

Can a Feminist Critique of the Masculinity of Scientific Knowledge provide a Blueprint for a Less Inhumane Science ? Evelyn Fox Keller and the Feminist Dream of a Degendered Science.

ANN DUGDALE

The assumption that there is something anomalous about women doing science is still entrenched in Western industrial society despite the success of many women who have worked as scientists, and a long history of struggle by women and their supporters to overcome such views (Alic 1986 ; Rossiter 1982.) A feminist critical engagement with science must both unpack the masculine gendering of science and pose the question of how a different science might be characterised. There has been considerable recent interest in such a project amongst Western feminists (e.g. see Brighton Women and Science Group 1980 ; Hubbard, Henifin and Fried 1982 ; Sayers 1982 ; Rose 1983 ; Harding and Hintikka 1983 ; Bleier 1984 ; Irigaray 1985 ; Keller 1985 ; Harding 1986 ; Birke 1986 ; Bleier 1986 ; McNeil 1987). Despite their many differences these feminists approach scientific knowledge as historically and socially contingent. They share a desire for the encoding of women's experience into scientific knowledge. No-one imagines that this will occur simply by breaking down the barriers to woman's involvement in scientific occupations and training. Rather, the problem of women in science has been redefined as challenging the very epistemology of science. It is not a question of equality for women within scientific institutions which are already masculine, but of a new science which women can practise as women.

One of the earliest feminist critiques of science to clearly argue simultaneously that science was masculine but that women should struggle to participate in this domain in order to perform science differently, was the work of Evelyn Fox Keller. Moreover, Keller stressed the importance of women's possible contribution to science as the means of reforming the destructive monster which science had become. The urgent task faced by

women scientists, long considered by many feminists as highly suspect for their involvement with what was seen as a masculine enterprise, was to humanise science. Perhaps it is not surprising that Keller, an American feminist and bio-physicist, became involved with such a project which promised to resurrect women scientists from their position as traitors from the point of view of a feminist politics, to that of saviors of men and women from nuclear annihilation. (For examples of feminist critiques of science as patriarchal 'tools of the oppressor' see Ehrenreich and English 1979; Merchant 1980; Griffin 1984). Through her work on the politics and rhetoric of science Keller made no compromises in conceding that science was anything but masculine, as a practice and as a knowledge. But by recognising science as a social activity governed by socially negotiated norms, and scientific knowledge as a social construction which necessarily involved the intervention of a human subject between the real physical world and sciences accounts of that world, Keller, among others, opened the scientific disciplines as a field of feminist struggle.

This paper is divided into three parts. The first discusses some of the different ways in which the masculinity of science has been thought about by various feminist theorists. The second elaborates the approach taken by Keller. In the third section I discuss some problems that I think limit and undermine Keller's radical critique of the masculinity of science.

How can Science be Masculine ?

In what sense can it be claimed that scientific knowledge, including its laws, observations and models, is gendered ? One approach that feminists have taken to this question is to contest authorised stories of what is to count as nature, showing that they embody masculine interests. Particularly during the eighteenth and nineteenth centuries, scientific accounts (which constituted Western cultural meanings of nature), were highly privileged in debates about human nature and social order. Science was seen as describing what was essential to human nature and such accounts were used by both conservative and reform movements in political struggles over social practices. Rousseau for example appealed to nature as that which existed prior to arbitrary political and social regimes and could thereby provide a standard against which social conventions could be arbitrated.

Political and social movements of the twentieth century also appeal to 'nature'. Feminism has, at times, attributed to women an essential female nature which was excluded from the public sphere, thereby damaging the public interest. Anti-feminists have cited nature as providing limits to the flexibility of the human 'raw material' that is shaped by social practices (McMillan 1982). Scientific knowledges such as evolutionary biology, primatology, sex difference research and sociobiology are important. They affect the concrete material conditions of peoples—lives, who has access to education, how menstruation is experienced, which jobs are deemed suitable for whom, how a society responds to domestic violence. Not surprisingly,

women have contested these areas of scientific research which lexicplicity incorporate and support male viewpoints and interests. Women's experience of scientific knowledge as an oppressive force through its promulgation of such 'facts' as our smaller brains, more delicate constitution and nimbler fingers, has alerted us to the political nature of scientific knowledge. We have experienced the non-neutrality of science with respect to interests.

