Modest_Witness@ Second_Millennium
.FemaleMan©_Meets_OncoMouse™
FEMINISM AND TECHNO-SCIENCE

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With paintings by Lynn M. Randolph

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Acknowledgments

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Modest, Write@Second Millennium (Chapter 1) [revised from "Modest Witness: Feminist Diffractions in Science Studies," in Peter Galison and David Stump, eds., The Diversity of Science: Boundaries, Contexts, and Power (Stanford University Press, forthcoming)]]

FemaleMan®MeetsOnMouse™, Mice into Wormholes: A Technoscience Fugue in Two Parts (Chapter 2) [revised from essay in Gary Downey, Sharon Travis, and Joseph Doyee, eds., Cyborgs and Cuidados: Interventions in the Anthropology of Technomodernism (School of American Research, Seattle: University of Washington Press, forthcoming)]


SYNTACTICS

The Grammar of Feminism and Technoscience

"The ability to access information is power," Nilli said with her slight accent in her husky voice. "The ability to read and write belonged to the Church except for women and Jews. We are people of the book. We have always considered getting knowledge part of being human."

—Marie Pierre’s Hé, She and It

LITERATURE

Nilli had read kollekti, the technologically enhanced, genetically engineered, multi-lingual Jewish warrior woman in the postcolonial world. Marie Pierre’s Hé, She and It. The novel explored the many kinds of boundaries at stake when a seventeenth-century galant in Pugis’s ghetto and a twenty-first-century cyborg in a Japanese freezone in North America are blithely brought into being to defend their endangered communities. Introducing herself at the home of the old woman, Mikhel, who helped her colleague Aware to program the cyborg, Nilli said of herself:

"I can tolerate briefs of bombardment that would kill you. We live in the halls—inside the net. We are a joint community of the descendants of Israeli and Palestinian women who survived. We each keep our religion, observe our other holidays and fast days. We have no sense of class or engineer genes. After birth we undergo additional alteration. We have crossed ourselves to endure, to survive, to hold our land. Soon we will begin rebuilding Yerushalaim. . . . We live in extreme isolation. We have a highly developed technology for our needs, but we don’t get on the Net. I’m a spy and a scout. . . . I am sent like the dove or maybe the raven.
Nili comes into the story in partnership with her lover, Riva, daughter of Malkah and an anarchist data pirate who has turned into a serious revolutionary against the transnational corporate order that wields the globe. Nili and Riva are committed to the principle that information must not be a commodity. In their vulnerable bodies and potential of their altered codes, these technologically savvy women understand the bond of literacy and wealth that structures the chances of life and death in their world. Nili, Riva, Malkah, and the cyborg live without innocence in the regime of technoprofane, where literacy is about the jointing of information, histories, and economies—about the knapping of the chip, gene, seed, bomb, lineage, ecosystem, and database.

Nili remembers that in the European past, the Catholic Church controlled literacy, except for the potent exceptions of heretics, infidels, and Jews, who can claim the status of people of the book with an originarity authority that strikes at the heart of the Church’s monopoly. Tunnelling under the wreckage of a violent history with the other Israeli and Palestinian survivors, Nili belongs to those oppositional traditions of reading and writing, with their generative accounts of what can count as human, as knowledge, as history, as insider and outsider. Dow, rave, and reconstructed assays, Nili fights for rebuilding Yerushalmi outside the appropriations of all of the official peoples of the book, in both their religious and technocratic incarnations. Her interpellated origins provide a platform for surfing the sacred-secular technocratic web that infuses Mader’s Indecent Millions. We have always considered getting knowledge part of being human.”

My book takes shape through cascading accounts of humans, nonhumans, technocentres, nation, feminism, democracy, property, race, history, and knapping. Beginning in the mythic times called the Scientific Revolution, my titular modern witness indulge in narrativism about the imaginary configurations called the New World Order, Inc., and the Second Christian Millenarian. I learned early that the imaginary and the real figure each other in concrete fact, and so I take the actual and the fictal seriously as constitutive of both material-semiotic worlds. Teagu and read and write inside the stories of Christian salvation histories and technoscientific progress. I am neither heretic, infidel, nor Jew, but I am a marked woman informed in literacies as well as by those given to me by birth and education. Shaped as an insider and as outsider to the hegemonic powers and discourses of my European and North American legacies, I remember that anti-Semitism and misogyny intensified in the Renaissance and Scientific Revolution of early modern Europe, that racism and colonialism flourished in the trading habits of the cosmopolitan Enlightenment, and that the intensified misery of billions of men and women seems organically rooted in the freedoms of transnational capitalism and technoscience. But I also remember the dreams and achievements of contingent freedoms, situated knowledges, and relief of suffering that are inextricable from this contaminated triple historical heritage. I remain a child of the Scientific Revolution, the Enlightenment, and technoscience. My modest witness cannot ever be simply oppositional. Rather, she is suspicious, implicated, knowing, ignorant, worried, and hopeful. Inside the web of stories, agencies, and instruments that constitute technoscience, she is committed to learning how to avoid both the narratives and the realities of the Net that threaten her world at the end of the Second Christian Millennium.

S/he is seeking to learn and practice the mixed literacies and differential consciousness that are more faithful to the web of the world, including the web of technoscience, actually works.2

And so this book is sited as a node that leads to the net, which is synecdochic for the wealth of connections that constitute a specific, finite, material-semiotic universe called technoscience.

