bacon talks about how the new science will be a rebirth. He jeers at the Greeks, whom he calls "mere boys" and calls for a masculine birth of time, a rebirth without indebtedness to women.[28] Through this rebirth, the scientific imagery goes, one can conquer the universe. And what does conquering the universe involve? The "death of nature," as Carolyn Merchant points out.[29] At the same time as Bacon, Descartes declared Mother Nature dead — mere matter in motion without sentience, without consciousness. Animals are mere machines, in the Cartesian framework.

Hence, in the 17th century we have a cognitive attack on Mother Nature through the writings of such influential thinkers as Bacon and Descartes. Coupled with this assault we also have a physical attack on women: in the 16th and 17th century scores of thousands of women were hunted and killed for witchcraft. This link is, Easlea argues, no accident.[30] It spells a deep antagonism to women which men cope with by being violent towards nature. So anti-feminist sentiment feeds ecological disaster, from the testing of atomic bombs to using animals as tools of trivial research projects.

The Causes and Consequences of an Elusive Masculinity. In *Science and Sexual Oppression*, Easlea argues that sexuality defines the kind of existence one lives and vice-versa. The person who wants to live sensuously and joyously must also love sensuously and joyously. The person committed to frenetic thrusting, for mastery in sexual intercourse, whether male or female, is often also committed to domination and aggression in social relations and to relations of brutality with the natural environment. Easlea's principal argument is that hyperaggressive people seek power over other men and other women and over nature "not solely because of harsh material conditions...but also because they seek through that power to underwrite and demonstrate an elusive masculinity."[31]

Why do men face an elusive masculinity? Because of the way our society defines male sexuality exclusively in terms of a partial and limited (and marketable) sexuality — genital sexuality; because traditionally in our culture only mothers parent and so men are not equally integrated into the reproductive process, hence there is a cultural alienation regarding paternity; finally, because of the natural alienation men experience from the living products of their own sexuality — men can never be sure if the baby is their child.

Herbert Marcuse argues that there is a direct link between the repression of sexuality and the eruption of aggression, that our 'permissive' society is in fact sexually repressive. It is dominated by the tyranny of genital sexuality where permissiveness is linked to marketable commodities. Thus a partial and limited sexuality has been put to work in service of the established order. This myopic view of sexuality feeds an elusive masculinity which in turn exacerbates aggressive behaviour.[32]

The second cause of elusive masculinity has been developed by Nancy Chodorow in her book, *The Reproduction of Mothering*.[33] If only women parent, she argues, it is far more difficult for a male to establish his identity than for a female to establish hers. Why? Because in our culture the male model is relatively inaccessible as Dad is out of the house nine to five, five days a week. In a boy's search for a male identity, he over-rejects the receptivity present in the female model and identifies manhood as an achievement in which he must appear to be hard, relatively inaccessible and super-independent. As a result of this social conditioning, men grow up with blocked access to their receptive, empathetic and compliant aspects and so they continually try to dominate. Unless men parent, Chodorow argues, men will be unable to recognize their dependence — specifically their dependence on nature which is ultimately the source of our being. If men parent, boys will be freed from the demands of being aloof and will be able to be receptive, empathetic, compliant, playful and tender. Likewise, girls will be liberated from the demands of being exclusively emotional and intuitive and will be able to be exuberant, active and creative.