Women have always realised the stakes involved in the construction of scientific stories about our 'underlying' biology which encode current unequal power relations between the sexes. Masquerading as politically unmotivated, such knowledges are all the more difficult to discredit because of the claim that they are objective and the manner in which they are legitimated through the institutional backing of laboratories, universities and medical science. Scientific 'facts' are spoken by those individuals who are authorised to produce accounts of the physical world deemed to be universally true (mostly men), and are rendered uncontestable by those who are not experts (including almost all women). This is the first meaning of the claim that science is masculine. Science, as a body of knowledge, is seen as being produced mainly by men, and consequently as having, perhaps unwittingly, incorporated masculine interests. Scientific knowledge is seen as masculine in so far as it supports sociopolitical struggles which maintain the domination of women by men (Haraway 1986 ; Hubbard 1979 ; Bleier 1984 ; Sayers 1982).

A second approach which has been taken to the problem of the masculinity of science is to challenge science as a masculine culture (Easley 1983 ; Traweek 1988). The scientific community is seen as one in which men have shaped the *activities* of science. Masculine values such as competitiveness, 'cold', 'hard', reason, aggression and arrogant self-confidence, have become positively valued and operate as criteria of success. Characteristics associated with femininity, such as co-operation, a concern with human relations, an application of the complexity of nature and of our necessarily partial viewpoint, have been negatively valued and excluded. Such a masculine ethos in the scientific community is seen as exerting a selection pressure which continues to favour the entry and advancement of men socialised into such masculine behaviour patterns. Moreover, the masculine culture of science is seen as affecting the cognitive content of science.

Evelyn Fox Keller (1977), reflecting on her experience in a scientific research group, argued that masculine perspectives within the scientific community, which favoured hierarchy, competition, and instrumentalism (in conjunction with post-sputnik external political pressures for experimental success), affected paradigm choice in the American physics research community of the 1950s and 1960s. According to Keller the definition of doing legitimate physics, and therefore the criteria for the validity of knowledge claims shifted. The kind of research which followed Einstein's approach of asking questions about fundamentals such as space, time and matter, was, says Keller, replaced by "operationalism" which focused on technical success and getting formulae to work.

This approach explains how masculine interests 'get into' scientific knowledge claims. It extends the first approach in so far as it is not necessary to infer masculine interests from the scientific knowledge claims, which, with respect to such statements as Newton's laws, begins to sound a little far fetched. Keller links masculinity with the 'hard' physical sciences rather than simply with those 'soft' sciences whose claim to objectivity could be conceded as premature.

However, neither of these approaches employs a symmetrical analysis of the relationship between the culture that is seen as producing unequal power relations between the sexes and scientific knowledge. Even Keller's explanation of the masculinity of particular approaches to research relies on a prior judgement that only certain scientific accounts are not objective. It is only those scientific knowledge claims that are seen as presenting a distorted 'reflection' of the natural world for which an explanation needs to be sought. It is always a matter of asking why such 'false', or partial theories were accepted. Only in this negative way is the sex/gender system seen as influencing or otherwise 'getting into' scientific knowledge. No explanation is sought for the success of other scientific knowledge claims which, Keller leads her readers to believe, somehow escape the stamp of masculinity. Keller's analysis of the masculinity of scientific knowledge is therefore limited.

A third approach moves from attempting to correct scientific theories and models by ensuring that they include women's viewpoint, to the claim that all science is masculine. This approach analyses the norms and methods on which the special epistemological status of scientific knowledge is based. The object under discussion is not simply the current activities of a scientific enterprise distorted by its enmeshing in patriarchal social structures, but the actual ideal model of science, its epistemology. The masculinity of science is connected to such statements as that science aims for objectivity, or that the scientific method ensures the impartiality of the observer, or that scientific theories are universally valid. The exclusion of such culturally labelled feminine resources as subjectivity, nurturance, and an immersion in personal relationships from the legitimate tools of knowledge construction is seen, not as accidental, but as fundamental to science.