Mader’s Indecent Millions: Finally, M’s Memo, One MoreTM is an e-mail address. Let us see how its nodes and operators map out the tropes and topics of this book.

Keystrokes

My title contains three syntactical marks: @, ©, TM. Each little modifer signs us into history in particular ways. The @, ©, and TM are minimal origin narratives in themselves. Part of a writing technology (Kaye 1991; Derrida 1976; Lacan and Woolgar 1979), the marks also map an argument they indicate in proper grammar. Like the special signing apparatus for operations in symbolic logic, the marks in my title are operators within a particular sociotechnical discourse. This discourse takes shape from the material, social, and literary technologies that bind us together as entities within the register of historical hyperpace called technoscience.

Hyper means “over” or “beyond,” in the sense of “overshooting” or “exaggeration.” Thus, technoscience indicates a time-space modality that is extravagant, that overshoots passages through naked or unmarked history. Technoscience extravagantly exceeds the distinction between science and technology as well as by those given to me by birth and education. Shaped as an insider and as outsider to the hegemonic powers and discourses of my European and North American legacies, I remember that anti-Semitism and misogyny intensified in the Renaissance and
mutations that mark the difference between the sense of time in European medieval chronicles and the secular, cumulative salvation histories of modernity. Like all the other chimerical, conditioned word forms that are cobbled together without benefit of hyphen in the hyperbolic of the New World Order, Inc., the word technoscience communicates the preconsciously fused and transonic quality of its domain by a kind of visual onomatopoeia. Once upon a time, in another, closely related, ethnospecific narrative field called Western philosophy, such entities were thought to be subjects and objects, and they were reputed to be the finest and most stable actors and actants in the Greates Story Ever Told—the one about modernity and war. In the imploded time-space anchoring of late-capitalist, interpersonal, transnational capitalism and technoscience, objects and objects, as well as the natural and the artificial, are supported through science-fictional wormholes to emerge as something quite other. Even drenched with all the hype about revolution and technoscience that pervades contemporary discussion, the frenzy of the transformations lived in daily life throughout the world are undeniable.

The "@" and "." are the title chief signifiers of the Net. An ordinary e-mail address specifies where the addressee is in a highly capitalized, transcendentally sustained, machine language-mediated communications network that gives byte to the euphemists of the "global village." Dependent upon a densely distributed array of local and regional nodes, e-mail is one of a powerful set of recent technologies that materially produce what is otherwise called "global culture." E-mail is one of the passage points—both distributed and obligatory—through which identities eb and flow in the Net of technoscience. Despite all the hype, technoscience is not the Greatest Story Ever Told, but it is playing powerfully to large, widely distributed audiences.

Partly because the Internet was originally developed for defense research and communication, including communication among academic scientists, and then extended to more civilian users primarily in universities, the system is now becoming densely commodified (Krol 1992:11–30). The Net still has many of the practices and ethics of a public commons, but one that is being rapidly enclosed. The civilian freedoms of the Net are indebted to a tax-supported commons tied initially to Cold War priorities and then to goals of national economic competitiveness and requiring a broad technoscientific research and communication apparatus. The Internet was established in the 1970s as a U.S. Defense Department network called ARPAnet, which was an experimental network designed to support military research. The noncentralized structure of the communication system was related to the need for it to survive nuclear destruction of component parts.

As other U.S. (and Scandinavian) organizations built their own networks, they used the ARPA protocollan's communications protocols. Connecting all these systems was, therefore, an attractive goal. In the late 1980s the National Science Foundation (NSF) established five supercomputer centers that made the capabilities of the world's fastest computers available for general scholarly research. Using ARPA technologies, the tax-supported NSF created a web of regional networks connected with each other through a supercomputer center. "The NSF promoted universal educational access by funding campus connection only if the campus had a plan to spread access around. So everyone sending a four-year college could become an Internet user" (1992:13). The NSF is now to form the backbone of the Internet, and the impact throughout the social fabric has been tremendous. Then, following policy set by the president and congress in 1992, the NSF fully privatized its system in 1995. The large users remain worried and expect the continuing growth of volume and advances in technology to lower their costs in the long run. In addition the new net system will support high-speed, wide-bandwidth uses such as videoconferencing and other visual processing applications that the old NSFnet could not handle. Overall, immediate costs to users are expected to go up 10 percent to 100 percent, depending on distance from an access point. The Net is likely to be small colleges, institutions in more remote areas, and public libraries (Lawler 1995).

Those parts of the public commons that cannot contribute to capital accumulation for private corporations, such as MCI, Bellcore, and Sprint, which reap the benefits of decades of tax-supported infrastructure, will naturally wither away in the free market. The death of the nation seems to demand it. Furthermore, the Internet has been international for many years, but originally only U.S. allies and overseas military bases were connected. By the mid-1990s most countries in the world had attempted to connect as part of their national educational, commercial, and technology goals. More than 20 million users in over 60 countries were tied into the Internet by 1995. Inequality of access and the dominance of the Internet's, and so the United States', communications protocol standards—thereby isolating nets using other standards—have become serious international issues. As Marilyn Strathern put the matter in another context, "a world made to Euro-American specifications will already be connected up in determined ways" (1992:17).