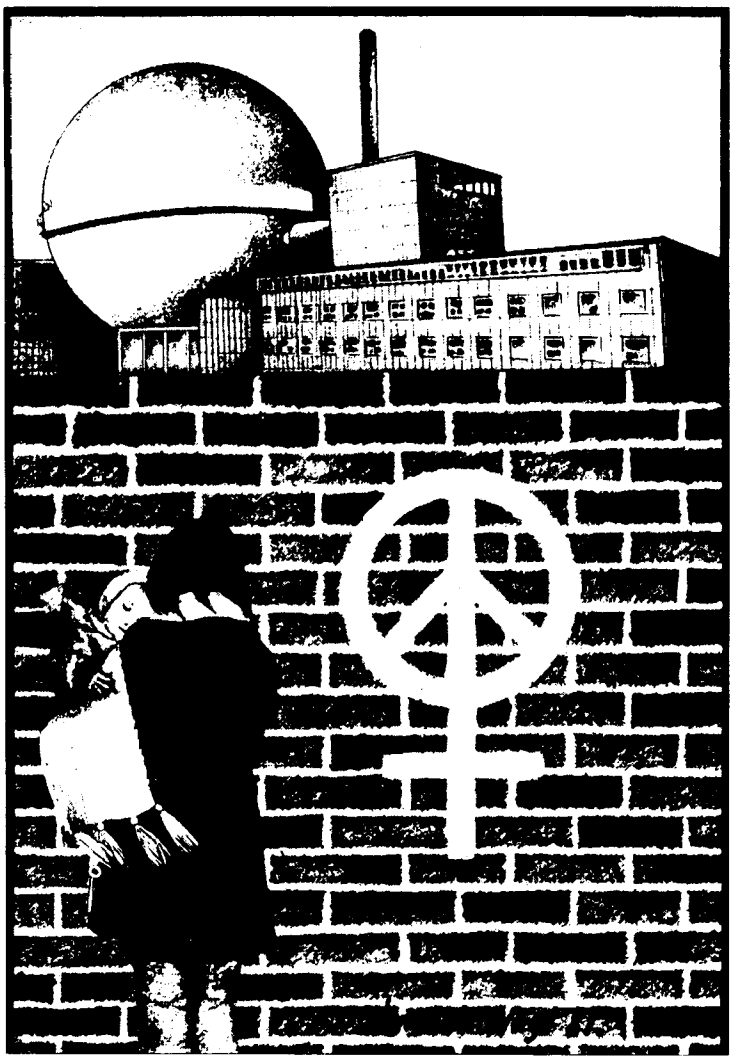
The third cause of an elusive masculinity has been well articulated by Mary O'Brien.[34] The moment of ejaculation creates a natural alienation from the male creative process. And this natural alienation which men experience heightens their culturally induced paternal alienation.

The insecure identity of sexist, hyperaggressive men is a significant (but not the only) force underlying the irrationality of our society intent on plunging the world into ecological or nuclear holocaust. The evidence for this thesis comes from three sources: 1) psychological theories which make intuitive sense about the exaggerated role of genital sexuality and the links to aggressive behaviour; 2) sociological theories about the importance of our primary identification with our parents, which tends to tie men to a role of aloof independence; and 3) philosophical theories about men's natural alienation regarding fatherhood which fans the flames of their insecurity.

Science: A Surrogate Sexual Activity. Evidence also is found in the history of science. In *Science and Sexual Oppression*, Easlea amasses considerable evidence to show how "so often scientific investigation into the properties of the natural world has been viewed metaphorically as active male penetration into the innermost recesses of a passive female nature."[35]

Scientists often describe their quest of understanding nature in sexual terms: scientists have to be 'rigorous' in their thinking, 'hard' in their questioning to unfold nature's secrets. According to Francis Bacon, nature is very much a woman whose secrets "need to be penetrated." Again, says Bacon, we need "to storm and occupy her castles and strongholds."[36]

The imagery of male, sexual wooing, conquest and penetration of female nature is very explicit in the 17th century, as Easlea's scholarship shows. He quotes Henry More, a Fellow of the Royal Society: "We must break open her private closet and pierce into her very centre." Henry Vaughan, another notable 17th-century writer, succinctly identified the sexual imprint of the new scientific spirit of inquiry:



I summoned nature; pierced through all her store:/ broke up some seals, which none had touched before;/ her womb, her bosom, and her head,/ where all her secrets lay abed.