This approach to the masculinity of science has resulted in the call for a new feminist science in which, as Hilary Rose (1983) eloquently expressed this desire, there would be a re-unification of "hand, brain and heart". Such a different science would not exist alongside 'masculine science', giving expression to women's specific perspectives, but would replace it with a genderless science that incorporated the feminine, a less partial and therefore more human(e) science which would no longer reflect a social order of domination, and consequently would no longer be destructive of nature.

Evelyn Fox Keller : for a Degendered Science

What I want to examine here is this third project in which the different

experience of women, our identity as the 'other' to the man of science, is seen as providing the basis for a different science.

I will approach this discussion through some of the work of Evelyn Fox Keller since she is among the earliest and most vociferous protagonists of this strategy. (For different views of what this approach to science involves see Rose 1983 ; Harstock 1983 ; Irigaray 1985). I want to account for both the strengths and weaknesses of this 'woman-centred' approach to science. On the one hand I do not believe that it can simply be dismissed because it is idealist (McNeil 1987). Keller's detailed analysis of the masculine sexual metaphors through which science has been represented do tell us something important about how science reproduces patriarchal society (see especially Keller 1985, pp. 43-65, 150-157). I certainly agree with Keller's assertion that the exclusion of the social, the emotional, the irrational, the subjective, from modern conceptions of the nature of scientific knowledge is highly problematic. Nevertheless I also think that it is necessary to approach with great caution strategies that prescribe the so called feminine characteristics as the basis for the revival of an old Western dream of a science that is both ontologically true and just.

Keller calls into question the commonsense view that sex is irrelevant to which statements come to count as scientific knowledge. She shows that science is not ideologically neutral. Much of her work analyses the metaphors and images through which Western culture represents science. In several articles (Keller 1985 pp. 33-42, 75-94) Keller refers to the Baconian metaphor of science as a "chaste and lawful marriage between Mind and Nature" in which aggressive and forceful seduction (experiment and the application of the mechanical arts) "have the power to conquer and subdue her" and so "bind (Nature) to (man's) service and make her (his) slave" (quoted in Keller 1985, pp. 48, 36). Keller demonstrates that science is caught up in a network of meanings through which it acquires a sex. The legitimate activities of science and the way in which scientific knowledge statements must be expressed in order to be recognised as scientific, are influenced by such metaphors and beliefs about science. Keller shows that such metaphors persist today through such expressions as the 'hard' sciences and the idea that scientific thought is male thought.

The ideology of science according to Keller is neither a historical nor something immutable that is essential to reliable knowledge construction. Keller associates the ideology of science with the mechanistic world view and contrasts it with the world view of medieval knowledge systems: "No longer filling the void with living form, man learned instead to fill it with dead form. Nature, deanimated and mechanized, could now be put to the uses of men." (Keller 1985, pp. 69-70). She sees the New Philosophers of the seventeenth century as having renegotiated cultural representations of 'man's' relation to nature. The New Philosophy depended on the assumption of an autonomous and rational subject whose relation to the physical world is one of radical separation and distance. It is this relation that Keller sees as

making science masculine. The New Philosophy constitutes not only a new approach to knowledge but also constructs man as knower in a very specific sense, that is as a person who had escaped his position in nature, and the influences of his desires, wishes and beliefs. 'Man' as the knower in scientific knowledge systems is not limited by partial perspectives, by local context, by the historical and social specificity of his position in a social order. Rather he is thought of as a universal, rational mind working on observations that are self-evident.

Keller argues that the image of the scientist projected by scientific thought reveals a series of parochial commitments that support the cultural norms of masculinity but are in contradiction with the feminine sense of self. Far from finding the universal perspective of reason or the speaking voice of nature occupying the enunciative position in scientific texts, Keller finds the image of a very partial and most peculiar man. This seems to me to be a claim about the author position in scientific documents. Scientific knowledge is a form of writing. It is a special kind of discourse, following particular rules and conventions. It is a language, a system of communication. As such, it necessarily encodes a relationship between the speaking subject and the text. The particular logic of the subject constructed by a piece of writing might be hidden, as it usually is in scientific accounts emitted beyond the walls of a laboratory, but all writing generates a position from which the text is enunciated. Modern scientific reports produce a highly specified speaking subject and it is the nature of this subject that Keller's discussions of science reveal as masculine. We perhaps need to clarify the meaning of the term masculine.