Not even mentioning the World Wide Web, MicroWeb, NetScape, and a host of other tools saturating the information order at the end of the millennium, I am giving a very partial and abbreviated account of the Internet, much less of commercial...
street person going to collect his e-mail at the public library, where addresses had been handed out free to the homeless. Looking for pay-erational employers' responses to his job quest, he posts an address that puts the hype about the universal democracy built into the technoscientific information system into perspective: latinos@street_level.

Tradescue helps unlock the confusion of the "irrational" New World Order found both by New Age people and by right-wing armed militias in the United States—who are convinced, in chilling anti-Semitic patterns, that the bankers and gray men are taking over the world—with the "normal" New World Order of the post-Cold War transnational free-market system imagined by presidents, congresses, planners, and parliamentarians and advanced by the political-economic strategies of double accumulation and by free-trade instruments such as the North American Free Trade Agreement (NAFTA) and General Agreements on Tariffs and Trade (GATT). Informed by Latanian@street level, as well as by Anna Tsing (1992), the subtle ethnographers and heroes of the complex, shifting, and microworld geometries of margins and centers in the contemporary world, I try to write on the razor edge between passivity that the New World Order affects by the bundling of transnational capital and technoscience actually defies the world and the denial that large, distributed, articulated practices of domination are in fact luxuriating in just that bundling. Our task is learning to navigate both the imagined Net and the actual net with the flotsam literacies of Nihilist's "heretics, infidels, and Jews" and their many sisters and brothers who have learned the skills of differential recognition. Reading and writing on the razor edge between paranoia and denial, I venture to consider the syntax of intellectual property in my title's Internet address.

The and in my title mark the syntax of natural social/technical relationships congealed into property. Built into the Constitution and early legislative acts of the United States, these marks, as much as the "g" in my address, are about the origins and fates of nations as well as of personal and corporate individuals. Each dealing with the implosion of bodies, texts, and property, the Internet and the Market conjointly supply the principal metaphors and norms for contending communications, commerce, freedom, and foundations in the New World Order, Inc.

Like the stagnation of gender and race, which signify asymmetrical, regularly reproduced processes that give some human beings rights in other human beings that they do not have in themselves (Rabin 1975), the copyright, patent, and trademark are specifically asymmetrical, congealed processes—which must be constantly revived in law and commerce as well as in science—that give some agencies and actors statutes in socio-technical production not allowed to other agencies and actors. By socio-technical production I mean the knowledge-poor processes that inscribe and materialize the world in some forms rather than others. Only some of the necessary "written" have the semantic status of "authors" for any "text." This point has animated transnational industries of literary and philosophical deconstruction. Similarly, only some actors and accounts that are necessarily allied in a patented invention have the status of owner and inventor, authors, and to brand a contingent but essentially total entity with their trademark. I am intensely interested in the power of such "syntactical" marks as the and. I am extremely curious about what kinds of bodies, what forms of frozen as well as mobile sociotechnical alliances, also called social relationships, these little operators can adorn, at whose cost, and to whose benefit in particular. I am interested in the kinds of artificial elements, like the Peculiar Man and OsocoMouse in my title, that bear such distinctive brand marks. I am also interested in the supplement, excess, and commentary implied by these little marks; I ask what kinds of entities can be marked in these ways. I am riveted...
by "brand names" as "genres"; that is, as generic marks that are directional signals on maps of power and knowledge. I am curious about how members of technoscientific cultures are, literally, invested in their proprietary kin, both psychologically and commercially. Property is the kind of relationality that poses as the-thing-in-itself, the commodity, the thing outside relationship, the thing that can be exhaustively measured, mapped, owned, appropriated, disposed. Something of an unconstructed and dogged Marx, I remain very interested in how social relationships get conglomated into and taken for decontextualized things. But unlike Marx, and allied with a few prominent and deliberately crazy scholars in science studies, with armies of very powerful and paradigmatically same scientists and engineers, and with a medley band of off-the-wall ecocriticism and science-fiction enthusiasts, I insist that social relationships include nonsuch as well as humans as socially (or, what is the same thing for this odd conger, sociotechnically) active partners. All that is unhuman is not un-kind, outside kinship, outside the orders of signification, excluded from trading in signs and wonders.

FIGURES

Signs and wonders bring us to the next contaminated practice suffusing my book and built into the title Modern Women@Second_Millenium_Female-Man@Men@OncoMouse® that is, figuration. In my book, entities such as the modest woman of the Scienomic Revolution, the FemaleMan® of commodified transnational feminism, and OncoMouse® of the biotechnical war on cancer are all figures in secular technoscientific sabotage stories full of promise. The promises are check-by-jowl with ultimate threat at멸. Apocalypse, in the sense of the final destruction of man's home world, and commodity, in the sense both of the humorous and of the ultimate harmonious resolution of all conflict through progress, are bedfellows in the soap opera of technoscience. Figuration in technoscientific text and artifacts is often simultaneously apocalyptic and comedic. As we will examine in detail later, figuration in technoscience seems to operate according to the corporate slogans for the patented transgenic mouse, OncoMouse®, "available only from DuPont, where better things for better living come to life." Teleconferencing with luratic@internet, I explore technoscientific figuration with the help of another Donnabury cartoon. Here, my modest woman is a New Age woman recounting her past lives. In her various reincarnations, she recapitulates hominid evolutionary history as that developmental account is narrated within paleanthropology. The typical fusing of New Age belief and orthodox scientific model is part of what makes the cartoon funny. Gary Trudeau's cartoon character, named Boopie, figures—what is, embodies — "the universal story of woman." Part of the joke is the whimsical reversal of the humanist narrative to give the story of woman instead of man. In this cartoon, "Man," that is, Boopie's bored partner, is the one who listens (sort of). Biology is the vehicle of universality; we are in the domain of technobiopower, with its subject formations, beliefs, and practices. The early ages of drudgery— "Hunt and gather, hunt and gather, the routine could really wear you down"— give way in the saga of hominid progress to the Pleistocene. "The omens were fabulous." The punchline captures perfectly the identifications and hopes built into technoscientific accounts of progress; without losing their physical reality, the sufferings of the earlier period are transcended in the sociotechnical advances of universal history. "To begin with, it was the first time in ages I didn't die in childbirth." Technology, including the technology of the body itself, is the real subject of universal history. Trudeau knows that the story of techni-}

