

From Omega to Mr. Adam: The Importance of Literature for Feminist Science Studies

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*The simultaneous publication in 1992 of two texts dealing with a global decline in sperm potency, P. D. James's *The Children of Men* and Elisabeth Carlsen's "Evidence for Decreasing Quality of Semen during the Past 50 Years," inaugurates the exploration of another kind of sterility: the failure of feminist literary criticism and feminist science studies to converge as a fertile zone of inquiry and analysis. This article considers the modern discipline of literary studies, as well as feminist literary criticism and feminist science studies, and suggests how Latour's seven rules of method might be adapted to produce cross-fertilization between these fields. . .*

When Omega came it came with dramatic suddenness and was received with incredulity. Overnight, it seemed, the human race had lost its power to breed. The discovery [took place] in July 1994 that even the frozen sperm stored for experiment and artificial insemination had lost its potency.

—James (1992, 8)

This passage, from P. D. James's *The Children of Men*, introduces us to "Omega": the moment when men lose the ability to produce viable sperm and human fertility ends. James's novel gives us a world without birth, in which the emotions evoked by the stages of life are misplaced and distorted. The very old are coldly euthanized by the state in a mass murder/suicide known as the "Quietus," while adults of child-bearing age, broody victims of "frustrated maternal desire," lavish unrequited affection on increasingly intricate and expensive dolls ("the newborn, the six-month-old baby, the year-

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old, the eighteen-month-old child able to stand and walk, intricately powered" [p. 34]). And the last children born to humankind—in the final fertile year, 1995—have an eerie, remote perfection and seem “incapable of human sympathy” (p. 10). “Men and women, the Omegas are a race apart, indulged, propitiated, feared, regarded with a half-superstitious awe. In some countries, so we are told, they are ritually sacrificed in fertility rites resurrected after centuries of superficial civilization” (p. 10).

The same year in which *The Children of Men* appeared, Danish endocrinologist Elisabeth Carlsen and a team of Danish scientists published a study in the *British Medical Journal* that systematically reviewed the statistics on semen quality for the past half-century and concluded that a significant decrease was occurring in male fertility.¹ Carlsen’s essay was the first of a number of articles to be published in the next several years, in both popular and scientific journals, that would raise the alarm about a steep decline in both the quantity and quality of human sperm, and would offer a wide range of theories for this sudden decline.²

Both of these texts raise important questions at the millennium, fascinated as we are by new models of sexuality, birth, aging, and the endgame. Carlson et al.’s (1992) concluding call for further investigation into whether “oestrogens . . . or other environmental or endogenous factors damage testicular functions” offers an ironic millennial rejoinder to the dawn-of-the-century optimism of the nascent discipline of endocrinology.³ And James’s (1992) novel is an important meditation on what development, growth, aging, and death might mean in a culture robbed of birth and childhood. But I want to focus instead on what Wright has called a “remarkable coincidence”: the fact that these two very different texts dealing with the same issue—the global threat of male sterility—should appear simultaneously in 1992.⁴ Wright’s choice of the label “coincidence”—with its implicit assumption that literature and science are stable, discrete, and (I will argue) *gendered* categories that only by accident share the same agenda—betrays another kind of sterility that is the subject of this article: the failure of two potent fields, feminist literary criticism and feminist science studies, to come together in a fertile zone of inquiry and analysis. In short, I am interested in why feminist literary criticism is so indifferent to the question of science, and why feminist science studies is so little marked by the methodology and epistemology of literary studies.

The gendered history of the modern discipline of literary studies has shaped the current state of relations between literature and science, and I will situate the response to science within that gendered history. Then, I will consider the institutional relationship between feminist science studies and the analysis of literature and science, and adapt a set of strategies developed for

science studies in order to suggest which special tools and approaches those of us trained as feminist literary critics can bring to feminist science studies. Finally, I will return to the case with which we began, to sketch out how we might examine the relations between literary and scientific practices in the specific area where these two publications converge: the highly charged zone of human reproduction. This will suggest a model for feminist science studies that can attend more fully to the rich traffic between literature and science.

Technologies for Knowing, and Constituting, Subjects and Objects

Science and literature are the two preeminent technologies the Enlightenment produced for *constituting social subjects and objects of knowledge* (Foucault 1973, 344).⁵ I use the term “literature” in its unrestricted sense, as writing of any kind, although its scope has increasingly been narrowed to mean a kind of writing (1) associated with a certain class and sensibility, (2) restricted to imaginative works, and (3) viewed as an important “source of cultural and economic value” (Shumway 1994, 14). I am using the term “science” as shorthand for the more cumbersome “science and technology” or the Latourian “technoscience”: “all the elements tied to the scientific contents no matter how dirty, unexpected or foreign they seem” (Latour 1987, 174). And I am adapting for science studies de Lauretis’s (1987, 2-3) modification of Foucault’s notion of *technologies*: techniques and discursive strategies that are put to the service of gender production and construction. Science and literature are technologies because they incorporate “institutionalized discourses, epistemologies and critical practices” to define what is knowable and to bring those objects into being.

Since the eighteenth century, literature has helped us to know the self and, in a certain sense, actually *produced* that self-as-subject-of-knowledge. For example, the literary subgenre known as domestic fiction played an important role in constructing a woman as a gendered, socially positioned site of deep subjectivity; the literary genre of sensation fiction produced certain bodily effects of physical excitation in its readers while catalyzing certain behaviors and social relations, among them the debates over the propriety or impropriety of such sexually tinged fictions. And more specifically still, Radclyffe Hall’s *The Well of Loneliness* claimed territory for a powerful new subject position: the lesbian. Science engages in another kind of double process of bringing into being *and* constituting as “knowable,” as sociologists of science and feminist science studies scholars have demonstrated. By processes of abstraction, demarcation, measurement, quantification, publication, and

dissemination, the objects of scientific knowledge are brought into being and defined, and their properties are articulated. We can provisionally summarize the relationship I am describing between the two spheres. Science functions as the site of the construction of the *objectively known other*, whereas literature is the site of the construction of the *subjectively known self*.

