

Working It Out

23 Women Writers, Artists, Scientists,
and Scholars Talk About Their Lives and Work

EDITED BY

Sara Ruddick and Pamela Daniels

With a foreword by Adrienne Rich



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Flora

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Bess who has been fingering a fruit-jar lid—absently, heedlessly dropped it—aimlessly groping across the table, reclaims it again. Lightning in her brain. She releases, grabs, releases, grabs. I can do. Bang! I did that. I can do. I! A look of neanderthal concentration is on her face. That noise! In triumphant astounded joy she clashes the lid down. Bang, slam, whack. Release, grab, slam, bang, bang. Centuries of human drive work in her; human ecstasy of achievement, satisfaction deep and fundamental as sex: *I can do, I use my powers; I! I!*

Tillie Olsen

Yonnonidio: From the Thirties
1935 (published 1974)

. . . modern women who, by force of youth, education, or temperament, are in some degree out of touch with the traditions of status received from the barbarian culture, and in whom there is, perhaps, an undue reversion to the impulse of self-expression and workmanship—these are touched with a sense of grievance too vivid to leave them at rest.

Thorstein Veblen

The Theory of the Leisure Class
1899

Contents

<i>Acknowledgments</i>	xi
Foreword <i>Adrienne Rich</i>	xiii
Introduction <i>Sara Ruddick and Pamela Daniels</i>	xxv
Finding New Forms <i>Kay Keeshan Hamod</i>	3
Juxtapositions <i>alice atkinson lyndon</i>	25
Dependency, Individuality, and Work <i>Amelie Oksenberg Rorty</i>	38
Birth of the Amateur <i>Pamela Daniels</i>	55
On Work <i>Catharine R. Stimpson</i>	71
→ The Anomaly of a Woman in Physics <i>Evelyn Fox Keller</i>	77
In Search of Our Mothers' Gardens <i>Alice Walker</i>	92
My Work and My Working-Class Father <i>May Stevens</i>	103
Scenes <i>Joann Green</i>	117
A Work of One's Own <i>Sara Ruddick</i>	128
Catching the Sun <i>Diana Michener</i>	147
Learning to Work <i>Virginia Valian</i>	162

Notes from an Extra in the American Moving Picture Show <i>Connie Young Yu</i>	179
Writing in the Real World <i>Anne Lasoff</i>	196
Contradictions <i>Marilyn Young</i>	213
Plain Truth <i>Naomi Thornton</i>	228
"How can a little girl like you teach a great big class of men?" the Chairman Said, and Other Adventures of a Woman in Science <i>Naomi Weisstein</i>	241
What Counts as Work? <i>Cynthia Lovelace Sears</i>	251
Coming of Age the Long Way Around <i>Nanette Vonnegut Mengel</i>	270
Notes from a Conversation on Art, Feminism, and Work <i>Miriam Schapiro</i>	283
The Sacred Fire <i>Celia Gilbert</i>	306
One Out of Twelve: Women Who Are Writers in Our Century <i>Tillie Olsen</i>	323

→ *About the Contributors*

341

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Evelyn Fox Keller was an active editorial participant in the project from the start; she secured contributors, read manuscripts, and offered sound counsel. Victoria Steinitz and Marilyn Young were there for us with emotional and editorial support, whenever we needed them. Anne Lasoff proofread the manuscript and commented on each essay. Margaret Pennace and Carol Redford typed the essays and gently kept us in touch with the "reader's point of view." Barbara Plumb, Amy Huntoon, and Phyllis Benjamin at Pantheon have been enthusiastic and patient critics.