Figure 12 Donnabury © 1997 Gary Trudeau. reprinted with permission of Universal Press Syndicate. All rights reserved.
The legacy of figurative realism is what puts the title’s modest women in the sacred story’s time zones of the end of the Second Millennium and the New World Order. Second Millennium is the time machine that has to be reprogrammed by Nāthā heroes, infedels, and Jews, who it is crucial to remember, “have always considered getting knowledge part of being human.” Challenging the material-semiotic practices of technoscience is at the anointers of a deeper, broader, and more open scientific literacy which this book will call intuited knowledge.

Figuration has many meanings besides, or in connection with, those proper to the legacy of Christian realism. Aristotle’s “figures of discourse” are about the spatial arrangements in rhetoric. A figure is a geometrical and rhetorical topics and tenses are both spatial concepts. The “figure” is the French term for the face, a meaning kept in English in the notion of the linesament of a story. “To figure” means to count or to calculate and also to be in a story, to have a role. A figure is also a drawing; figures pertain to graphic representation and visual forms in general, a matter of no small importance in visually saturated technosciences. Figures do not have to be representational and mimetic, but they do have to be tropic, that is, they cannot be literal and self-identical. Figures must involve at least some kind of displacement that can trouble identification and certainty.

Figurations are performative images that can be intuited verbal or visual, figurations can be condensed maps of contestable worlds. All languages, including math-matics, is figurative, that is, made of tropes, constituted by bumps that make us swerve from literal-mindedness. I emphasize figuration to make explicit and inescapable the tropic quality of all material-semiotic processes, especially in technosciences. For example, think of a small set of objects into which lives and worlds are built—chip, gene, seed, fetus, database, bomb, race, brain, body, ecosystem. This manuscript list is made up of impaled atoms or dense nodes that explode into entire worlds of it’s-race. The chip, seed, or gene is simultaneously literal and figurative; we inhabit and are inhabited by such figures that map universes of knowledge, practice and power. To read such maps with nuanced and differential literacies and without the totality, appropriations, apocalyptic disasters, comedic resolutions; and salvation histories of stigmatized Christian realism is the task of the modern modest women.

Time and Space

Figures always bring with them some temporal modality that organizes interpretive practice. I understand Foucault’s (1978) concept of biopower to refer to the practices of administration, therapies, and surveillance of bodies that discursively constitute, increase, and manage the forces of living organisms. He gives shape to his theoretical concept through delineating the
nineteenth-century figures of the mass-producing child, reproducing Malthusian couple, hysterical woman, and homossexual pervert. The temporality of these biopolitical figures is developmental. They are all involved in dramas of health, degeneration, and the organic: efficientics and pathologies of production and reproduction. Developmental time is a legitimate descendant of the temporality of salvation history proper to the figures of Christian realism and technoscientific humanism.

Similarly, any cyborg figure inhabits a mutated time-space regime that I call technobiosphere. Intersecting with—and sometimes displacing—the development, fulfillment, and containment proper to figural realism, the temporal modality pertaining to cyborgs is communication, fusion, and implosion. This is more the temporality of the science-fiction wormhole, that spatial anomaly that can travel through unexpected regions of space, than of the birth passages of the biopolitical body. The implosion of the technical, organic, political, economic, orientic, and formal is evident in the material-semiotic practices and entities in late-twentieth-century technoscience. Inform my practice of figuration, cybernetic figures such as the end-of-the-millennium seed, chip genie, database, bionic feminist, race, brain, and ecosystem—are the offspring of implosions of subjects and objects and of the natural and artificial. Perhaps cyborgs inhabit the domain of "living" with its developmental and organic temporalities, than of "life itself," with its temporarities embedded in communications enhancement and system redesign. Life itself is time and space, as the logical version of the technoscientific soup opera; the species becomes the broad name and the figure becomes the price. Ironically, the millennialist fulfillment of development is the excessive condensation of implosion.