Yet, almost immediately we must qualify those assertions. Science also functions to construct the subject, bringing into being a range of new selves that are the subject of scientific scrutiny and understanding: the homosexual, the hospital patient, the criminal, the woman. The most robust product of scientific subject production, although most often exempt from scientific scrutiny, is the scientific knower, whose intellectual agency, social currency, and personal authority have been memorialized in a range of fictions and memoirs, as well as in the history of science.⁶ And literature can also be understood as constructing objects, not only in the sense of the book as object of exchange value but in terms of the way literary texts from children's stories to romance novels have functioned to produce children and women as the docile objects of social forces, whereas nineteenth-century English novels (*Jane Eyre*, *Kim*) shaped the contours of the subaltern mind.⁷

In short, literature and science mediate social relations with material objects, as well as with subjects. Both disciplines frame and shape our understanding of the things of this world, whether the knowing subject or the object that is known is a domestic woman, an episode of hysteria, a chemical formula, or an echinoderm. Although the process of "bringing into being" in science may seem more tangible because it frequently has material and conceptual results (giving us a new chemical compound, for example), the imaginative practices and disciplines enforced through literature also have tangible social results, whether in the production of a literary market, of obscenity laws, or of a craze for a new kind of clothing or domestic furnishings. And scientific practices also produce social subjects, often in uncanny echoes of literary predecessors. So, for example, the recent flurry of news about the possibility of cloning human beings threatens us with a Wildean future in which life imitates art. Scholars expanding on the work of Foucault have amply investigated this crossover effect between the constructive forces of science and literature, demonstrating that both objectification and subjectification processes are carried out by disciplines and technologies in the arts and sciences, ranging from the cinema and literature to primatology, gerontology, and embryology.⁸

We can grasp the intertwined workings of these technologies of subjectification and objectification if we consider chapter 15 of Shelley's *Frankenstein*, in which the monster relates how he learned to know himself through

reading Plutarch's *Lives*, Goethe's *The Sorrows of Young Werther*, and Milton's *Paradise Lost*. These texts—so critics have long agreed—shape the monster as *subject*: in society, in relation to nature, in relation to God, and to the opposite sex. Less remarked on is the fact that the monster also reads a fourth text that shapes him as an experimental *object*: “the journal of the four months that preceded [his] creation,” in which Frankenstein “minutely described . . . every step [he] took in the progress of [his] work” and set down “the whole detail of that series of disgusting circumstances which produced it” (Shelley [1831] 1994, 92-93). In drawing together these different texts, Shelley opposes the formative influence of *literature*, and particularly *Paradise Lost*'s powerful story of the origin of sin in the moment of sexual knowledge, to the constructive power of *science*, embodied by Frankenstein's laboratory notebook, in which he records in appalling detail the process of experimentation that led to the creature's monstrous “birth.”

If the literature he reads creates the monster as a subject, the lab book records how his creator's scientific will to power/knowledge constituted him as an object. Indeed, these subject and object positions are troublingly conflatable and interfused. The monster models his upbringing on the De Lacey family's education of the beautiful Safie; human civilization goes astray with monstrous results. Shelley's point is worth reversing: not only can literature and science come together under abnormal circumstances to produce a monster who is the object of fear and derision, but they also collaborate under normal circumstances to produce human beings who are valued, even idealized. And whether monstrous or normal, these acts of literary and scientific construction have concrete, material consequences; they produce a “set of effects . . . in bodies, behaviors, and social relations” (Foucault 1980, 127).

Science and literature are more like each other than they are different, not only because both operate in culture and society to produce subjects and objects, but because both fields have come into being through a crucial act of institutional self-creation: the creation of a disciplinary divide between scientific and literary knowledges and practices. This divide reflects the gendered nature of intellectual inquiry, as Schiebinger (1989) has demonstrated:

By the late eighteenth century, scientists and philosophers were championing a science stripped of all metaphysics, poetry, and rhetorical ornament. . . . Literature, which Claude Bernard called the “older sister of science,” was to be distinct from science. It was banished from science under the disgraceful title of the “feminine.” The equation of the poetic and the feminine ratified the exclusion of women from science, but also set limits to the kind of language (male) scientists could use. (pp. 158-59)

We can date the beginning of the modern era from the gender-hierarchized act of partition and self-definition through which science and literature forged themselves as mutually excluding disciplines. According to Latour (1993), that disciplinary and epistemological partition between the human and the nonhuman, the social and natural worlds, gave rise to our modern moment. Putting “intellectual life . . . out of kilter,” it made “analytic continuity . . . impossible” (p. 7). This science/literature divide has been maintained by literature and science, producing a kind of systematic ignorance, a product of the compartmentalization of experience, that we can trace through scientific practice and literary critical practice.

A Brief History of Modern Literary Studies' Responses to Science

Scientific discourse has had a shaping effect on modernist literature, on the literature beyond or outside modernism, and on the new academic discipline of literary criticism that has definitively constructed our interpretation of each. “Literary studies as we now know it” began with the “establishment in 1917 of the first modern English course in Cambridge University” (Bloom 1993, 21). Central to the disciplinary consolidation of literary criticism was the new literary form known as modernism, which took shape in England, Europe, and the United States in accord with scientific principles of objectivity and precision. As it shaped itself around the study of modernist literature, the new discipline of literary criticism relied on science for both analytic and ethical guidelines, just as the modernism that the new literary criticism valued so highly also relied on “a hidden language of technology, chemistry and automatism” while expressing the desire to escape that technoscientific realm for a past of rural craft and classicism (p. 21). This pattern of disciplinary consolidation through commitment to scientificity characterized literary studies as a whole: “Early scholars in English . . . made the study of literature a discipline out of their own commitment to science and research” (Shumway 1994, 7). This new field defined itself implicitly as “the last human science,” reflecting the perspective of the scholar who shaped it: “the first important academic literary analyst, I. A. Richards” (Bloom 1993, 23). Ironically, the scientific aspirations were the product of an early disciplinary change of affiliation, for although Richards became known as the founder of modern literary criticism, he began his professional life as a psychologist (Bloom 1993, 21).

Beginning with the shocking principle “a book is a machine,” Richards set an agenda for contemporary literary criticism that had as its contradictory

foundations both an allegiance to scientific principles and a flight from modern technoscience into nostalgia for a communitarian past. As Annan (1990) recalls, Richard's critical program was frequently linked with modernist scientificity. "Modernism affected the way we regarded life and hence our literature and art. It was a movement that both admired and rejected science. English philosophers became engrossed by the discovery of exact truth and many intellectuals were convinced that we could improve the conditions under which we lived by applying the methods of science to social problems" (p. 10). At the dawn of literary modernism, then, if critics distinguished forcibly between literature and science, it was frequently in order to assert resemblances. From Eliot's ([1919] 1994, 30) claim, in "Tradition and the Individual Talent," that "art may be said to approach the condition of science" to Frye's ([1949] 1994, 35) assertion that "literary works . . . are, for the critic, mute complexes of fact, like the data of science," critics emphasized the objectivity, precision, the *scientificity* of literary criticism because they aspired to science's disciplinary prestige.