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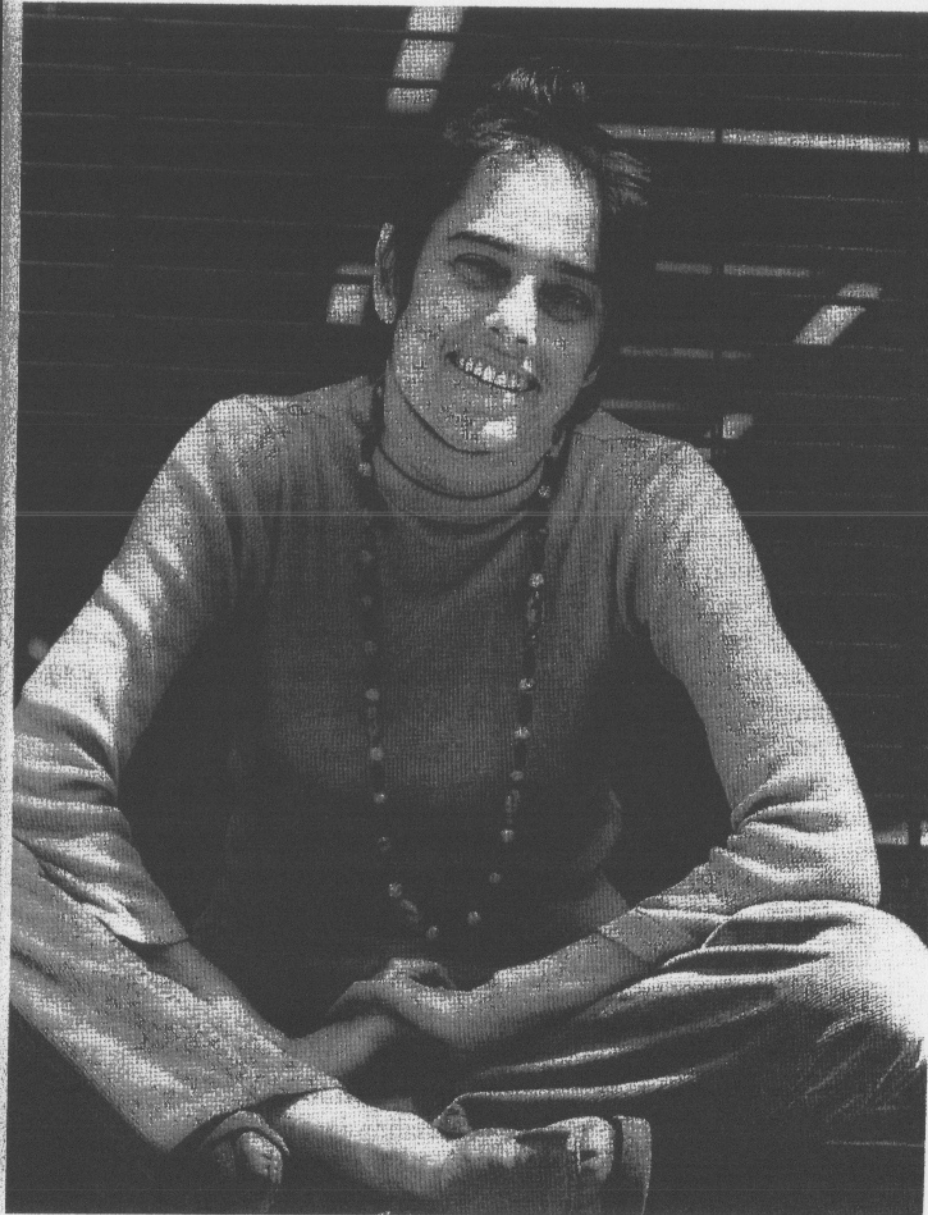
sometimes seems unmanageable. I like reassurance, but I hesitate to confess dependency on it. No amount of inoculation against self-pity has fully immunized me against its sickly charm. I get lonely.

One accepts such minor crises of belief and of the emotions as one does weeds. In my middle years, I think I have been fortunate. I wonder if I ought not to rearrange my occupations—perhaps to write more and to teach less. A legacy of mobility is restlessness. I often remember my mother's mother, the wonderful security of her unconditional tenderness. A world without her resilience and capacity for love would be terrible, unacceptable, but, in brief, I am glad that I am not, and will not, be her. However, I regret that as I received and achieved much of what she wanted for her family—my education, for example—I also received and achieved what my politics have ultimately taught me to suspect: that membership, albeit marginal, in an elite.

Catherine R. Simpson

The Anomaly of a Woman in Physics

Evelyn Fox Keller



A COUPLE OF MONTHS AGO I was invited to give a series of lectures at a major university as one of a "series of distinguished guest lecturers" on mathematical aspects of biology. Having just finished teaching a course on women at my own college, I somehow felt obliged to violate the implicit protocol and address the anomalous fact of my being an apparently successful woman scientist. Though I had experienced similar vague impulses before, for a variety of reasons arising from a mix of anger, confusion, and timidity, it had never seemed to me either appropriate or possible to yield to such an impulse. Now, however, it seemed decidedly inappropriate, somewhat dishonest, and perhaps even politically unconscionable to deliver five lectures on my work without once making reference to the multitude of contradictions and conflicts I had experienced in arriving at the professional position presumed on this occasion. Therefore, in a gesture that felt wonderfully bold and unprofessional, I devoted the last lecture to a discussion of the various reasons for the relative absence of women in science, particularly in the higher ranks. The talk formed itself—with an ease, clarity, and lack of rancor that amazed me. I felt an enormous sense of personal triumph. Somehow, in the transformation of what had always appeared to me an essentially personal problem into a political problem, my anger had become depersonalized, even defused, and a remarkable sense of clarity emerged. It suggested to me that I might, now, be able to write about my own rather painful and chaotic history as a woman in science.

Origins are difficult to determine and obscure in their relation to final consequences. Suffice it to say that in my senior year of college I decided I would be a scientist. After several years of essentially undirected intellectual ambition, I majored in physics partly for the sake of discipline and partly out of the absence of any clear sense of vocation; and in my last year I fell in love with theoretical physics.