Temporarities intertwine with particular spatial modalities, and cyborg spatialization seems to be less about "the universal" than "the global." The globalization of the world, "planet Earth," is a semiotic-material production of some forms of life rather than others. Technoscience is the story of such globalization; it is the travelogue of distributed, heterogeneous, linked, sociotechnical circulations that make the world as a net called the global. The cyborg life forms that inhabit the recently congested planet Earth—the "whole earth" of eco-activism and green commodity catalogs—generated in a historically specific technoscientific womb. Consider, for example, only four hours of this multilevel reproductive wormhole:

1 The apparatuses of twentieth-century military coalitions, embedded in repeated world wars, decades of cold war, nuclear weapons and their institutional matrix in strategic planning, endless scenario production, and simulations in think tanks such as RAND; the immune system-like networking strategies for postcolonial global control inscribed in low-intensity-conflict doctrines; and post-Cold War, simultaneous multiple-war-fighting strategies depending on rapid massive deployment, concatenated control of information and communications, and high-intensity, subnanosecond precision weapons (Heald 1993; Gray 1991; Edwards 1995).

2 The apparatuses of hypercapitalist market traffic and flexible accumu-

3 The apparatuses of production of that technoscientific planetary habitat space called the ecosystem, with its constitutive birth pangs in resource management practices in such institutions as national forests in the 1950s and 1960s; in post-World War II theoretical fascination with all things cybernetic; in the Atomic Energy Commission-mediated research projects in the 1950s for tracing radioisotopes through food chains in the Pacific ocean; in 1970s global modeling practices indebted to the Club of Rome and to international projects such as the United Nations Educational, Scientific, and Cultural Organization's (UNESCO) Man and the Biosphere program; and in the early 1990s of widespread "green war" as a dominant New World Order security concern, with its diplomatic form played out in 1992 at the Earth Summit in Rio de Janeiro (Escobar 1994; Taylor and Buttel 1995).

4 The apparatuses of production of globalized, extraterritorial everyday consciousness in the planetary pandemic of multimedia, multispecies, multicultural, cyberbiong entertainment events such as Star Trek, Blade Runner, Terminator, Akira, and their proliferating sequelae in the daily information stream, embedded in transnational, U.S.-dominated, broad-spectrum media conglomerates, such as those forged by the mergers of Time-Warner with CNN and of the Disney universe with Capital Cities, owner of CBS (Gohilondo 1991; Sofia 1992).
The offspring of these technoscientific wombats are cyborgs—imploded germinal entities, densely packed conglomerations of worlds, shocked into being from the force of the implosion of the natural and the artificial, nature and culture, subject and object, machine and organic body, money and live, narrative and reality. Cyborgs are the stem cells in the narrow of the technoscientific body; they differentiate into the subjects and objects at stake in the contested zones of technoscientific culture. Cyborg figures must be read, too, with the mixed, unfinished literacies Nilli is ready to teach.

So, what kinds of kids are allied in the proprietary form of life in these days near the end of the Second Christian Millennium? How do we, who inhabit such stories, make psychic and commercial investments in forms of life, where the lines among human, machine, and organic nature are highly permeable and enormously revisable? How useful is my abiding suspicion that "biology"—the historically specific, congealed embodiment in the world as well as the technoscientific discourse positing such bodies—is an accumulation strategy? The point is less disputable if I write that "biotechnology"—both the discourse and the body constituted as a biotechnology—is an accumulation strategy. But much of what is accumulated is more strange than capital, more kind than alien, more alluring than gold. It is time to move from grammar to content, from syntax to semantics, from logic to body.

Contents
Modest_Witness@Second_Millenium is organized around the anatomy of meaning. The book's sections correspond to the parts of the human science of semiotics. Part I, Syntactics: The Grammar of Feminism and Technoscience, corresponds to syntax, or the formal structure of signification. Part II, Semantics: Modest_Witness@Second_Millenium/FemaleMan®_Meets_OncoMouseTM matches up the contents and figures of a communication. Part III, Pragmatics: Technoscience in Hypernet, recall paperpads, or the physiology of meaning-making. Inverting a fourth category of semantics and troping on the conventional parts of the subject, I end my book with Epilogue, Lynn Randolph's painting of a sphinx figure moving through a screen into a world where inference patterns can make a difference in how meanings are made and lived. Each chapter can be read as a separate essay, but in sequence, the chapters are a kind of Pilgrim's Progress through the story fields, material-semiotic apparatuses, and political stakes where biologists and informatics colibrate and reproduce. Guiding the reader through the grammar of the title, Part I explains an e-mail address, the mixed and differential literacies necessary to evade millenarian closures, and the contaminated practice of figuration that pervades the book. Inseminating and mixing narrative fiction, biological argument, historical analysis, political inquiry, mathematical jokes, religious savoir, literary readings, and visual theory, the book is itself generically heterogeneous. In mixed genres and its intertextualizing visual and verbal acts ask for a generous literacy from the reader. In its most basic sense, this book is my exercise regime and self-help manual for how not to be literal minded, while engaging proactively in serious moral and political inquiry about feminism, amorism, democracy, knowledge, and justice in certain important domains of contemporary science and technology. I also want those who inhabit Modest_Witness@Second_Millenium to have a good time. Comedy is *both* object of attention and method.