Keller does not mean that science is determined by something essential to being biologically male. Masculinity and femininity, she says, are not fixed, natural characteristics of male and female individuals. She distinguishes between sex (those bodily characteristics which are biologically given), and gender—socially produced traits and behaviours determined by historically changeable social practices. Nor does Keller simply mean that the scientist is male and displays a set of personality traits that Western culture deems appropriate for men. These characteristics include instrumental reason that only considers objects from the point of view of their enhancement of material interests; objectivity which is opposed to the subjective experience of the body and the emotions; or, to take just one more example, the ability to extract the part from the whole, to think abstractly and to reduce complexity to simple formulae. Keller's argument is not only that there are men and women scientists that do not conform to cultural stereotypes of masculinity. There is also a sense in which she is claiming that science itself is gendered. Representations of science place science in the same position in relation to nature as man is normally placed in relation to woman. Furthermore, science is attributed with the same characteristics as Western culture ascribes to men.

For example, Keller shows how stories still current in shaping the way in which scientific knowledge is understood in modern societies, that is as a

progressively more complete and more accurate reflection of the real world, reveal the trace of the sexualisation of science. For Keller, Bacon's metaphors do not merely illustrate the nature of science, they are constitutive of it. Contemporary popular understandings of the scientific method as minimising personal bias and subjective interests construct the relationship between the scientist and the world in exactly the same manner as Bacon's metaphors. The unknown, natural world remains a voracious and dangerous feminised space which must be held in check, controlled by, and put to use for the purposes of rational, dispassionate man—the scientist. Undoubtedly such accounts of science reproduce a masculine view of sexual relations. What Keller hopes to reveal is that, far from guaranteeing the objectivity of scientific knowledge and therefore its political neutrality, the very commitment that science claims to make to objectivity and the escape from limited contextual, social and personal viewpoints, masculinise scientific knowledge. Science is produced in the image of a highly parochial masculine subjective self. Keller writes.

A feminist critique of objectivity looks at the window through which the scientist views the world and irreverently sees not simply nature unveiled, but the reflection of a particular image of self. It sees an image of self as autonomous and objectified. And we ask if it is not the very investment in impersonality, the assumption of having escaped the influences of our own desires, wishes and beliefs—even more than the confidence of actual accomplishment—that constitutes the special arrogance of the modern scientist and, at the same time, reveals his peculiar subjectivity. (Keller 1983, p 16)

Keller goes on to argue that if science is masculine because it reflects the patriarchal masculine subject, then the cause of the masculinity of science is the sex/gender system which produces such human subjects. The origin of the failure of current scientific disciplines to be universally progressive is their reflection of the masculine sense of self. Even though this masculine individual is not presented in Keller's work as the inevitable unfolding of a male biological identity, I think that the orientation of much of Keller's work around the question of the cause of the masculinity of scientific knowledge is highly problematic. Particularly worrying is her placement of the masculine individual as the cause of the failure of science to live up to its promise of providing a knowledge which is universally progressive, because concomitant to this is her espousal of the incorporation of the feminine identity as the basis for a new, less destructive science. In the next section I will elaborate the limitations and political problems with this strategy.

Some problems with Keller's model of the Masculinity of Science

Keller argues that modern twentieth century cultures have a science that is masculine and therefore destructive, as the outcome of a patriarchal social order, as the consequence of the impinging of social structures which function to reproduce male supremacy. But, such social structures are seen as

separate from science, as merely shaping science through the mediation of individuals. Rather than asking how scientific accounts erect and maintain themselves as masculine systems of meaning, Keller looks for the cause of the sexualisation of scientific knowledge in the individuals who have traditionally taken up the place of scientist. Perhaps unwittingly, her conception of the masculinity of scientific knowledge remains contained within the bounds of the very story of the objectivity of science that her critique places under attack.