I invoke the romantic image not as a metaphor, but as an authentic, literal description of my experience. I fell in love, simultaneously and inextricably, with my professors, with a discipline of pure, precise, definitive thought, and with what I conceived of as its ambitions. I fell in love with the life of the mind. I also fell in love, I might add, with the image of myself striving and succeeding in an area where women had rarely ventured. It was a heady experience. In my adviser's fanta-

sies, I was to rise, unhampered, right to the top. In my private fantasies, I was to be heralded all the way.

It was 1957. Politics conspired with our fantasies. Graduate schools, newly wealthy with National Science Foundation money, competed vigorously for promising students, and a promising female student was a phenomenon sufficiently unique to engage the interest and curiosity of recruiters from Stanford to Harvard. Only Cal Tech and Princeton were closed to me—they were not yet admitting women—and I felt buoyant enough to challenge them. I particularly wanted to go to Cal Tech to study with Richard Feynman—a guru of theoretical physics—on whose work I had done my senior thesis. In lieu of my being accepted at Cal Tech, an influential friend of mine volunteered to offer Feynman a university chair at MIT, where I would be admitted. Heady indeed.

Even then I was aware that the extreme intoxication of that time was transitory—that it had primarily to do with feeling "on the brink." Everything that excited me lay ahead. I had fantasies of graduate school and becoming a physicist; what awaited me, I thought, was the fulfillment of those fantasies. Even the idea of "doing physics" was fantasylike. I could form no clear picture of myself in that role, had no clear idea of what it involved. My conception of a community of scholars had the airiness of a dream. I was intoxicated by a vision that existed primarily in my head.

Well, Feynman was not interested in leaving Cal Tech, and so I went to Harvard. More accurately, I was pressured, and eventually persuaded, by both a would-be mentor at Harvard and my adviser, to go to Harvard. At Harvard I was promised the moon and the sun—I could do anything I wanted. Why I was given this extraordinary sales pitch seems, in retrospect, all but inexplicable. At the time, it seemed quite natural. I dwell on the headiness of this period in order to convey the severity of the blow that graduate school at Harvard actually was.

The story of my graduate school experience is a difficult one to tell. It is difficult in part because it is a story of behavior so crude and so extreme as to seem implausible.

Moreover, it is difficult to tell because it is painful. In the past, the telling of this story always left me so badly shaken, feeling so exposed, that I became reluctant to tell it. Many years have passed, and I might well bury those painful recollections. I do not because they represent a piece of reality—an ongoing reality that affects others, particularly women. Even though my experiences may have been unique—no one

else will share exactly these experiences—the motives underlying the behavior I am going to describe are, I believe, much more prevalent than one might think, and detectable in fact in behavior much less extreme.

I tell the story now, therefore, because it may somehow be useful to others. I *can* tell the story now because it no longer leaves me feeling quite so exposed. Let me try to explain this sense of exposure.

Once, several months into my first year in graduate school, a post-doctoral student in an unusual gesture of friendliness offered me a ride home from a seminar and asked how I was doing. Moved by his gesture, I started to tell him. As I verged on tears, I noticed the look of acute discomfort on his face. Somehow, I had committed a serious indiscretion. It was as if I had publicly disrobed. Whatever I said, then and always after, it somehow seemed I had said too much. Some of this feeling remains with me even now as I write this article. It is a consequence of the assumption in the minds of others that what I am describing must have been a very personal, private experience—that is, that it was produced somehow by forces within myself. It was not. Although I clearly participated in and necessarily contributed to these events, they were *essentially* external in origin. That vital recognition has taken a long time. With it, my shame began to dissolve, to be replaced by a sense of personal rage and, finally, a transformation of that rage into something less personal—something akin to a political conscience.

That transformation, crucial in permitting me to write this, has not, however, entirely removed the pain from the process of recollecting a story that retains for me considerable horror. If I falter at this point, it is because I realize that in order for this story to be meaningful, even credible, to others, I must tell it objectively—I must somehow remove myself from the pain of which I write. The actual events were complex. Many strands weave in and out. I will describe them, one by one, as simply and as fairly as I can.

My first day at Harvard I was informed, by the very man who had urged me to come, that my expectations were unrealistic. For example, I could not take the course with Schwinger (Harvard's answer to Feynman) that had lured me to Harvard, and I ought not concern myself with the foundations of quantum mechanics (the only thing that did concern me) because, very simply, I was not, could not be, good enough. Surely my ambition was based on delusion—it referred to a pinnacle only the very few, and certainly not I, could achieve. Brandeis, I was told bluntly, was not Harvard, and although my training there might have earned me a place at Harvard, distinction at

Brandeis had no meaning here. Both I and they had better assume I knew nothing. Hence I ought to start at the beginning. The students they really worried about, I was informed, were those who were so ignorant and naive that they could not apprehend the supreme difficulty of success at Harvard.