As a result of this evidence, Easlea sees science

as a kind of surrogate sexual activity in which scientists can penetrate to the hidden secrets of an essentially female nature, thereby proving their manhood and virility without necessarily running the risk of attempting the same with real, live and perhaps far from passive women.[37]

Objection: Surely the Knowledge-Claims of Science are not Sexist. At this point the reader might object and declare: the language used by scientists contains a surprising number of sexual metaphors, the practice of science was sexist, as it excluded women — but surely there is nothing remotely sexist about the knowledge-claims of science! At first sight this objection might seem correct, but consider an apparently asexual neutral scientific law, Newton's law of universal gravitation. Newton viewed the existence of gravitational attraction as a manifestation of God's direct agency in nature.[38] It was through God's action that the earth was attracted to the sun. In Newton's mechanical model of the universe, no action-at-a-distance was possible. Only direct, contact action was conceivable. So, God became the all-important medium for gravitational pull. And Newton's God was God the Father. So inevitably male-female relationships entered into the interpretation of gravitational theory.

The reader might continue to object and say these debates about the nature of God were extraneous to science. But such debates were central to the scientific community at the time; as Easlea points out,[39] how much more so must male-female relationships enter into scientific pronouncements on the nature of life, how it originates and how it reproduces. Surely all kinds of hopes and fears about sexual reproduction will be projected onto these theories, despite claims to objectivity.

Masculine Fears. Men fear women's affinity with nature, as the witch-hunt craze shows. Male insecurity and the resultant need to dominate nature led to the persecution of scores of thousands of women who had some understanding of nature.

Men fear dependence, as the history of science and its language and metaphors show. Therefore, it is not easy for them to think clearly and feel positively about our human dependence upon the ecosystems of the biosphere. Finally, men fear women's ability to reproduce life and hence they declared that nature, mythed as female, was really barren. Nature does not have life-giving powers; she is just a machine to be exploited, a "standing reserve," to use Heidegger's phrase.[40]

From Mother Earth (Nature Alive) to an Inert Machine (Nature Dead). The patriarchy's envy and fear of women and the earth was transformed symbolically into a mechanistic world view. As Merchant illustrates,[41] the earth was no longer regarded as a nurturing mother to be cherished, but as a machine to be manipulated and exploited. The transformation from earth mother to barren, inert matter had been accomplished through the scientific revolution of the 17th century: men hoped to become, through the medium of science, "masters and possessors of nature."[42]

This mechanical world-view accelerated the exploitation of humans, both men and women, and the exploitation of natural resources. Mechanism saw nature not as a live presence but as a system of dead, inert particles moved by external forces. As such, it bears no moral self-examination. Nature is merely material for man's appropriation — a view which suited commercial capitalism.

The Feminist Challenge to Mechanism. Both feminism and ecology challenge mechanism's assumptions which make the manipulation and control of nature seem possible and acceptable. The ontological assumption of mechanism is that matter is not living, interdependent bundles of energy, but that matter is composed of dead, discrete particles. The epistemological assumption is that knowledge and information can be abstracted without distortion from the natural world because they are independ-

ent of context and value-free. The methodological assumption is that real-life problems can be successfully analyzed into parts that can be manipulated by mathematics. The moral assumption is that humans (especially white, upper class males) are more valuable than the rest of nature.

The mechanical paradigm, though outdated, persists. States Francis Crick: "The ultimate aim of the modern movement in biology is, in fact, to explain *all* biology in terms of physics and chemistry."[43] The project is to explain life (humans, brains) in terms of non-life (machines, computers). The commitment is that nature is lifeless. And this allows us to perform gruesome experiments on living animals and to write them up "as if the experiments had been done on inert matter."[44]

Contrast two descriptions. Woodridge, a modern psychological researcher, convinces himself that when a laboratory monkey with an electric current passing through its 'pain centre' bites objects so hard as to wrench teeth from its jaw — then the monkey really is experiencing pain and not exhibiting "meaningless or automatic physical symptoms." Jane Goodall describes an experience in the Tanzanian National Park of Gombe Stream: once a chimpanzee that she was studying grasped her hand "firmly and gently with his own before scurrying off into the forest." Goodall writes that "at that moment there was no need of any scientific knowledge to understand this communication of reassurance."[45]