Traditional philosophy argued or assumed that science is objective and therefore universally progressive, in the sense that it benefits all social groups, because it is produced by individuals possessing universal reason. Keller argues that science is masculine because it is produced by masculine individuals. Keller breaks with the philosophical tradition on which commonsense notions of science still in part rely, in so far as this tradition always begins with the individual, assumed to be a universal rational being. This individual is assumed to be autonomous and fundamentally unaffected by social experience. Keller, on the other hand, always refers to the individual scientist as a socially produced gendered person. However, for Keller, it is still the characteristics of the individual that determine the nature of scientific knowledge.

Scientific knowledge is conceptualised in Keller's texts as the product of intervention of a historically formed (masculine) subject mediating between the 'real' world of objects and the scientific account. To the extent that Keller goes along with the traditional picture of the nature of scientific knowledge, her work repeats the assumption, evident in such accounts of science, of a natural split between a real world of objects and the self. This undermines the demand Keller makes for the reincorporation of the subjective into science. Her article "Gender and Science" (1985, pp. 75-94) for example argues that the dichotomy between subject and object, the masculine perspective of distance, is the ideology of modern science and precisely because it is ideology, it explains the failure of science to be truly objective. But Keller's work retains a commitment to the subject/object split and this prevents her from analysing this split as an ideological construct. Keller is able to question the relationship between subject and object as it is presented in the ideology of science, but she is unable to question the dichotomy itself.

Keller's focus on science as the reflection of a masculine identity results in further problems when it requires, as the logic of her argument does, the specification of the masculine subject so that science can then be analysed for its reproduction of this image. Keller is led to offer her readers an objective knowledge of the masculine subject. Not only does she want to infer their interests from their position in society, a strategy which assumes that individuals act rationally, but Keller wants a detailed knowledge of the masculine self, both conscious and unconscious. It is only through such an account that Keller is able to convince the reader that those characteristics of all of the scientific disciplines such as the separation between subject (scientist) and object have something to do with masculinity.

Keller uses psychoanalytic theory, particularly object-relations theory, to provide a knowledge of the subject, both masculine and feminine (Keller 1985, pp. 67-115). Object-relations theory has played an important role in American feminism (Choderow 1978, Dinnerstein 1976). It provided an explanation of why patriarchal structures were so persistent and of how the external sexist social order was internalised by both men and women without resorting to such conceptions as the innate inferiority of women. It provides Keller with a socially based explanation of the acquisition of different genders by most men and most women starting from the assumption that both sexes are essentially the same, an assumption that is crucial to Keller's argument about the possibility of a non-ideological science; a gender-neutral science that reflects a truly human producer.

Object-relations theorists argue that the sexual division of labour, which ensures that almost all parenting of infants is done by women, results in different experiences for male and female children which produces differences in their perception of themselves as autonomous human beings, separate from their mother. Girls are more likely to maintain a sense of continuity with the mother's body and so are more likely in later life to admit to and enjoy the pleasures of merging with another, secure in the knowledge of one's basic autonomy and sense of self. Boys, according to object-relations theory, are more likely to experience anxiety in this process of the development of boundaries between self and other. This process is made doubly difficult for boys who must not only define themselves as separate from the mother, but must repudiate the secret desire to merge with the mother a second time in order to define their gender identity. The persistence of these infantile fears and desires into adult life can result in men adopting an exaggerated and overly rigid sense of autonomy. It is precisely such individuals who would be attracted to, and wish to maintain, a science that had an ideology which emphasised the radical separation between subject and object and denied the presence of secret personal desires.

Object-relations theory thus provides Keller with both a knowledge in which masculinity is constructed as a stable and knowable object, a property of persons seen to be socially influenced, and a mechanism for explaining how science came to be masculine. The problem is that it is precisely the characteristic of science to present itself as essentially a descriptive enterprise that is in question in Keller's work. The reader cannot help but wonder how object-relations theory acquires its authority. Why should we privilege it as communicating the truth about gendered subjects, as being free from patriarchal distortion?