Science has had a contradictory and multiple position to play in modern literary studies, however. Not only did it help to constitute both the new discipline of literary criticism and to establish the modernist aesthetic values such critics prized, but it also catalyzed a reaction to modernist criticism, and figured as a thematic element in the nonmodernist popular and serious fiction of the period. That brings us to the second position we can distinguish—very broadly—in the modern literary critical response to science. Scholars coming after the initial wave of modernist criticism—and I am thinking here of Walter Benjamin and Raymond Williams most prominently—rejected the White male ruling-class canon of modernism. Instead, they investigated the sociocultural and historical context of literature, a context in which—in the first four decades of that most scientific of centuries—science figured prominently.⁹ Yet, although their work often addressed issues of science, in particular technosciences of the printing press, photography, and methods of industrial production, their Marxist-socialist position gave short shrift to issues of gender.¹⁰ The categorical and disciplinary division between literature and science begun in the eighteenth century, continuing in the nineteenth, and culminating in the early twentieth century with the erection of literary criticism as a would-be counterdiscipline to science—equally objective and equally precise—achieved its definitive utterance in Snow's ([1959] 1993) lecture on the two cultures. This lecture has been tagged by Williams as "the most notorious modern example" of our failure to notice how the categories "science" and "literature" constitute themselves by their mutual exclusion.¹¹

One strand of literature and science studies can be traced back to Snow's ([1959] 1993) lecture. This new field has developed its own critical tradition,

emerging out of the conjunction of philosophy and history of science, and is generally concerned with investigation of the representations of scientific thought in literary texts and encounters in which science is taken as the stable ground and literature the symbolic and discursive construct, although more recent contributions have stressed the discursive character of both literature and science.¹² Although such a field has generated increasing interest, as marked by the emergence of scholarly societies, focused journals, and publishers' series, its practitioners have tended to cluster in Victorian studies and postmodern literary theory, and predominantly to address an audience of literary scholars. Furthermore, there has been little crossover between those working in the literary fields of Victorian and postmodern literary criticism and those working in feminist literary criticism, including Victorian literature.¹³

A disjunction between these two groups of literary scholars contributes to the low profile of science studies within feminist literary criticism, as well as the relatively small amount of traffic between the field of literature and science and the contemporary field of feminist science studies. During the seventy years since Woolf's ([1929] 1981) inaugural *A Room of One's Own*, feminist literary criticism has devoted very little attention to science, as literary trope or topic, epistemological category, culture, or discourse. The feminist literary critics who emerged in the early 1970s, in the United States and Great Britain, gave serious attention to the context of literature, but unlike the Marxist critics who were their contemporaries, their primary analytic category was not class, but gender. In the decade that followed, as they were engaged in the various stages of feminist criticism, from the critique of the male-dominated field, to the recovery of forgotten women writers, to focusing on women writers exclusively, to questioning the gendered basis of the canon itself, those pioneering feminist critics devoted little time to scientific issues, themes, plots, or images. They tended to ignore science as a topic. Instead, rejecting the entire project of masculinist objectivity and rationality and accepting rather than interrogating the gendered divide of literature and science, they investigated issues like women's literary relations and the narrative impact of feminism (Moers 1976; Showalter 1977; Du Plessis 1985). Focusing on recovery and reconstruction, and profoundly influenced by Woolf's *A Room of One's Own*, 1970s feminist critics developed one strand of her argument (i.e., her focus on the forgotten female tradition and the unarticulated lives of women) only to ignore another (i.e., her analysis of how the "sciences" of medicine, psychology, and sexology, like the would-be science of literary criticism, established themselves as disciplines by the production of knowledge about women). As Woolf's narrator discovers during her research foray to the British library, a multidisciplinary convergence of male

scholars collaborated to constitute woman as object of knowledge: “Sex and its nature might well attract doctors and biologists; but what was surprising and difficult of explanation was the fact that sex—woman, that is to say—also attracts agreeable essayists, light-fingered novelists, young men who have taken the M.A. degree” (Woolf [1929] 1981, 27). It was only with the emergence of a historiographic strand of feminist criticism, in the late 1970s and 1980s, that feminist literary scholars began to consider how science helped to shape women’s writing, and how women’s writing might reshape science. Exemplary of that new perspective was Jordanova’s *Languages of Nature* (1986).

Feminist Science Studies and Literature and Science

Jordanova’s (1986) *Languages of Nature* was designed as an introduction to “science and literature as a field” (p. 16). Opening with the assertion that “[s]cience and literature are united in their shared location within cultural history,” the volume was planned to both consolidate a new field of scholarship and serve as an introductory text for the new courses that—the editor assumed—would grace this emerging field of study. The essays in this pathbreaking collection take the externalist position that both literature and science as fields are rooted in their specific historical contexts, and they turn to a range of textual and social sites to consider the relations between the two fields in the pre- and protodisciplinary moment of the eighteenth and nineteenth centuries. Literary texts including *Tristram Shandy*, *Les Liaisons Dangereuses*, the nature poetry of Erasmus Darwin, and Eliot’s *Silas Marner* are put in conversation with science texts by Lavater, Lamarck, Darwin, and Michelet, and with social science texts by George Henry Lewes and Herbert Spencer.

Yet, the literature/science categorization I have just made eludes the texts the essays examine, for, as Jordanova (1986) points out in the introduction, “It is significant that the entire notion of a discipline is a recent one, having developed in the nineteenth century” (p. 16). Moreover, *Languages of Nature* deliberately transgresses disciplinary boundaries. Rather than claiming disciplinary orthodoxy, it takes an “interdisciplinary [approach] to science and literature” and emphasizes its attention to “the discourses common to science and literature” (p. 17). The contributors are a mix of historians and literary scholars, including Gillian Beer, author of an important study published only three years earlier, and others who went on to make major scholarly contributions in the decade since the volume’s publication.¹⁴

Although the aim of *Languages of Nature* was to establish a new field of study, drawing together literary critics and historians of science to consider the relationships between literature and science, it did not fully succeed in reorienting mainstream feminist science studies to include its methodology, the attention to the “cultures, contexts and even philosophical structures” that science shares with literature (Jordanova 1986, 17). Despite the publication of a valuable collection of essays—Benjamin’s *A Question of Identity: Women, Science and Literature* (1993)—ten years after the appearance of Jordanova’s pathbreaking volume, the study of the intersection of literature and science is still not explicitly thematized as part of the field of the gender critique of science, as authoritatively defined by Keller and Longino in their Oxford Readings in Feminism foundation text *Feminism & Science* (1996). This generally excellent volume contains contributions by seven philosophers, four historians, two sociologists, one anthropologist, and one biologist, but features no study by a literary scholar *despite* the fact that the coeditors devote at least one-third of the book to what they describe as the “large subject, the role of language in shaping research agendas” and conclude with a call for more work to be done in “studies of language and gender in the physical sciences” (Keller and Longino 1996, 6, 12). Although several of its essays do address literary themes, among them the role of analogy in science, the construction of a scientific “romance,” the implications of naming in science, and the epistemological role of language, and although it thematizes the role of language in scientific practice, *Feminism & Science* never addresses the relations between science and literature as a substantial part of the gender critique of science. Thus, if Jordanova’s (1986) volume represented the early promise of the new field of literature and science, Keller and Longino’s (1996) volume represents the paradox of literature and science today: the *presence* of literary methods of analysis coupled with the *absence* of a specifically literary critique as part of feminist studies.