Nature: A Live Presence and 'Our Body.' Goodall's attitude to non-human life forms is, while vastly preferable, not a female prerogative. Martin Buber, for example, has an I-Thou relationship while looking into the eyes of his cat.[46] And people who live close to nature see nature not as an 'it,' but as a 'thou.' Nature is for so-called 'primitive' people a live presence, each part of which is unique, and not satisfactorily describable by a universal law.[47] Hence their relationship with a tree, for example, is emotional, direct, not able to be fully articulated. For many traditional peoples, "nature is their body."[48]

> *Communication, at its best, is called love; when it breaks down completely, we call it war. And it is a sort of war that is going on now between human beings and the earth. It's not that nature refuses to communicate with us, but that we no longer have a way to communicate with it. For millennia, primitives communicated with the earth and all its beings by means of rituals and festivals where all levels of the human were open to all levels of nature.*[49]

Carnal Knowledge. We need to recapture this reality. We need, as Alfred North Whitehead urges, to develop "a science based on an erotic sense of reality rather than an aggressive, dominating attitude towards reality."[50]

We need to relate the crisis of production (and overproduction) to the crisis of reproduction.[51] We will not solve our environmental crisis unless we allow the earth to reproduce.

We need to appreciate reproductive reality, including a recognition of our own death. Freud did not consider aggression a basic psychological fact. Aggression for Freud was rather a secondary manifestation of a more fundamental force, the death instinct.[52] Norman O. Brown, analyzing Freud in his *Life Against Death*,[53] felt that we could learn to channel our aggressive behaviour positively only if we could learn to contain death within life, that is, if we were not "fugitives from our own death," in short, if we learnt how to die with dignity.[54]

We need a new scientific basis whereby we recognize, as Barbara McClintock reminds us, that each organism is unique and that it is an integral part of an ecosystem. We need a new psychological basis whereby we see, as Carl Jung reminds us,[55] that to heal is to make whole (as in wholesome), to reunify our split selves, to integrate the masculine and the feminine in each of us. We need a new epistemological basis whereby we realize, as Norman O. Brown reminds us,[56] that we must have carnal knowledge, a copulation of subject and object. We need a new ethical basis whereby we recognize, as the Aboriginal peoples show us, the intrinsic value of and our dependence upon the non-human aspects of nature. Finally, we need a new ontological basis whereby we experience, as Hegel details,[57] that reality is a process and that the truth is just as much subject as substance — that the truth is the whole.

Why We Need Each Other. We need to recognize that the whole is more than the sum of the parts and that the parts themselves take meaning from the whole. Each part is defined by and dependent upon the total context. Isolation (as in a laboratory) distorts the truth because it distorts the whole. As it is valid to interpret the higher (life) in terms of the lower (non-life), so it is also valid to interpret the lower in terms of the higher. 'Aim' can be applied to cells; 'enjoyment' can be applied to gorillas. Reality is a complex and dynamic web of energy. Nature is alive and active and its parts are fundamentally interconnected by cyclical processes.

We need a reversal of mainstream values and the triumph of feminism, a revolution in economic priorities and a steady-state economy,[58] a peace force for a just and sustainable society,[59] a social force for voluntary simplicity,[60] and collective action for the ecological reconstruction of society.[61]

We need to overcome our dichotomies and to discover our deep sources, our springs, as Rachel Carson did.

We need each other.

[1]For example, Simone de Beauvoir's fruitful framework of analyzing women's status as 'the other.' See *The Second Sex* (Harmondsworth, Middlesex, England: Penguin Books, 1975).

[2]For instance, the treadmill situation of pesticide use in California. See Robert van den Bosch, *The Pesticide Conspiracy* (New York: Doubleday, 1978).

[3]Arne Naess, "The shallow and the deep, long-range ecology movement," *In-*

quiry, 16 (1973), pp. 95-100; see also Ariel Kay Salleh, "Deeper than deep ecology: The eco-feminist connection," discussion papers, *Environmental Ethics*, Winter, 1984.

[4]Marilyn French, *Beyond Power* (New York: Harper and Row, 1985).

[5]Neil Evernden, *The Paradox of Environmentalism*, symposium proceedings, the Centre for Environmental Studies, New Haven, Yale University Press, 1985, p. 4.