There is one more serious problem which I want to discuss in relation to Keller's model of the masculinity of science. This arises when Keller moves from showing how masculine perspectives have shaped the science we have, to the reconstructive enterprise of suggesting how science might change so that it incorporates the feminine and produces a more complete, human understanding of the natural world. Having recognised the 'objectivity' of

scientific knowledge as a fiction which reflects masculine wishes and desires, Keller's solution to the problem posed by the masculinity of science is to reform science by making it gender neutral. At one level this involves the identification of resources that have been excluded from science, showing that they are indeed at work in the construction of scientific knowledge, but have been subjugated. Keller's biography of the Nobel Prize winner and cytogeneticist, Barbara McClintock (Keller 1983) attempts to show that resources that our culture associates with femininity can result in legitimate scientific knowledge. McClintock is depicted as using feminine resources normally excluded from scientific practice. Included among these are :

- (1) Intuition, guesswork and the solving of problems by irrational means.
- (2) A relational perspective that resists the reduction of a systems complexity to simple mechanism.
- (3) Emotional involvement with her objects of study and a passionate commitment to her ideas.
- (4) The dissolution of the subject/object boundary between her own sense of self and the chromosomes that she studied.

However, femininity does not simply describe a set of positive behaviours, values and interests that have been historically devalued, as Keller seems to imply. The meaning of terms such as masculinity, rationality and objectivity only exist in relation to the concepts of femininity, irrationality and subjectivity. The first set of meanings is produced through the exclusion of the second set. For example the possibility of imagining an objective knowledge depends on the suppression of the producers' subjectivity, their involvement with the uncertainties and limited, context-dependent perspective of their personal history. Neither a feminine identity nor a subjective way of knowing have independent referents.

Keller's demand for the addition to service of subjectivity and objectivity, and for the addition of perspectives which current cultural practices produce as feminine, does not recognise the historical structuring through which male domination has constructed these dichotomies. They are not immutable givens that need to be fully represented to prevent the present distortions of humanness and science. They are socially constructed divisions which generate power relations between social groups. It is not that in the first place there is a difference between subjective and objective means of knowledge construction, or between masculinity and femininity, which are then represented in language and other systems of meaning. The evaluation of masculinity and objectivity as superior is not something that is done to neutral representations of real objects so as to justify social structures of male domination and the privileging of scientific knowledge. Keller is claiming that knowledge is socially constructed. It is important to recognise not only that scientific representations of the natural world are always already political, but that all systems of meaning encode and generate power effects.

Imagining scientific knowledge production as a process which excludes the activity of a subject and its necessary involvement with historical, accidental and contextual interests, is already a symbolic construction. In Keller's conceptual scheme the sex/gender system exists prior to and outside of science in the first instance and is then reflected in scientific accounts. What we need to do is to analyse the tactics that science, as a system of representations not only 'about' nature but also 'about' itself, employs to valorise masculinity and so reveal the mechanisms whereby science participates in the production of patriarchy.

Conclusion

The interpretation of the question of the masculinity of science as a question about causes, and the acceptance of scientific knowledge as the product of subjects seen as the centre of their own action, takes a feminist critique of science in a dangerous direction. As Keller admits, her work is often read as the specification of a feminine identity that will produce a "better" science, not in any political sense, but in the sense that it would be a more accurate reflection of nature (Keller 1987). Even though Keller ascribes this identity as a possible achievement for both men and women, this has the effect of colluding with traditional patriarchal systems of representation which reduce woman to a symbol of the irrational, the emotional, the subjective.

Once the universal human subject at the centre of the scientific text is recognised as masculine, it is simply not enough to demand his replacement with a different subject, a feminised subject (either male or female) who will properly fulfil the function of that universal masculine author and guarantee the authenticity of science's accounts of the physical world. Once we admit that science is a social process and that it always bears the mark of its limited cultural perspective, we admit the impossibility of guaranteeing the truth of scientific knowledge claims and of judging which claims are no longer flawed by gendered perspectives. This does not signal an end to the political struggle between feminism and science, but the necessity for feminist involvement in what has been called the fierce fight to construct reality (Latour and Woolgar 1979, pp. 243). This does not mean an acceptance of the rules of the game which currently are involved in determining which statements can be recognised as science. It does mean that a science which incorporates different values and which admits its political nature is a science that must be struggled for. Such a science cannot be relied on to somehow, win through because of a natural superiority in representing more completely the truth of the natural world. □