Contesting the meanings of word, instruments, and figures, Part II brings the reader into the time zone of the Scientific Revolution through the figure of the modest witness, who bears testimony to matters of fact constituted by means of material, literary, and social technologies crafted in the experimental way of life. Drawing on approaches developed in feminist science studies to communities of practice, boundary objects, situated knowledges, agential realisms, and strong objectivity, the chapter aims to mutate the modest witness into a more usable vehicle for entering the wormholes of contemporary millenarian technoscience. The second chapter of the Semantics section interrogates the kinship of the FemaleMan® and OncoMouseTM. These late-twentieth-century figures inhabit the story fields and sociotechnical practices of feminism and biotechnology. Beginning with a comparison of transaurine elements and transgeneric organisms and lingering in the biotechnological laboratory, the chapter examines a broad range of popular and official texts, careers, economic developments, global webs, research practices, visual materials, and efforts to construct a more democratic science. The purpose is to reenact our practical imagination of who the actors are and what is at stake in some of the material-semiotic domains of modern biology. By the end of Semantics, the family has been assembled and the action can expand.

Part III, Pragmatics, tinkers with mechanisms for unwinding sticky threads and making new artificiations in the dense knots and hyper textual webs of technoscience. The topics are the Human Genome Project and its mapping practices; the transhuman and transgenic bond between reproductive technoscience and reproductive freedom projects; the changing discourses of human unity and difference in biological approaches to race across the twentieth century; and the kinship of diverse cyborg figures that populate ecology, medical technology, cinema, and evolutionary biology. Technoscientific visual culture;
inhospitable versions of flattery, jokes, songs, and solemn pronouncements; the close weave of art, money, and science; and proliferating vampire figures all find their place in this Pragmatism section.

My invented category of semantics, diffusion, takes advantage of the optical metaphors and instruments that are so common in Western philosophy and science. Reflexivity has been much recommended as a critical practice, but my suspicion is that reflexive, like reflexive, only displaces the same elsewhere, stirring up the worries about copy and original and the search for the authentic and really true. Reflexivity is a bad trope for escaping the false choice between realism and idealism in thinking about strong objectivity and situated knowledge. What we need is to make a difference in material-semiotic apparatus, to dislodge the rays of technocracy so that we get more promising interference patterns on the recording film of our lives and bodies. Diffraction is an optical metaphor for the effort to make a difference in the world. Lynn Randolph’s suggestive painting on the last page concludes *Madame Wintes*®-*Second Millennium FemaleMan® Meets_ OomMouse™* with an interference pattern, not with a reflection of the same displaced elsewhere. Randolph gave me a powerful figure for coping with the end of my culture’s parochial millennium, in both its feminist and its technocentric versions. That is, Randolph’s woman is a device for considering how to make the end work. What more could a people given to teleology ask for in the last?

Throughout *Madame Wintes*®-*Second Millennium*, the paintings of Lynn Randolph introduce and frame themes and arguments. Randolph’s and my own metaphoric realism and Cybernaut surrealism are in punctuated conversation. Our verbal and visual figures were sometimes developed in direct response to each other’s work. I have placed one of her paintings, paired with my commentary, at the beginning of each part and of two individual chapters. I am indebted to Randolph for conversations and letters in which she helped me see her art, which also infiltrated the tissue of my sentences. Similarly, some of her paintings were done in response to earlier versions of chapters. The book contains ten of Randolph’s troubling and hopeful paintings, each exploring the material and psychic territory of technocracy. I am grateful to her with all my heart. Her willingness to let me weave her work into mine is a rare gift. It is through the eyes of her mouse-human hybrid in *The Laboratory* or the *Passion of OomMouse* that I watch Robert Boyle’s experiments with the air-pump in seventeenth-century London, from which the modest witnesses of this book began their travels toward the end of the millennium.
I have tried to persuade any readers that several apparently counterintuitive claims should have the status of matters of fact—that is, crucial points of contingent stability for possible sociotechnical orders, attested by collective, networked, situated practices of witnessing. Witnessing is seeing; attesting; standing publicly accountable for, and psychologically vulnerable to, one's vision and representations. Witnessing is a collective, localized practice that depends on the constructed and never finished credibility of those who do it, all of whom are mortal, fallible, and fraught with the consequences of unconscious and discerned biases and fears. A child of Robert Boyle’s Royal Society of the English Restoration and of the experimental way of life, I remain attached to the figure of the modest witness. I still inhale the stories of scientific revolution as earthshaking mutations in the apparatuses of production of what may count as knowledge. A child of antireligious, feminist, multicultural, and radical science movements, I want a mutated modest witness to live in worlds of reassessment, to years for knowledge, freedom, and justice in the world of consequent facts. I have tried to queer the self-evidence of witnessing, of experience, of the conventionally upheld and inverted perceptions of clear distinctions between subject and object, especially the self-evidence of the distinction between living and dead, machine and organism, human and nonhuman, self and other as well as of the distinction between feminized and mainstream, progressive and oppressive, local and global. Queering all or any of these distinctions depends, paradoxically, on undoing the founding border trace of modern science—that between the technical and the political. The point is to make situated knowledges possible in order to be able to make consequent claims about the world and on each other. Such claims are rooted in a firmly modern, lamented desire for justice and democratically crafted and lived well-being. It is important to remember that these were also, often, the dreams of the players in the first Scientific
communities of practice, articulation work, displaced concretism, and feminista method (Star 1994); cyborgs and situated knowledges (Haraway 1991); border crossings and narrative strategies (Trawek 1992); science as social knowledge (Leyton, 1990). If any one thing pervades this heterogeneous list, it is a commitment to avoiding What Whitehead called "the fallacy of misplaced concreteness" (1948:52), where simple location and a metaphysics of substantive figures with primary and secondary qualities—those fruitful but extreme abstractions that were critical to seventeenth-century innovations later narrated as the Scientific Revolution—get mistaken as reality. Attention to the agencies and knowledges crafted from the vantage point of nonstandard positions (positions that don't fit but within which one must live), including the heterogeneous locations of women, and questions about whose and for what the semiotic-material apparatuses of scientific knowledge production get built and sustained are at the heart of feminist science studies. Interrupting critical silences, excising the reasons questions cannot make headway and seem ridiculous, getting at the denied and disavowed in the heart of what seems natural and rational: These notions are all fundamental to feminist approaches to technoscience (Keller 1992a/1992). I think what binds the hungry community of modern witnesses called feminist science studies together is what bell hooks (1990) called "yearning." "Yearning in technoscience is for knowledge projects as freedom projects— it is a polyplot, rereadability mapping, and practical and material way—coupled with a yearning sense that all is not well with women, as well as a billion of nonwomen, who remain incommensurable in the warped coordinate systems of the New World Order, Inc.