This is not to say that science studies has not paid attention to linguistic or textual or literary issues. Feminist science studies has been amply provisioned with good stories. To confirm that, we need only recall Keller’s (1985, 1992) early, and crucial, delineation of the narrative foundational to science since the seventeenth-century scientific revolution—the act of unveiling and ravishing nature-as-a-woman.¹⁵ Then, there is her delineation of the self-serving, internalist “story of the rise of molecular biology . . . a drama between science and nature” and her critical, externalist counternarrative of “the transformation of biology from a science in which the language of mystery had a place not only legitimate but highly functional, to a science that tolerated no secrets, a science more like physics, predicated on the conviction

that the mysteries of life were there to be unraveled” (Keller 1986, 70). And we can recall Harding’s (1986) witty delineation of science’s own self-construction through its “origins myth”:

All of us grew up on a well-known story about the birth of modern science: who was responsible for the conception, why the labor necessary to bring forth this babe was so difficult, what its birth has meant to three centuries of European and American history, and why the mature personage this babe has become continues to be deserving of massive support in the face of competing demands for public resources. (p. 202)

And, finally, we can summon the various wonderfully self-interested narratives of primate lives produced, as Haraway (1991) has shown, by twentieth-century primatologists. Even leaving aside these analyses of narratives and origin stories as elements of scientific practice or scientific self-construction, increasingly, science studies is replete with linguistic methodologies—from discourse analysis and studies of analogy and metaphor to studies of the role of plot.¹⁶ Yet, the two disciplines continue to have unequal weight. Scholars have given far more time to the narratives, or analogies, or metaphors used by science than to the ways the traffic between the realms of literature and science destabilizes our notions of science and literature.¹⁷ There, as in the broader science studies field, science studies scholars generally locate and analyze stories, metaphors, analogies, or plots in scientific practice(s), rather than the science being illuminated by literary practice. In short, science is still conceptualized as having an agency and a primacy that literature lacks; science can generate literary representations, whereas literature is not thought to motivate or generate scientific representations.

Moreover, what might be called a failure of collegial cross-fertilization marks the two fields. Only the important work of N. Katherine Hayles departs from the general rule that science studies scholars do not emerge out of literature departments. Hayles, the author of *The Cosmic Web: Scientific Field Models and Literary Strategies in the Twentieth Century* (1984) and *Chaos Bound: Orderly Disorder in Contemporary Literature and Science* (1990), has played a crucial role in shaping how literature and science studies are carried out at the end of the millennium. Working in the terrain of twentieth-century mathematics and physics, and twentieth-century literature and critical theory, she has mapped the common ground between literature and science, focusing first on field theory, and later on chaos theory, or nonlinear dynamics. Hayles makes a valuable linkage between chaos theory and cultural postmodernism, in their shared commitment to what she calls the *denaturing*

process (the process of depriving language, context, and time of their natural qualities), in a critique of literary critical practices. Yet, these productive analyses have not brought about the convergence between feminist literary criticism and feminist science studies one might want. With the exception of the occasional review in sociological journals, Hayles's work has been taken up less by feminist literary critics than by scholars working in postmodern literary theory, and her influence is conspicuously absent—even from the index—of the benchmark volume edited by Keller and Longino (1996).¹⁸

This indifference to the literary on the part of those working in science studies may be a reflection of a functionalist turn in the broader culture: the institutional and economic forces of the capitalist and late-capitalist eras that have shaped education toward increased emphasis on producing the fungible and highly abstract knowledge required by industry and, thus, privilege technoscience over literature. The opposition between useful science and useless literature mystifies the functional relations between literature and political and economic power. As Ohmann (1976) pointed out, “[T]he humanities—and high culture—[are used] within universities to harden class lines and teach the skills and habits of mind that will serve the industrial system” (p. 334). Still, economic and geopolitical interests join the already existing epistemological hierarchy of the disciplines with the result that, in most cases, the linguistic turn in science studies has not dislodged the gendered relations between the disciplines themselves. The culturally enforced, hierarchized, and gendered relations between science and literature that render literature an insignificant, invisible, feminized part of the cultural project in relation to significant, visible, masculinized science remain largely untested. The result is that our critique of science is incomplete, for its gendered disciplinary boundaries remain uninterrogated.

This is precisely the kind of sterile thinking that labels as *coincidental* the simultaneous appearance of James's novel and Carlsen's article. Far from being a coincidence, the double publication should alert us to the persistence of a certain Enlightenment epistemological logic: whenever we find an object, somewhere there's a subject (even if hidden), and vice versa. This logic implies its corollary: whenever we see literature, we should expect that there's also science. For, to reiterate, literature and science operate together in culture and society to produce subjects and objects. Moreover, this epistemologically tidy, reciprocally constructed connected distinction between subject and object has been reconstituted politically as a family structure of decidedly unequal relations. Dominic LaCapra once compared the research university to nuclear family: the scientists are the fathers who go out to make money, whereas the humanities are the mothers who stay home and take care of the children. As feminists, we are quite familiar with the problems bred by

the nuclear family, from violence to agoraphobia. As feminist science studies scholars, we face a dilemma equally bred by that disciplinary nuclear family that can (at least for polemical purposes) be imagined as a choice between two directions. Do we continue to demonstrate how science not only produces but depends on broadly literary representations, despite its continual work to deny and disguise the generative importance of these representations, and despite the fact that they continue to be disguised by a relentlessly masculinized disciplinary position, organization, and protocols? This work has been pathbreaking indeed, but it also extends and perpetuates the Enlightenment epistemology—no subjects without objects—as it seeks to redress a politically constructed inequality. Or, following Latour and others, do we start to rethink the logic that assumes some primary demarcation of social production between subjects and objects, and some primary genre-bound division between literature and science?¹⁹

A Methodological Toolkit for Literature and Science

We have not been bold enough in our approach to the intersection of literature and science, and the result has been a certain sterility. We have limited ourselves to using one field to gloss the other rather than using them to unsettle not only each other, but their mutually opposed relation. A genuinely reciprocal understanding of the ways both literature and science collaborate and compete to construct the subjects of disciplinary knowledge can challenge the very organization of culture within which both fields find their place: the Enlightenment epistemology of subjects and objects. I suggest that we need to shift the kinds of questions we ask away from “Is this discourse primarily scientific or literary?” and “Is it engaged primarily in the explorations of subjects or objects?” and toward “What kind of cultural work is this doing? Where? And in what ensemble of social relations?”

Latour has been a leader in such interdisciplinary thinking. In a 1993 interview, he put such a challenge on the agenda of science studies, asking “How can we invent literary style [sic] for science studies, and how can we pursue the fusion of social sciences and literature?”²⁰ In his influential volume *Science in Action*, Latour (1987) offered seven rules of method for analyzing the interdisciplinary domain of “science, technology and society”: “a few sets of concepts sturdy enough to stand the trip through all [the] many disciplines, periods, and objects” (p. 16). We can adapt Latour’s seven rules of method to generate new questions, like those I have outlined above, leading to a set of practices for analysis of the relations between literature and science. Such an adaptation follows. In each case, an explanation of its implications for the

incorporation of literature to feminist science studies follows the rewritten rule of method.