These remarks were notable for their blatant class bias and arrogance, as well as for their insistent definition of me on the basis of that bias—a gratuitous dismissal of my own account that I experienced recurrently throughout graduate school. The professor's remarks were all the more remarkable in that I had expressed exactly the same intentions in our conversation the previous spring and had then been encouraged. What could account for this extraordinary reversal? There had been no intervening assessment of my qualifications. Perhaps it can be explained simply by the fact that the earlier response was one of someone in the position of selling Harvard, while now it seemed there was an obligation to defend her. (It is ironic that universities should be associated with the feminine gender.) Nor was it coincidental, I suspect, that this man was shortly to assign to one of the senior graduate students (male, of course) the task of teaching me how to dress.¹

Thus began two years of almost unmitigated provocation, insult, and denial. Lacking any adequate framework—political or psychological—for comprehending what was happening to me, I could only respond with personal rage: I felt increasingly provoked, insulted, and denied. Where political rage would have been constructive, personal rage served only to increase my vulnerability. Having come to Harvard expecting to be petted and fussed over (as I had been before) and expecting, most of all, validation and approval, I was entirely unprepared for the treatment I received. I could neither account for nor respond appropriately to the enormous discrepancy between what I expected and what I found. I had so successfully internalized the cultural identification between male and intellect that I was totally dependent on my (male) teachers for affirmation—a dependency made treacherous by the chronic confusion of sexuality and intellect in relationships between male teachers and female students. In seeking intellectual affirmation, I sought male affirmation, and thereby became exquisitely vulnerable to the male aggression surrounding me.

I had in fact been warned about the extreme alienation of the first year as a graduate student at Harvard, but both my vanity and my

¹ My attire, I should perhaps say, was respectable. It consisted mainly of skirts and sweaters, selected casually, with what might have been called a bohemian edge. I wore little or no makeup.

naiveté permitted me to ignore these warnings. I was confident that things would be different for me. That confidence did not last long. Coming from everywhere, from students and faculty alike, were three messages. First, physics at Harvard was the most difficult enterprise in the world; second, I could not possibly understand the things I thought I understood; and third, my lack of fear was proof of my ignorance. At first, I adopted a wait-and-see attitude and agreed to take the conventional curriculum, though I privately resolved to audit Schwinger's course. Doing so, as it turned out, seemed such an act of bravado that, daily, all eyes turned on me as I entered the class and, daily, I was asked by half a dozen people with amusement if I still thought I understood. Mysteriously, my regular courses seemed manageable, even easy, and as I became increasingly nervous about my failure to fear properly, I spent more and more evenings at the movies. In time, the frequent and widespread iteration of the message that I could not understand what I thought I understood began to take its toll. As part of a general retreat, I stopped attending Schwinger's course. I had begun to lose all sense of what I did or did not understand, there and elsewhere. That I did well in my exams at the end of the semester seemed to make no difference whatever.

Meanwhile, it was clear that I was becoming the subject—or object—of a good deal of attention in the Physics Department. My seriousness, intensity, and ambition seemed to cause my elders considerable amusement, and a certain amount of curiosity as well. I was watched constantly, and occasionally addressed. Sometimes I was queried about my peculiar ambition to be a theoretical physicist—didn't I know that no woman at Harvard had ever so succeeded (at least not in becoming a *pure* theoretical physicist)? When would I too despair, fail, or go elsewhere (the equivalent of failing)? The possibility that I might succeed seemed to be a source of titillation; I was leered at by some, invited now and then to a faculty party by others. The open and unbelievably rude laughter with which I was often received at such events was only one of many indications that I was on display—for purposes I could either not perceive or not believe. My fantasy was turning into nightmare.

In lieu of support I began to long for anonymity, but the anomaly of my position had made it so public that there was no hiding. My real world began to resemble a paranoid delusion. Many people in Cambridge knew who I was and speculated about me. None of them offered friendship. Once, feeling particularly lonely on a Saturday night, I went for a walk by the Charles River. I was sitting on a bench, deep in thought, when a young man, a stranger, appeared out of the

dark, sat down, and began to recite a detailed knowledge of me—what I was doing, who my friends were, where I had come from, and other particulars. Finishing his recitation, he got up and walked away. When real events so take on the qualities of delusion, it becomes difficult indeed to expect the credulity of others. Yet I remained frighteningly sane and had no difficulty in recognizing the reality—only in understanding it.