Committed to cyborg articulations, I have tried to undermine the notion of self-evidence entirely by insisting, along with most other critical new-realists and practitioners of science studies, that the shapes the world takes are conventional and revisable, if also eminently solid and full of consequences for equally distributed chances of life and death. Valid witnessed depends not only on modernity but also on naming and acknowledging alliances with a lively array of others, who are like and unlike human and not, inside and outside what we have been the defended boundaries of hermeneutic selves and powerful places. I am thinking, centrally, of selves such as scientists and places such as laboratories. If by the mid of the Second Millennium, it is past time to query then permanently, to revise them generically, to color them back into visibility. The empty spaces of both the "culture of no culture" of self-invasive technoscienists and the "nature of no nature" of the chimerical entities emerging from the world-constructed-as-laboratory must be remapped and embellished by new practices of witnessing. With the evident imposition of nature and culture for those who
held the distinction sacred, the task of making our common space inescapable. What counts as modesty now is a good part of what it is to be modest. In our age, agencies will evolve new forms of "modest warrant" each, and whose will it displace? The kind of modest warrant that attests to the natural kinship of the fully artificial FemaleMan® and OncorMouse® is the kind that insists on an action-network theory that traces the stakes, alliances, and actions of a much-enhanced array of constituents and produces of what may count as fact. It is a kind of modest warrant that insists on its intimated dress, where location is itself a complex construction as well as inheritance, and that can sit lot with the projects and needs of those who could not or would not inhabit the subject positions of the self-invited and the discursive sites, the "laboratories," of the credible, civil man of science. Modest_Warrant@Second_Millennium needs a new experimental way of life to fulfill the millenniums' hope that life will survive on this planet.

Entities such as the feto, chip gene bomb, brain, race, ecosystem, seed, and database are partly like Robert Boyle's air-pump. They are material technologies through which many must pass and in which many visible and invisible actors and agencies cohere. The air-pump was a device for establishing matters of fact, an instrument in a new way of life, called "experimental," based on the laboratory as a theater of persuasion. The air-pump was part of the armament enforcing the partition of the world into subjects and objects. Thus, my hyper-text nodes and links to totipotent stem cells are also very unlike the air-pump because they are all part of a material technology for tearing down the Berlin Wall between the world of objects and the world of subjects, and the world of the political and the technical. They all attest, witness, to the impersonation of nature and culture as embodied entities of the world and their explosion into con- tractions for possible, maybe even livable, worlds in globalized technoscience.

To play with the hyper-text made up of entities such as the gene, feto, race, seed, and database, one must enter the Net from many sites. One must risk following the links among stem cells through indeterminate numbers of dimensions, persevering and alloying with agencies and actors too often excluded by scholars of technoscience. One must understand that the reality effect of "virtual reality" is no less and no more "real" than that made available—and enforced—by the material, literary, and social conventions of the fact scientific evolutions and meanings that make up the stories about European-derived apparatuses for the production of matters of fact and states of self-evidence. If the endeavors of antiracist feminist studies, cultural studies, and science studies are really to lose their status as performed and mutually repellant categories, joined, if at all, by an exacting series of coordinating juxtapositions and defensive addenda and apologies, then entering the Net is going to require a radically reformulated practice for finding our addresses and sending our messages into the ether.
Diffraction patterns record the history of interaction, interference, reinforcement, difference. Diffraction is about heterogeneous history, not about origins. Unlike reflections, diffractions do not replace the same elsewhere, in more or less distorted form, thereby giving rise to industries of metaphysics. Rather, diffraction can be a metaphor for another kind of critical consciousness at the end of this rather private Christian millennium. One committed to making a difference and not to repeating the Sacred Image of Same. Diffraction is a view of Christian narrative and Psalmonic optics, in their secular technoscientific story cycles as well as in their more orthodox manifestations. Diffraction is a narrative, graphic, psychological, spiritual, and political technology for making consequential meanings.