1. *We study literature and science in action and not ready made literature or science. To do so, we either arrive before the disciplines, facts/interpretations, and machines/texts are black boxed or we follow the controversies that reopen them.* The study of literature and science requires awareness of the microprocesses that produced each as a discipline, and gave rise to the linked and opposed entity of “literature and science.” Canon creation in literature, like the creation of scientific facts, requires practices of literary inscription, abstraction, taxonomization, and selective amnesia—that refusal to remember or reexamine origins that science studies scholars call “black boxing.” When we work on literature and science, we reexamine those uninterrogated microprocesses and reopen those black boxes, both the literary and the scientific ones. The result will be a richer, far less tidy sense of the meaning or boundaries of “literature” and “science.”

2. *To determine the objectivity or subjectivity of a claim, the efficiency or perfection of a mechanism or interpretation, we do not look for their intrinsic qualities but at all the transformations they undergo later in the hands of others.* This rule transcends the time-honored citation index as a gauge of literary or scientific worth, since that mechanism is usually limited to the discipline and does not cover the traffic between disciplines. Rather, it prompts us to study the transformations and functions of a claim, theme, trope, or process as it moves between very greatly dispersed disciplines, asking how it is differently constructed, situated, and deployed in its new disciplinary environment(s). It prompts us to realize that it is not the inherent qualities of a claim, theme, trope, or process, but rather their trajectory and the way that they are put in play that shapes the way we weigh their accuracy, efficiency, or truth value.

3. *Because the settlement of a controversy is the cause of nature's representation by literature and science, not its consequence, we can never use this consequence, nature, to explain how and why a controversy has been settled.* Rather than accepting as *natural* that some aspects of the material world fall under the purview of science and some under the purview of literature, we realize that this division into scientific and literary objects of knowledge is constructed as the solution of a past controversy over disciplinary realms and regimes. There is nothing inherently literary or scientific, only what disciplinarity makes so.²¹

4. *Because the settlement of a controversy in the field of literature and science is the cause of society's stability, we cannot use society to explain how and why a controversy has been settled. We should consider symmetrically the efforts to enroll human and nonhuman resources for literature and science.* This rule is particularly important for those who come to the study of literature and science from a social constructionist perspective. It counsels us to problematize the notion of social construction as carefully as we do the notion of the natural, realizing that there is a material base to even the most seemingly socially constructed experiences or entities. It further counsels us to remember that the material world exercises a shaping effect on "the literary," as well as "the scientific."

5. *We have to be as undecided as the various actors we follow as to what literature and science is made of; every time an inside/outside divide is built between literature and science, we should study the two sides simultaneously and make the list, no matter how long and heterogeneous, of those who do the work.* This means being ready to investigate the scientific practices and popular scientific writings of an era, as well as its literary texts. Moreover, it means understanding that influence can flow back and forth between literature and science, and that literary works (and workers) can influence science, as well as the reverse.

6. *Confronted with the accusation of undisciplinarity, we look neither at what disciplinary rule has been broken nor at what structure of society could explain the distortion, but to the angle and direction of the observer's displacement from the discipline, and to the length of the network thus being built.* Perhaps the loosest of my adaptations from Latour, this rule understands accusations of disciplinary transgression, like accusations of irrationality, as attempts to maintain disciplinary authority even at the cost of intellectual acuity. In place of disciplinary gatekeeping, it advocates making interdisciplinary networks and assemblages. The goal is to determine what the linkage of literature and science can bring into being rather than what the distinction between literature and science can prevent.

7. *Before attributing any special quality to the mind or to the method of people involved in literature or science, let us examine first the many ways through which literary and scientific inscriptions are gathered, combined, tied together, and sent back. Only if there is something unexplained once the networks have been studied shall we start to speak of cognitive factors particular to literature or science.* This final rule works two ways. First, it encourages us to realize that a specific epistemology and methodology are not

naturally inherent in either literature or science, but rather are the product of disciplinary organization and training. Then, combating the notion of naturally discrete disciplinary practices, it encourages us to take an interdisciplinary perspective. This new perspective is profoundly decentering. To Latour (1987), working in science studies, it is a “Copernican revolution . . . a shift in what counts as centre and what counts as periphery” (p. 226). To Kaplan (1987), it entails the Deleuzian process of “becoming minor.” Minor writing “dismantles notions of value, genre, canon, etc. It travels, moves between centers and margins . . . [refusing] to admit either position as final or static” (p. 189).

Adapting Latour’s rules of method for studying “science in action” to the study of the domain of literature and science enables us to consider how each field would represent the other and to think of them as an ensemble of social relations; to watch them in action, to ask what they do as linked social practices, to note the traffic between and within them, and to gauge the agency of each in relation to the other. This methodological program, like other rules of method (and I include scientific practices), is to some degree retrospectively constructed. When the study of literature and science is taxonomized and systematized, its instability and provisionality may be covered up. However, these revised rules of method can allow us to explore the particular value of literature and science as a field of feminist science studies. Returning, with that in mind, to the event with which I began—the simultaneous publication of James’s *The Children of Men* and Carlsen’s *British Medical Journal* article, with their shared focus on the worldwide decline in semen quality—I will sketch out the kinds of questions several of these rules of method might lead me to ask, and the networks they would prompt me to trace. Although it is not my aim to provide a full-scale analysis of the coincidence, it will enable me to show these revised rules in practice, and to suggest how such an approach to literature and science can dramatize the value of the domain to feminist science studies.

Tracing the Networks: Omegas and Mr. Adam

Drawing on the first revised rule of method (to study literature and science *in action* rather than as ready-made discrete objects), I refuse the label “a remarkable coincidence” for the simultaneous appearance of two texts dealing with a crisis in male fertility, one literary and one scientific (Wright 1996, 42). Rejecting the inside/outside divide such a label implies, as well as the notion that either literature or science is a stable and discrete category, I hypothesize instead that the simultaneity of publication caps two interwoven

strands of interest in male fertility, appearing in communities from the scientific to the literary, and converging (not necessarily for the first time) in the late twentieth century. I ask myself not only why have these expressions of interest converged (and why now), but also which assumptions have I made that led me to be surprised by that convergence.

This leads me to question the primary assumption—of disciplinary integrity—behind the label “coincidence.” I consider the disciplinary structures that function to make these two publications seem—despite their shared status as textual representations—such very different entities. Beyond the training and credentialing apparatus that differentiates Carlsen from James, these disciplinary structures also include the rules for literary and scientific publication, including generic formulas. I note that each publication seems to have a hybrid identity in relation to its “home genre”: James’s text mingles the novel and science fiction, whereas Carlsen’s article straddles scientific research and science reporting. I reflect on—and question—the disciplinary conventions that assert their kinds as incommensurable, framing the former as a realm of objective facts generated without reference to social context and the latter as a realm of subjective fictions generated as commentary on the larger social realm. In so doing, I share the understanding that “literature and science, whatever else they may be, are modes of discourse, neither of which is privileged except by the conventions of the cultures in which they are embedded” (Levine 1987, 3).