References

- Alic, M. (1986) *Hypatia's Heritage ; A History of Women in Science from Antiquity to the Late Nineteenth Century* London : Women's Press.
- Birke, L. (1986) *Women, Feminism and Biology: The feminist Challenge* Brighton : Harvester.
- Bleier, R. (1984) *Science and Gender : A Critique of Biology and its Theories on Women* New York : Pergamon.
- (ed) (1986) *Feminist Approaches to Science* Oxford : Pergamon.
- Brighton Women and Science Group (1980) *Alice Through the Microscope* London : Virago.
- Choderow, N. (1978) *The Reproduction of Mothering : Psychoanalysis and the Society of Gender* Berkeley : University of California Press.
- Dinnerstein, D. (1976) *The Mermaid and the Minotaur* New York : Harper and Row.
- Easlea, B. (1983) *Fathering the Unthinkable* London : Pluto.
- Ehrenreich, B. and English, D. (1979) *For her Own Good : 150 Years of Experts' Advice to Women*, New York : Doubleday
- Griffin, S. (1984) *Women and Nature : The Roaring Inside Her* London : Women's Press.
- Haraway, D. (1986) "Primateology is Politics By Other Means" in R. Bleier (ed) *Feminist Approaches to Science* Oxford : Pergamon.
- Harding, S. (1986) *The Science Question in Feminism* Ithaca : Cornell University Press
- and M. Hintikka (eds) (1983) *Discovering Reality : Feminist Perspectives on Epistemology, Metaphysics, Methodology, and Philosophy of Science* Dordrecht ; D. Reidel
- Harstock, N. (1983) "The Feminist Standpoint : Developing the Ground for a Specifically Feminist Historical Materialism" in S. Harding and M. Hintikka (eds) (1983) *Discovering Reality ; Feminist Perspectives on Epistemology, Metaphysics Methodology, and Philosophy of Science* Dordrecht ; D. Reidel
- Hubbard, R. (1979) "Have only Men Evolved ?" in R. Hubbard, M. Henifin and B. Fried *Biological Woman : The Convenient Myth* Cambridge, Mass. : Schenkman
- M. Henifin and B. Fried (eds) (1982) *Biological Woman : The Convenient Myth* Cambridge, Mass. : Schenkman
- Irigaray, L. (1985) "Is the Subject of Science Sexed?" in *Cultural Critique* 1, pp. 78-88.
- Keller, E. (1977) "The Anomaly of a Woman in Physics" in S. Ruddick and P. Daniels *Working it Out* New York ; Pantheon
- (1983) *A Feeling for the Organism : The Life and Work of Barbara McClintock* San Francisco : W.H. Freeman
- (1985) *Reflections on Gender and Science* New Haven ! Yale University Press
- (1987) "The Genders/Science System : In Sex to Gender as Nature is to Science" in *Hypatia* 2, 3, pp. 37-49.
- Latour, B. and Woolgar, S. (1979) *Laboratory Life ; The Social Construction of Scientific Facts* Beverly Hills ; Sage
- McMillan, C. (1982) *Women Reason and Nature : Some Philosophical Problems with Feminism* Oxford : Basil Blackwell
- McNeil, M. (1987) *Gender and Expertise* London : Free Association Books
- Merchant, C. (1980) *The Death of Nature : Women, Ecology and the Scientific Revolution* New York : Harper & Row
- Rose, H. (1983) "Hand, Brain and Heart : A Feminist Epistemology for the Natural Sciences" in *Signs* 9,1, pp. 73-90
- Rossiter, M. (1982) *Women Scientists in America : Struggles and Strategies to 1940* Baltimore ; John Hopkins University Press
- Sayers, J. (1982) *Biological Politics ; Feminist and Anti-Feminist Perspectives* London : Tavistock
- Traweek, S. (1988) *Particle Physics Culture : Buying Time and Taking Space* Forthcoming