[6]Evelyn Fox Keller, *Reflections on Gender and Science* (New Haven: Yale University Press, 1985), pp. 4, 178.

[7]Brian Easlea, *Fathering the Unthinkable: Masculinity, Scientists and the Nuclear Arms Race* (London: Pluto Press, 1983).

[8]Carol Gilligan, *In a Different Voice* (Cambridge: Harvard University Press, 1982).

[9]Nancy Chodorow, Dorothy Dinnerstein, Jessica Benjamin, Jane Flax and Ann Oakley, among others.

[10]Mary O'Brien, *The Politics of Reproduction* (Boston: Routledge and Kegan Paul, 1983).

[11]Carolyn Merchant, "Feminism and ecology," Appendix B, pp. 229-231, in Bill Devall and George Sessions, *Deep Ecology: Living as if Nature Mattered* (Salt Lake City, Peregrine Smith Books, 1985).

[12]Barry Commoner, *The Closing Circle: Nature, Man and Technology* (New York: Alfred A. Knopf, Inc., 1972), pp. 41-42.

[13]Evelyn Fox Keller, *A Feeling for the Organism: The Life and work of Barbara McClintock* (New York: W.H. Freeman, 1983). All quotes are from pp. 99-102.

[14]Francis Bacon, "Thoughts and conclusions," in Benjamin Farrington, *The Philosophy of Francis Bacon* (Liverpool University Press, 1970), p. 92; see also F. Bacon, *Essays* (Ward, Lock and Bourden, 1894).

[15]Keller, *Reflections on Gender and Science*, pp. 164, 165.

[16]Keller, *Reflections on Gender and Science*, p. 162.

[17]Nel Noddings, *Caring: A Feminine Approach to Ethics and Moral Education* (Berkeley: University of California Press, 1984). Introduction, p. 1.

[18]Erazim Kohak, *The Embers and the Stars: A Philosophical Inquiry into the Moral Sense of Nature* (Chicago and London: Chicago University Press, 1984).

[19]Herbert Marcuse, *Eros and Civilization* (Boston: Beacon Press, 1984).

[20]Easlea, *Fathering the Unthinkable*, pp. 93-96; 8, 146.

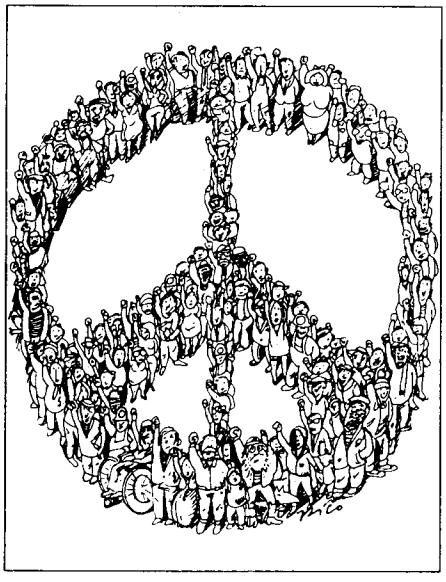
[21]Helen Caldicott, *Missile Envy* (New York: Doubleday, 1985); Easlea, *Fathering the Unthinkable*, p. 8.

[22]de Beauvoir, *The Second Sex*, p. 95.

[23]Easlea, *Fathering the Unthinkable*, p. 3.

[24]Ibid., p. 5; see also Brian Easlea, *Witch-Hunting, Magic and the New Philosophy: An Introduction to Debates of the Scientific Revolution 1450-1750* (Brighton, Sussex: Harvester Press, 1980).

[25]E.W. Monter, *Witchcraft in France and Switzerland* (Ithaca, New York: Cornell University Press, 1976).



[26]Easlea, *Witch-hunting, Magic and the New Philosophy*, p. 7.

[27]Bertrand Russell, *The Scientific Outlook* (London: Allen and Unwin, 1949).

[28]Francis Bacon, "The masculine birth of time and the great instauration of the dominion of man over the universe," in B. Farrington, *The Philosophy of Francis Bacon.*

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

[30]Easlea, *Witch-hunting, Magic and the New Philosophy*, p. 10.