It is sometimes hard to separate affront to oneself as a person from affront to one's sensibilities. Not only do they tend to generate the same response—one feels simply affronted—but it is also possible (as I believe was true here) that the motives for both affronts are not unrelated. I went to graduate school with a vision of theoretical physics as a vehicle for the deepest inquiry into nature—a vision perhaps best personified, in recent times, by Einstein. The use of mathematics to further one's understanding of the nature of space, time, and matter represented a pinnacle of human endeavor. I went to graduate school to learn about foundations. I was taught, instead, how to do physics. In place of wisdom, I was offered skills. Furthermore, this substitution was made with moralistic fervor. It was wrong, foolhardy, indeed foolish, to squander precious time asking why. Proper humility was to bend to the grindstone and learn techniques. Contemporary physics, under the sway of operationalism, had, it seemed, dispensed with the tradition of Einstein—almost, indeed, with Einstein himself. General relativity, the most intellectually ambitious venture of the century, seemed then (wrongly) a dead subject. Philosophical considerations of any sort in the physical sciences were at an all-time low. Instead, techniques designed to calculate *n*th-order corrections to a theory grievously flawed at its base were the order of the day.

Physics had become a major industry. Huge investments poured into experiments, the results of which needed subsequently to be matched by theoretical calculations. Paralleling the influx of money was an influx of manpower. They couldn't all be creative innovators. The Baconian vision of an army of scientific foot soldiers was imminent; and Harvard physicists, whatever they were doing, were, by definition, the best—they were the generals. The status of the elite had to be protected even though the very conception of elite was uncertain. While there was general agreement about what the student rank and file should (or rather, should not) be doing, the generals seemed considerably confused about what they should be doing. The work of Harvard's most distinguished theoretician conveyed a sense of grand sweep. While he was roundly faulted and criticized for the abstract

formality of his approach, his status as the best went unchallenged. Even among the elite, then, there was a lack of clarity about the nature and rules of progress and excellence, and a certain amount of scrambling. Somehow the notion of different but equally valid postures did not seem tenable—the preoccupation with ranking was overriding.

My naiveté and idealism were perfect targets. Not only did I not know my place in the scheme of things as a woman, but by a curious coincidence, I was apparently equally ingenuous concerning my place as a thinker. I needed to be humbled. Though I writhed over the banality of the assignments I was given, I did them, acknowledging that I needed in any case to learn the skills. I made frequent arithmetic errors—reflecting a tension that endures within me even today between the expansiveness of conception and the precision of execution, my personal variation perhaps of the more general polar tension in physics as a whole. When my papers were returned with the accuracy of the conception ignored and the arithmetic errors streaked with red—as if with a vengeance—I wondered whether I was studying physics or plumbing. Who has not experienced such a wrenching conflict between idealism and reality? Yet my fellow students seemed oddly untroubled. From the nature of their responses when I tried to press them for deeper understanding of the subject, I thought perhaps I had come from Mars. Why, they wondered, did I want to know? That they were evidently content with the operational success of the formulas mystified me. Even more mystifying was the absence of any appearance of the humility of demeanor that one would expect to accompany the acceptance of more limited goals. I didn't fully understand then that in addition to the techniques of physics, they were also studying the techniques of arrogance. This peculiar inversion in the meaning of humility was simply part of the process of learning how to be a physicist. It was intrinsic to the professionalization, and what I might even call the masculinization, of an intellectual discipline.

To some extent the things I describe here are in the nature of the academic subculture. They reflect the perversion of academic style—familiar in universities everywhere—a perversion that has become more extensive as graduate schools have tended to become increasingly preoccupied with professional training. My experiences resemble those of many graduate students—male and female alike. What I experienced as a rather brutal assault on my intellectual interests and abilities was I think no accident, but rather the inevitable result of the pervasive attempt of a profession to make itself more powerful by weeding out those sensibilities, emotional and intellectual, that it con-

siders inappropriate. Not unrelated is a similar attempt to maintain the standards and image of a discipline by discouraging the participation of women—a strategy experienced and recounted by many other women. Viewed in this way, it is perhaps not surprising that the assault would be most blatant in a subject as successful as contemporary physics, and in a school as prestigious as Harvard.

Perhaps the most curious, undoubtedly the most painful, part of my experience was the total isolation in which I found myself. In retrospect, I am certain that there must have been like-minded souls somewhere who shared at least some of my disappointments. But if there were, I did not know them. In part, I attribute this to the general atmosphere of fear that permeated the graduate student body. One did not voice misgivings because they were invariably interpreted to mean that one must not be doing well.² The primary goal was to survive, and, better yet, to *appear* to be surviving, even prospering. So few complaints were heard from anyone. Furthermore, determined not to expose the slightest shred of ignorance, few students were willing to discuss their work with any but (possibly) their closest friends. I was, clearly, a serious threat to my fellow students' conception of physics as not only a male stronghold but a male *retreat*, and so I was least likely to be sought out as a colleague. I must admit that my own arrogance and ambition did little to allay their anxieties or temper their resistances. To make matters even worse, I shared with my fellow classmates the idea that a social or sexual relationship could only exist between male and female students if the man was "better" or "smarter" than the woman—or at the very least, comparable. Since both my self-definition and my performance labeled me as a superior student, the field of sociability and companionship was considerably narrowed.