About this painting for the last series, Randolph writes:

The enshrined memory of a powerful male figure in every woman's life meets a place where change occurs. The white that occurs with age and psychic transformation, the multiple selves interconnected in one body are embodied in the central figure with its two hands, two figures, and metaphysical space in between. Diffraction occurs at a place at the edge of the future, before the shay of the unknown. The structural pattern of the matter in a galaxy may be repeated in a female blossom, a vision perhaps peculiar to painters from Texas, I'm trying to create bodies that matter. Perhaps by showing women's heads and a set world, a place composed of interference patterns, contemporary women might emerge as something other than the female image of the same, something inappropriate desired unattained, and major—something that might make a difference. I believe that we need to be the active about this, not removed... not one natural and soiled by the messiness of life. (1993:9)
Part I. Syntaxics: The Grammar of Feminism and Technoscience

1 To stress the Church's control of the power to enforce such names, I use the
accurate terms of the Inquisition for women, Muslims, and Jews. Nahli
injured the "saffah" in her category of hecons, but her Palestinian sisters
would rearrange that to be more explicit when identifying the
people's of the book and their occupational lattan.

2 Fernandez (1991 and 1995a) discuss the mixed cultural literacies necessary to
navigating the material-semantic webs of the contemporary United States.
She inhabits a series of textual figures to mobilize conventional passages
despite literature, music, encyclopedias, dictionaries, theme parks, and
multicultural canons, literary and pedagogies. Sandoval (1991 and forth-
coming) theorizes oppositional and differential consciousness, rooted in the
reading and writing practices of U.S. ThirdWorld women of color but able to be
learned broadly. This kind of heterogeneous, reassembled, acquired politi-
cal-semiotic ability—indelibly and articulated to us who learned to
see and operate in the world in critical new ways—is central to feminist
standpoint theories including those in science studies.

3 ARPA is the acronym for (Defense) Advanced Research Projects Administration,
later renamed DARPA.

4 The marvellous blend of hype, sober analysis, and policy development joining the
rehearsal of the nation to the new world information order is everywhere; for
example, see the National Information Infrastructure: Agenda for Action
(Information Infrastructure Task Force 1993). For the more suspicious,
MicroAssociates, Box 5369, Arlington, VA 22205, keeps a power structure
research database online. Now: Modee_Willies@Second_Millenium
should be without these disks.

5 Marilyn Stoneham infuses into the wave culture is "reversing-up" in the
enhancement of advertising, in particular, but also in the "enterprise culture" of
the New World Order descended from Thatcher, Reagan, Bush, and their
potent kin, more generally. "Marked products are quality-enhanced." She
sees such enhancement as peculiar to a world where "the natural, innate
property and the entwined, cultural enhancement become one... This is not a new essentialism but a collapse of the difference between the material and the superseded" (Strathern 1992:38-39). My interest in the means of implosion of culture is linked to Strathern.

6 I am in conversation with Beudant (1994) in this discussion.

7 On a Claudia Card/lfeno in progress is the child to the phenotype that occurs

8 I was "life itself" to Sarah Franklin (1993b).

9 The Mostar computer game SeaEarth is, for training exercise 5a, learning to

10 Meanwhile, the Walla Walla Bank is the biggest institutional shareholder of

Part II. Semantics.

Chapter 1. Modest Witness

1 Coherence is a variety of containment, communication, autonomous passage. As any good economist will tell you, coherence is a preconceived act.

2 Traveaen was the legitimate son of Robert Boyle, her physician's detective.

1 SeaEarth and Dallas were popular soap operas in the 1980s and 1990s.

2 Inspired by Bernard Laffon, Raoul Fernandez (1991:1954) explored the materialized memory technology of Disney World by traveling through its sites in the process of a family of images—the caesare, cyborg, monist, and palazo, who together forged a poetic narrative that helped me write my book.

3 Of course, what counts as a variant for disintermediation, or lack of bias, changes historically (Shapin 1994:407-41) because the difference between the face-to-face, gentlemanly standards for attending and talking in seventeenth-century England and the anonymous, institutionally and professionally warranted practices of science in the twentieth century. And concrete laboratories, however, Shapin suggests that members of the community based on face-to-face interactions continue to assess credibility in ways Robert Boyle would have understood. Part of the problem sciences face today is legislating of these criteria in the eyes of outsiders. One of my goals in this book is to trouble what Shapin as outsiders and insiders in setting standards of credibility and objectivity "disinterested" cannot be allowed to mean "disinterested," i.e., unaccountable for, or unconscious of, complex layers of one's personal historical situation in the apparatus for the production of knowledge. Nor can "politically committed" be allowed to mean "biased." It is a delicate distinction, but one biographical for hopes for democratic and credible science. Endrulat and Wissenschaft (1995) discourse how the "interest of science," and so of what counts as objective, has changed during the twentieth century in the United States. For example, in molecular biology university-based investigators formerly doing sites and founders supported "pure science," which scientifically warranted these credibility and disintermediation, as the grants economy ended because much more closely tied to corporations, where intellectual property and science implode. Perhaps some of the anxiety about objectivity in the sciences with which science studies scholars, feminist theorists, and the like are so threatened broad-based belief in scientific credibility and objectivity through their irresponsible "prepostmodern" and "relativism"—should really be traced to transformed standard of disinterestedness among scientists themselves. See especially the attacks on Gross and Levstik (1994).

4 Shapin (1994) writes almost exclusively about the social technology for warranting credibility. He analyses the transfer of the code of gentlemanly风采, based on the independence of the gentleman, that man of men who owns the use anything to the, from established social regions to a new set of practices-experimental science. The most original contribution of Shapin and Schaffer (1985) is their analysis of the waste of all these technologies, and especially of the heart of the experimental life-from the sociotechnical apparatus that built and sustained the air-pump, which I take to be