[31]Brian Easlea, *Science and Sexual Oppression: Patriarchy's Confrontation with Women and Nature* (London: Weidenfeld, Nicolson, 1981), pp. x, 28-29.

[32]Marcuse, *Eros and Civlization.*

[33]Nancy Chodorow, *The Reproduction of Mothering: Psychoanalysis and the Sociology of Gender* (Berkeley, California: University of California Press, 1978).

[34]O'Brien, *The Politics of Reproduction*, p. 12.

[35]Easlea, *Science and Sexual Oppression*, p. 88.

[36]Francis Bacon, *The New Organon*, Book I, aphorism 109, 130 (New York: Bobbs-Merrill, 1960), pp. 101, 119.

[37]Easlea, *Science and Sexual Oppression*, pp. 83, 84, 89.

[38]Isaac Newton, "Mathematical principles of natural philosophy," in *Problems of Space and Time*, ed. J.J.C. Smart (New York: Macmillan, 1964), pp. 81-88; see also M. Jammer, *Concepts of Space* (Cambridge, Mass.: Harvard University Press, 1954).

[39]Easlea, *Science and Sexual Oppression*, p. 90.

[40]Martin Heidegger, *The Question Concerning Technology*, trans. William Lovitt (New York: Garland Publishing Co. 1977), p. 22.

[41]Merchant, *The Death of Nature*, p. 67.

[42]Francis Bacon, "The masculine birth of time," p. 28.

[43]Francis Crick, *Of Molecules and Men* (New York: Pan Books, 1968).

[44]Easlea, *Liberation and the Aims of Science* (London: Chatto and Windus, 1973), p. 263.

[45]D.E. Woodridge, *The Machinery of the Brain* (New York: McGraw Hill, 1963), p. 130; Jane van Lawick-Goodall, *In the Shadow of Man* (Glasgow: William Collins, Fontana Books, 1974), p. 184.

[46]Martin Buber, *I and Thou* (New York: Clark, 1970).

[47]Henry Frankfort, et al., *Before Philosophy* (Harmondsworth, Middlesex: Penguin Books, 1959), pp. 12-13.

[48]Karl Marx, "1844 manuscripts," in *The Early Texts*, ed. D. McLellan (Oxford: Oxford University Press), p. 117.

[49]Dolores Lachappelle, *Earth Wisdom* (Silverton Co., Guild of Tutor Press, 1978), p. 96.

[50]Alfred North Whitehead, *Modes of Thought* (New York: Capricorn Books, 1958), p. 202.

[51]O'Brien, *The Politics of Reproduction.*

[52]Paul Robinson, *The Sexual Radicals* (London: Paladin, 1972), p. 169.

[53]Norman O. Brown, *Life Against Death* (New York: Random House, Vintage Books, 1959), p. 110 ff.

[54]Martin Heidegger, *Being and Time*, trans. John Macquarrie and Edward Robinson (New York: Harper & Row, 1962). Part One, Division Two, H235 ff, pp. 279-311; Elisabeth Kubler Ross, *On Death and Dying* (London: Tavistock Publications, 1969).

[55]Carl G. Jung, *The Undiscovered Self*, trans. R.F.C. Hull (New York: The New American Library, Mentor Books, 1959), p. 119 ff.

[56]Norman O. Brown, *Love's Body* (New York: Random House, 1966), p. 17.

[57]G.W.F. Hegel, *The Phenomenology of Mind*, trans. J.B. Baillie (London: George Allen and Unwin Ltd., 1964), Preface.

[58]Herman Daly, *Steady State Economics* (San Francisco: W.H. Freeman, 1977).

[59]A phrase coined by the World Council of Churches; see P. Abrecht, *Faith, Science and the Future* (Geneva: World Council of Churches, 1978).

[60]K.S. Shrader-Frechette, "Voluntary simplicity and the duty to limit consumption," in *Environmental Ethics*, ed. K.S. Shrader-Frechette (Pacific Grove, California: The Boxwood Press, 1981), pp. 169-191.

[61]Commoner, *The Closing Circle*, p. 299.

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