There was one quite small group of students whom I did view as like-minded and longed to be part of. They too were concerned with foundations; they too wanted to know why. One of them (the only one in my class) had in fact become a close friend during my first semester. Though he preached to me about the necessity of humility, the importance of learning through the tips of one's fingers, the virtue of precision—he also listened with some sympathy. Formerly a Harvard undergraduate, he explained to me the workings of Harvard and I explained to him how to do the problems. With his assistance, I acquired the patience to carry out the calculations. We worked together, talked together, frequently ate together. Unfortunately, as the

² Indeed, most people then and later assumed I had done badly—particularly after hearing my story. Any claims I made to the contrary met with disbelief.

relationship threatened to become more intimate, it also became more difficult—in ways that are all too familiar—until, finally, he decided that he could no longer afford the risk of a close association with me. Out of sympathy for his feelings, I respected his request that I steer clear of him and his friends—with the consequence that I was, thereafter, totally alone. The extent of my isolation was almost as difficult for *me* to believe as for those to whom I've attempted to describe it since. Only once, years later in a conversation with another woman physicist, did I find any recognition. She called it the "sea of seats": you walk into a classroom early, and the classroom fills up, leaving a sea of empty seats around you.

Were there no other women students? There were two, who shared neither my ambition, my conception of physics, nor my interests. For these reasons, I am ashamed to say, I had no interest in them. I am even more ashamed to admit that out of my desire to be taken seriously as a physicist I was eager to avoid identification with other women students who I felt could not be taken seriously. Like most women with so-called male aspirations, I had very little sense of sisterhood.

Why did I stay? The Harvard Physics Department is not the world. Surely my tenacity appears as the least comprehensible component of my situation. At the very least, I had an extraordinary tolerance for pain. Indeed, one of my lifelong failings has been my inability to know when to give up. The very passion of my investment ruled out alternatives.

I had, however, made some effort to leave. At the very beginning, a deep sense of panic led me to ask to be taken back at Brandeis. Partly out of disbelief, partly out of the conviction that success at Harvard was an invaluable career asset, not to be abandoned, I was refused, and persuaded to continue. Although I had the vivid perception that rather than succeed I would be undone by Harvard, I submitted to the convention that others know better; I agreed to suspend judgment and to persevere through this stinging "initiation rite." In part, then, I believed that I was undergoing some sort of trial that would terminate when I had proven myself, certainly by the time I completed my orals. I need be stoic only for one year. Unfortunately, that hope turned out to be futile. The courses were not hard, never became hard in spite of the warnings, and I generally got A's. But so did many other students. Exams in fact were extremely easy.

When I turned in particularly good work, it was suspected, indeed sometimes assumed, that I had plagiarized it. On one such occasion, I had written a paper the thesis of which had provoked much argument

and contention in the department. This I learned, by chance, several weeks after the debate was well underway. In an effort to resolve the paradox created by my results, I went to see the professor for whom I had written the paper. After an interesting discussion, which incidentally resolved the difficulty, I was asked, innocently and kindly, from what article(s) I had copied my argument.

The oral exams, which I had viewed as a forbidding milestone, proved to be a debacle. My committee chairman simply failed to appear. The result was that I was examined by an impromptu committee of experimentalists on mathematical physics. Months later, I was offered the following explanation: "Oh, Evelyn, I guess I owe you an apology. You see, I had just taken two sleeping pills and overslept." The exam was at 2:00 P.M. Nevertheless, I passed. Finally, I could begin serious work. I chose as a thesis adviser the sanest and kindest member of the department. I knocked on his door daily for a month, only to be told to come back another time. Finally I gained admittance, to be advised that I'd better go home and learn to calculate.

My second year was even more harrowing than the first. I had few courses and a great deal of time that I could not use without guidance. I had no community of scholars. Completing the orals had not served in any way to alleviate my isolation. I was more alone than ever. The community outside the physics department, at least that part to which I had access, offered neither solace nor support. The late fifties were the peak of what might be called home-brewed psychoanalysis. I was unhappy, single, and stubbornly pursuing an obviously male discipline. What was wrong with me? In one way or another, this question was put to me at virtually every party I attended. I was becoming quite desperate with loneliness. And as I became increasingly lonely I am sure I became increasingly defensive, making it even more difficult for those who might have been sympathetic to me or my plight to approach me to commiserate. Such support might have made a big difference. As it was, I had neither colleagues nor lovers, and not very many friends. The few friends I did have viewed my situation as totally alien. They gave sympathy out of love, though without belief. And I wept because I had no friend whose ambition I could identify with. Was there no woman who was doing, had done, what I was trying to do? I knew of none. My position was becoming increasingly untenable.