Moving to the second revised rule of method (“we do not look for their *intrinsic* qualities but at all the transformations they undergo *later* in the hands of others”), I trace the network of transformations that Carlsen’s article undergoes since its 1992 appearance in the *British Medical Journal*. The article catalyzed a number of responses, which appeared in the *British Medical Journal*, *Lancet*, the *New England Journal of Medicine*, *Fertility and Sterility*, and other scientific publications. Although many debated Carlsen’s statistical methods, two essays in particular catch my attention for the way they transform the Carlsen piece into a lesson not about statistical methods or sperm quality but about disciplinary practices in science, and the disciplinary organization of knowledge.²²

Farrow (1994) repositions the case of the Carlsen article as a cautionary tale for scientists, arguing that it displays errors arising not only from methodological irregularities but from disciplinary *regularities*.²³ “There is inherent bias in how we define the problem in the first place,” Farrow observes. Errors arise from the choice of inappropriate statistical methods, but they are also produced by the disciplinary organization of knowledge: “what we choose to collect and what we choose to leave out” (p. 2). We risk errors, he suggests, when we let one discipline monopolize the construction of

knowledge (both the questions asked and the field studied); we risk error when we neglect a multidisciplinary approach to complex questions. "When inferences are being drawn over time we deserve more than simple analysis: we need to . . . seek corroborating evidence from a wide range of disciplines. Why not refer to the extensive data from veterinary research?" (Farrow 1994, 1). Although Farrow's article privileges disciplinary boundary crossing as leading to greater knowledge, the title the article is given by the *British Medical Journal*—"Falling Sperm Quality: Fact or Fiction?"—asserts the limits of those extradisciplinary wanderings (perhaps unwittingly) and recontains what could otherwise be an unacceptable challenge to scientific authority. A similar process of recuperation may be the result of the uneasy reference in Bromwich (1994): "[T]heir conclusion received widespread recognition, including coverage by the media" (p. 19). Both fiction and the popular press are implicitly constructed as beyond the boundaries of science. If Carlsen's finding of falling sperm quality is fiction, it is no longer the purview of science; similarly, media acclaim may prompt scientific skepticism.

Farrow's article is joined a year later by Olsen et al.'s (1995), which makes an even more vigorous linked critique of the statistical methods, popular acceptance, and insufficient interdisciplinarity of Carlsen's research. This article, too, emphasizes the popular press acclaim that has greeted Carlsen's study, observing that it "has crossed professional boundaries, appearing in publications of a variety of specialties, including medical, chemical engineering, and environmental, as well as the lay press" (p. 887).²⁴ Once again, this alarming interdisciplinarity is implicitly contrasted with an approved interdisciplinarity, in the concluding recommendation that there be "a thorough review of the veterinary medicine (theriogenology) literature" (p. 892). And here, too, these two kinds of boundary crossing can be differentiated: the right kind is still scientific, the wrong kind is *literary*. Implicitly suggesting that Carlsen has adopted one of the cardinal tropes of science fiction, extrapolation into the future, Olsen et al. observe: "If extrapolated forward in time, an admittedly unscientific conclusion might hold that the linear model portends the collapse of traditional means of human procreation by the middle of the next century" (p. 888).

This very brief survey of the response to Carlsen's article in the scientific literature traces its transformation at the hands of critical peers from scientific fact to something more like fiction. Carlsen's article has been tainted by the wrong sort of boundary crossing: scientific dabbling in the realm of the *literary and the popular*. Moreover, the articles suggest that taint might have been prevented by the right sort of boundary crossing: a thorough examination of the literature in adjacent *scientific* fields. My point here is not that Carlsen's critics neglect serious concern for the article's scientific validity in

order to attack its popularity, but rather that their mode of critique inevitably reflects the disciplinary hierarchy of science, science studies, and feminist science studies, in which fictional or literary elements are the bottom of the heap.²⁵

Drawing on the fifth revised rule of method (“study the two sides simultaneously, and make the list, no matter how long and heterogeneous, of those who do the work”), I begin to build the list of those who have written about a decline in sperm potency without regard for their disciplinary position. To Carlsen’s article, the responses to it in scientific journals, and James’s novel, I add Pat Frank’s *Mr. Adam*. Published in 1946, nearly a half-century before *Children of Men*, this novel concerns a global end to male fertility caused by a nuclear accident in Mississippi. Because I am working between the disciplines of literature and science rather than within the discipline of literary studies, in accordance with the sixth revised rule of method (look “to the angle and direction of the observer’s *displacement from the discipline*, and to the *length* of the network thus being built”), I am free to examine this novel in terms of its displacement from the other novel; not for its intrinsic qualities (what kind of a novel is it, is it well written, can it be called *literature*?) but for the similarities that appear, and transformations that occur, in the theme of sudden, global male sterility, as it travels between *Mr. Adam* and James’s “Omega” point.

Although separated by nearly a half-century, these novels are linked by their focus on a sudden crash in sperm potency. Both novels turn on the discovery of the last fertile human being. Frank’s novel features the discovery of “Mr. Adam,” the single *man* to retain his fertility after the nuclear accident, whereas James’s novel focuses on the discovery of androgynously named Julian, the single *woman* to give birth after Omega. Both are social misfits. Frank’s Homer Adam is a technoscientific outsider: a shy, gangly civil engineer who had been working in a lead mine in Colorado at the time of the nuclear accident and was protected from radiation-induced sterility by the mine’s thick walls. James’s Julian, a young woman student named after the fourteenth-century English mystic Julian of Norwich (author of *Sixteen Revelations of Divine Love*), is a religious visionary whose unexplained pregnancy testifies to the power not of science but of divine providence.

Although they share the same premise, the two novels offer different causes and different remedies for that disastrous collapse in human reproduction, reflecting their different historical contexts. The jacket blurb explains that *Mr. Adam* “had been growing in [Frank’s] mind since the first atomic bomb fell on Japan.” Not surprisingly, the novel attributes the fertility crash to a nuclear accident. However, characteristic of its optimistic era, it finds in technoscience both the frightening premise and the happy solution to the novel.

Artificial insemination—AI—looms large, and much of the novel's comedy arises from the efforts of government agencies to control not only that relatively primitive technology but the individual who will serve as its resource.²⁶ In contrast, *The Children of Men* was written after the Chernobyl nuclear accident; as befits our era of cynical pessimism, the novel attributes the fertility crash not to nuclear but to chemical and environmental pollution, and finds its solution not in medicine or science but in the countercultural and religious worlds.