Had I been married, would I have fared differently? I came to believe not only that marriage offered the only support possible, but even more, that my failure to marry was somehow the root of all my difficulties. But, it seemed, my career choice, and my attitude toward

it, discouraged all suitors. Where was the way out? Ideally, I had thought they would come together—physics and love. But they seemed to cancel each other out. My most frequent fantasy was that I would return to the Physics Department one day, victoriously, a physicist with a baby in my arms. My impoverished imagination could conceive of no better vindication. Even my fantasies conformed to stereotype.

What had happened to my dreams? Although I had, shortly after my orals, arranged to transfer out of Harvard at the end of the second year, when that time came, my hopes and plans (not to speak of momentum) were too thoroughly shattered for me to consider going elsewhere. After two years of virtually continuous denial of my perceptions, my values, and my ambitions—an experience that might then have been described as brainwashing, and ought now be called schizophrenogenic—my demoralization was complete. Feeling pushed to the wall, I decided, midyear, to give up physics and return to a world I realized must still exist, somewhere outside. Though I remained officially enrolled in graduate school in order to collect my monthly stipend, my commitment to physics was over. Even before I stopped attending classes formally, this change of heart was visible enough to trigger a remarkable change in my fellow students, who became, overnight, friendly and sympathetic. Clearly, I was no longer a threat. Ironically, at the end of my second year, during which I had done virtually no work and attended few classes, I still got A's. I include this as a comment on the grading system at Harvard.

I recognize that this account reads in so many ways like that of a bad marriage—the passionate intensity of the initial commitment, the fantasies on which such a commitment (in part) is based, the exclusivity of the attachment, the apparent disappearance of alternative options, the unwillingness and inability to let go, and finally, the inclination to blame oneself for all difficulties. Although I can now tell this story as a series of concrete, objective events that involved and affected me, at the time I eventually came to accept the prevalent view that what happened to me at Harvard simply manifested my own confusion, failure, neurosis—in short that *I* had somehow “made” it happen. The implications of such internalization were—as they always are—very serious.

Now I had to ask *how* I had “made” it happen—what in me required purging? It seemed that my very ambition and seriousness were at fault, and that these qualities—qualities I had always admired in others—had to be given up. Giving up physics, then, seemed to mean giving up parts of me so central to my sense of myself that a meaning-

ful extrication was next to impossible. I stayed on at Harvard, allowing myself to be convinced once again that I must finish my degree, and sought a dissertation project outside the Physics Department.

After drifting for a year, I took advantage of an opportunity to do a thesis in molecular biology while still nominally remaining in the Physics Department. That this rather unusual course was permitted indicated at least a recognition, on the part of the then chairman, of some of the difficulties I faced in physics. Molecular biology was a field in which I could find respect, and even more important, congeniality. I completed my degree, came to New York to teach (physics!), married, bore children, and ultimately began to work in theoretical biology, where I could make use of my training and talents. This proved to be a rewarding professional area that sustained me for a number of critical years. If my work now begins to take me outside this professional sphere, into more political and philosophical concerns, this reflects the growing confidence and freedom I have felt in recent years.

Inner conflict, however, was not to disappear with a shift in scientific specialization. While it is true that I was never again to suffer the same acute—perhaps bizarre—discomfort that I did as a graduate student in physics, much of the underlying conflict was to surface in other forms as I assumed the more conventional roles of wife, mother, and teacher. The fundamental conflict—between my sense of myself as a woman and my identity as a scientist—could only be resolved by transcending all stereotypical definitions of self and success. This took a long time, a personal analysis, and the women's movement. It meant establishing a personal identity secure enough to allow me to begin to liberate myself from everyone's labels—including my own. The tension between “woman” and “scientist” is not now so much a source of personal struggle as a profound concern.

After many years, I have carved out a professional identity very different from the one I had originally envisioned, but one that I cherish dearly. It is, in many important ways, extraprofessional. It has led me to teach in a small liberal arts college that grants me the leeway to pursue my interests on my own terms and to combine the teaching I have come to love with those interests, and that respects me for doing so. It has meant acquiring the courage to seek both the motives and rewards for my intellectual efforts more within myself. Which is not to say that I no longer need affirmation from others; but I find that I am now willing to seek and accept support from different sources—from friends rather than from institutions, from a community defined by common interests rather than by status.

As I finished writing this essay, I came across an issue of the annals of the *New York Academy of Sciences* (March 15, 1973) devoted to "Successful Women in the Sciences." The volume included brief autobiographical accounts of a dozen or so women, two of whom were trained in physics and one in mathematics. Because material of this kind is almost nonexistent, these first-person reports are an important contribution "to the literature." I read them avidly. More than avidly, for the remarks of these women, in their directness and honesty, represent virtually the only instance of professional circumstances with which to compare my own experience.