Both novels portray the same initial moment of revelation, when the protagonists, checking hospital bookings, realize that there are no more babies to be born. In *Mr. Adam*, the journalist protagonist notices "that people have quit making reservations to have their babies in Polyclinic Hospital, as of June 22" (Frank 1946, 16). His investigative ardor stimulated, he gets on the telephone. "I called Rochester, Philadelphia, Miami, and New Orleans, and then desperately swung west to San Francisco. The situation was identical. . . . So far as I could discover, our July birth rate was going to be zero. . . . I began combing the Western Hemisphere. Things didn't change" (p. 16). In *The Children of Men*, the situation is discovered by the remaining fertile woman herself:

I was twenty-seven at Omega and working in the maternity department of the John Radcliffe. I was doing a stint in the ante-natal clinic at the time. I remember booking a patient for her next appointment and suddenly noticing that the page seven months ahead was blank. Not a single name. Women usually booked in by the time they'd missed their second period, some as soon as they'd missed one. Not a single name. I thought, what's happening to the men in this city? Then I rang a friend who was working at Queen Charlotte's. She said the same. She said she'd telephone someone she knew at the Rosie Maternity Hospital in Cambridge. She rang me back twenty minutes later. It was the same there. It was then I knew, I must have been one of the first to know. I was there at the end. Now I shall be there at the beginning. (James 1992, 148-49)

If we return to the second revised rule of method, we can note that along with the striking similarities, there are also telling transformations in way this revelatory moment is portrayed in 1946 and 1992. When the protagonist discovers the impending end of human reproduction in *Mr. Adam*, he first assumes women have just decided to return to midwifery: "The truth is that people have just gotten damned sick and tired of kowtowing to those sacred, omnipotent institutions, the hospitals, and have decided to have their babies at home. . . . I might remind you that up until about a century ago all babies were born at home" (Frank 1946, 12). In contrast, when Julian discovers the blank pages in the hospital ledger, she immediately thinks "what's happening

to the men in this city?" (James 1992, 149). The difference in their responses not only reflects something about the two characters, it also reveals something about the social contexts of the fictions. Perhaps institutions like the profession of obstetrics are more widely accepted in 1992, less subject to female resistance, than they were in 1946. But despite the increasing confidence in obstetrical knowledge, anxiety about fertility, and male fertility in particular, seems closer to the surface in 1992 than in 1946. We see a disturbing shift in the balance of human power relations. Female agency that in 1946 led women to stay away from hospitals is replaced by a male failure of agency in 1992, as the empty hospitals testify to male reproductive incompetence.

Indeed, our consideration of Frank's novel has brought us back to our point of departure: the anxiety about fertility that surfaced in 1992 with the simultaneous publication of Carlsen's article and James's novel. Applying the revised rules of method to explore the domain of literature and science, we have traced the networks from Carlsen's article to James's novel and Pat Frank's *Mr. Adam*. Let us recap the chronology. Carlsen (1992) and her colleagues assessed the data from sixty-one papers published internationally between 1938 to 1990, with a subject pool of 14,947 men, and found that it revealed "a significant decline in mean sperm count from $113 \times 10^6/\text{ml}$ in 1940 to $66 \times 10^6/\text{ml}$ in 1990 among men without a history of infertility" (p. 610). Six years after the first significant data began to appear, in 1946, Frank's *Mr. Adam* was published. Frank's novel dealt explicitly with the issue that science was only beginning to reveal: a decline in male fertility. It took nearly fifty more years for that data to be presented, and their implications considered, in Carlsen's scientific study. And when Carlsen's study finally appeared, it did so neck and neck with a second work of fiction concerning a global decline in sperm potency.

What do we make of this story of literary and scientific treatment of human reproduction? It is tempting to begin with the polemical assertion that literature leads science in the articulation of crucial cultural, social, and material issues. Literature operates as the unconscious of science, so the argument would go, as the site where culture articulates its phantasmic investment in science, and where the implications of scientific findings speak first, despite the powerful forces of repression. Like dreams, literature functions to bring into disguised awareness issues that preoccupy us, but are too frightening to be considered directly. Thus, Frank articulated in a work of fiction a concern with male reproductive potency that required literary mediation for expression, a concern that would not be explored, and articulated fully, by science for nearly a half-century.

We would be wrong if we gave in to the temptation of this polemical assertion, however, for it participates in precisely the error that has given rise to the

curiously sterile zone between feminist literary criticism and feminist science studies. It assumes a two-culture divide, with a discrete literary realm that either represents or comments on an equally discrete, and different, realm of science. And it continues to participate in that familiar Enlightenment game of “see a subject, find an object.” In contrast, our application of the revised rules of method suggests that it is more productive to view literature and science not as binary opposites but as an ensemble of social relations, a thick and busy trading zone of boundary crossing and relationship. Taking that perspective, we have found that what seemed a “coincidence”—the simultaneous publication of two texts, one literary and one scientific, dealing with the issue of male sperm decline—instead marked a complex network of relations shifting from fiction to fact, literature to science, culture to nature, all concerned in their different ways with the possibility of a global sperm crash. From Carlsen’s article to the scientists commenting on it, to James’s and Frank’s novels, that network includes statistics and fiction, newspaper articles and scientific journals, and disciplines as divergent as chemical engineering, microbiology, and veterinary medicine. It includes hospital ledger books and Bibles, nuclear power plants, mines and cathedrals, the England of the future and the United States of the past. “Lateral encounter, between groups and individuals alive in the same time but in different initial conditions, allows fresh perceptions to thrive” (Beer 1996, 5). Taking this network of relations seriously, investigating its links as something more than merely coincidental, we have staged such a lateral encounter, and it has given us the complex understanding of cultural context that is literature’s contribution to feminist science studies.²⁷

Notes

1. “There has been a genuine decline in semen quality over the past 50 years. As male fertility is to some extent correlated with sperm count the results may reflect an overall reduction in male fertility” (Carlsen et al. 1992, 609).

2. “The apparent drop in the sperm count is so sudden and steep that it has caused some scientists to wonder whether the human species is approaching a fertility crisis. . . . Some scientists are calling for bans on chemicals that may inhibit sperm production; others claim that there is not yet enough evidence even to know whether the sperm count is actually declining, much less that the human race is edging toward extinction” (Wright 1996, 42).

3. I am thinking in particular of its chemical “fixes” for a range of disorders (sexual, developmental, morphological, and gerontological), its fluctuating regard for male as well as female infertility, and its many applications for the sexological project of taxonomizing sexual variations.

4. Wright (1996, 55).

5. Foucault's (1973) analysis of the ways modern thought constitutes the human being as an object of knowledge, and of the interrelations of power/knowledge, is crucial here. "Man's role of being as constituted in modern thought enables him to play two roles: he is at the same time at the foundation of all positivities and present, in a way that cannot even be termed privileged, in the element of empirical things" (p. 344).

6. Some of the most memorable, in a variety of genres, are DeKruif's *Microbe Hunters* ([1926] 1954), Watson's *The Double Helix* (1969), and, in a refreshingly different vein, Keller's *A Feeling for the Organism: The Life and Work of Barbara McClintock*. New York: Freeman and Company.

7. The work of Foucault has sensitized us to the three modes or practices by which human beings are turned into subjects: "classification practices, dividing practices, and self-subjectification practices" (Katz 1996, 17, borrowing from Dreyfus and Rabinow).

8. Armstrong (1987) has shown how "literature provided techniques for making the individual a specific object of knowledge to himself, . . . on a mass basis" (p. 164). Katz (1996, 18-19) has explored the subjectifying practices of the science of modern gerontology: "Dividing practices . . . separate, categorize, normalize, and institutionalize populations," whereas self-subjectification practices "designate the ways in which a person turns him or herself into a social subject."

9. The increasing prestige of science in the wider culture in the 1920s and 1930s was ironically at odds with an increasing modesty within the scientific community, as science realized the limitations on its knowledge. As Russell (1931) observed: "It is a curious fact that, just when the man in the street has begun to believe thoroughly in science, the man in the laboratory has begun to lose his faith" (p. 88).

10. Probably the best examples of this new contextual criticism are the works of Benjamin, especially his *Illuminations* (1970), and Williams, especially *The Country and the City* (1973).

11. Williams (1986, 10-11).

12. Although institutional consolidation always follows a period of more diffused but sustained work, during which an area is coming into being, the field of literature and science in the United States can be traced back to the foundation of the Society for Literature and Science and the establishment of the Division of Literature and Science of the Modern Language Association, respectively. In Britain, it was formalized with the first lecture on literature and science sponsored by the Royal Society, the Royal Society of Literature, and the British Academy (Beer 1996; see also Collini 1993).

13. The essays in two recent collections illustrate the nearly bipolar distribution of work in the field of literature and science: Levine's *One Culture: Essays in Science and Literature* (1987) and Hayles's *Chaos and Order: Complex Dynamics in Literature and Science* (1991). Although both collections do contain some essays dealing with modernist authors, the predominance of focus is on the Victorians (Levine) and the postmoderns (Hayles).

14. See Beer (1983), Shuttleworth and Christie (1989), Keller, Jacobus, and Shuttleworth (1990), and Jordanova (1990).

15. See Keller (1985, 1992). The change in titles between these two works—the addition of the word *language*—signals the increasing importance of discourse analysis as a methodology within feminist science studies. This is a change that Keller herself has helped to bring about, by her own scholarship and by her training of younger scholars, even though the discourse analysis is almost always practiced by scholars outside literary studies.

16. See Gross (1990) and Hesse (1966).

17. Haraway's (1989, 1991) writings are models for science studies that attends to the traffic between literature and science in order to destabilize the very disciplinary divide. Yet, Haraway is trained not as a literary critic but as a historian of science.

18. The exception is Schneider (1991). Faulting Hayles with following a “dubious strategy we associate with Karl Mannheim,” Schneider taxes her with assuming, without solid warrant, that the very specific intellectual developments she studies, such as chaos theory and postmodernism, can be attributed to very general social situations. Although Schneider reaffirms disciplinary boundaries in the course of his appreciation, he also affirms interdisciplinary engagements; although he points out the inadequacies of *Chaos Bound* as “sociology of culture,” he still applauds its force as an “interpretive effort” and recommends the work to sociologists.

19. Feminist science fiction may well provide a bridge between the projects of feminist literary criticism and feminist science studies, as evinced by the increasing interest in the work of Octavia Butler, in particular, on the part of feminist science studies scholars who are not literary critics. I have sketched out a theoretical route toward bridging the two fields, but it is equally possible that the convergence could be motivated by a repositioning of feminist science fiction in literary practice. Previously situated outside the canon, this generative and important new genre is increasingly given a central position in feminist teaching and criticism, with a powerful reshaping effect on practice. My thanks to Catharine R. Stimpson for the question that prompted these observations. See the concluding chapter of Haraway (1989) for one of the earliest examples of a nonliterary science studies scholar “crossing over” to discuss the work of Butler.

20. Asserting his interest in “scientifiction,” Latour went on to describe *Aramis, or the Love of Technology* as “a novel, a sort of novel but without fiction” (Crawford 1993, 267).

21. For analysis of the role of disciplinarity in naturalizing constructed intellectual, social, and professional relations, see Messer-Davidow, Shumway, and Sylvan (1993) and Shumway (1994).

22. Several responses concern debates over the statistical models used by Carlsen et al. to interpret their data. There are concerns about the research method used to sample the historical data (the reliance on Medline and Index Medicus, which leave out “books and reports and other grey literature”), critiques of the statistical models used to analyze the aggregate data, and concerns about bias in the selection of patient populations (Bromwich 1994, 19; Farrow 1994, 1).

23. Farrow (1994) begins by observing that “Bromwich and colleagues argue that Carlsen et al. applied the wrong form of analysis and that an artefact explains nearly all of the putative ‘fall’ ” (p. 2).

24. Olsen et al. (1995) list institutional affiliations (among them Dow Chemical Company and Shell Oil) that stand in uneasy juxtaposition to their purported willingness to sign on to Carlsen’s conclusion were it not for her flawed statistical methods.

25. Continuing to trace the transformations Carlsen’s article is subject to as it moves beyond that disciplinary boundary into such popular press venues as *The New York Times*, *Time* magazine, the *New Scientist*, and even the *New Yorker*, I find a range of responses, from straightforward reporting of the debate generated by the article (discussions of statistical methods, sampling techniques, relationships between sperm counts and fertility, and the possibility of a link to environmental toxins) to analyses that cross the disciplinary divide, noting the convergence of James’s fictional scenario with scientific findings of testicular anomalies and sperm motility decline. The convergence of literature and science is noted in Vines (1995) and Wright (1996).

26. Frank gives us a remarkable anticipation of our current situation, described so trenchantly not long ago by Spallone (1987): “AI, a practice that has been part of human culture for at least hundreds of years or possibly ever since the knowledge of paternity was realized is transformed into a high-tech medical procedure, unimaginable without genetic considerations” (p. 181).

27. See Crawford (1993, 260). Looked at in light of that complex network, all three items under study (the scientific texts, the fiction, and the sperm) are revealed to be not discrete objects but objects in relation. We can mine feminist science studies and the social studies of science to

find names for such objects. Following Haraway, we can call them “boundary projects,” the products of situated knowledge. Following Latour (1993), we can call them “quasi-objects” “completely new object[s] that [do not] have the classical features of objectivity” (p. 55). Whatever the term we choose, we should remember that such objects participate in the network of relations that extends to, and includes, the literary. As Latour (1993) observed, “[T]hey attach us to one another, because they circulate in our hands and define our social bond by their very circulation. They are discursive . . . they are narrated, historical, passionate . . . and never forget Being” (p. 89).

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