It may be difficult for those removed from the mores of the scientific community to understand the enormous reticence with which anyone, especially a woman, would make public his or her personal impressions and experiences, particularly if they reflect negatively on the community. To do so is not only considered unprofessional, it jeopardizes one's professional image of disinterest and objectivity. Women, who must work so hard to establish that image, are not likely to take such risks. Furthermore, our membership in this community has inculcated in us the strict habit of minimizing any differences due to our sex. I wish therefore to congratulate women in the mainstreams of science who demonstrate such courage.

Their stories, however, are very different from mine. Although a few of these women describe discrete experiences similar to some of mine, they were generally able to transcend their isolation and discomfort, and in their perseverance and success, to vindicate their sex. I am in awe of such fortitude. In their stories I am confirmed in my sense that with more inner strength I would have responded very differently to the experiences I've recorded here. The difficulty, however, with success stories is that they tend to obscure the impact of oppression, while focusing on individual strengths. It used to be said by most of the successful women that women have no complaint precisely because it has been demonstrated that with sufficient determination, anything can be accomplished. If the women's movement has achieved anything, it has taught us the folly of such a view. If I was demolished by my graduate school experiences, it was primarily because I failed to define myself as a rebel against norms in which society has heavily invested. In the late fifties, "rebel" was not a meaningful word. Conflicts and obstacles were seen to be internal. My insistence on maintaining a romantic image of myself in physics, on holding to the view that I would be rewarded and blessed for doing what others had failed to do, presupposed a sense of myself as special, and therefore left me particularly vulnerable. An awareness of the

political and social realities might have saved me from persisting in a search for affirmation where it could not and would not be given. Such a political consciousness would have been a source of great strength. I hope that the political awareness generated by the women's movement can and will support young women who today attempt to challenge the dogma, still very much alive, that certain kinds of thought are the prerogative of men.

Evelyn Fox Keller

Joann Green was born in Philadelphia in 1938. She is the only child of Dr. Louis A. Soloff, who was born in Paris while his mother was en route from Russia to meet her husband in America, and of Mathilde Robin Soloff, whose sister Clara played the role of Nell in the Camden, New Jersey, production of *He Ain't Done Right by Nell*.

Joann Green attended Friends' Select School in Philadelphia, Wellesley College, and Radcliffe College. She worked at a boarding house and then as an apprentice in summer stock during high school. At Wellesley, she became director of the student theater. After college, she married and mothered. She did volunteer political work and avoided the theater, until the women's movement and her secret longings grew too strong to ignore.

She is now the artistic director of The Cambridge Ensemble, which she helped found in Cambridge, Massachusetts. There, she has directed several American premieres, including works of Peter Handke and Gertrude Stein, and several original adaptations, among them *Gulliver's Travels*. Her production of *Tales of Chelm*, for children, is presented free in hospitals.

The Cambridge Ensemble is supported in part by grants from the National Endowment for the Arts and the Massachusetts Council on the Arts and Humanities. The theater is the recipient of the Association for Performing Arts 1975 and 1976 awards for excellence in theater.

Joann Green lives in Cambridge with her two children, Shoshanna, twelve, and Jonas, eleven.

Kay Keeshan Hamod, a historian, was born in Omaha, Nebraska, in 1936.

"My mother, a teacher, and my father, an attorney, were both born in small Nebraska towns. Mother's family—in the sense of extended family—was very much aware of its pioneer background. Our forebears had come from Norway; Great-grandmother and her siblings were the first white children born in the "Shell Creek" area in Nebraska, lived in a sod house, confronted prairie fires, traded with Indians. Even now there is a family historian, and all the descendants assemble periodically for family picnics. My father's family was primarily Irish Catholic, except that Grandpa left the church after some obscure quarrel. Grandmother was a farm wife with six children, but she wrote poetry and steered her daughters toward professional work; one of my aunts was in charge of the American press staff at the Nuremberg trials."

She was raised in a small Nebraska town and attended St. Olaf College in Northfield, Minnesota. She received a B.A. in English Literature from Northwestern University in 1958; her M.A. in Liberal Studies from Valparaiso University in Indiana in 1965; and after a period of study at Oxford, her Ph.D. in Modern European Intellectual History from the University of Iowa in 1976. Her son, David, is a freshman at the University of Iowa. Her fourteen-year-old daughter, Laura, lives with Kay.

Evelyn Fox Keller is Associate Professor of Mathematics at SUNY at Purchase. She has published numerous articles in molecular biology, theoretical physics, and mathematical biology. She is currently writing on the ways in which science is shaped by its commitment to masculinity.

The youngest of three children, she was born in 1936 to Russian-Jewish immigrant parents who, following a long tradition, had sought to make their

lives in New York City. Opportunities were not plentiful in the mid- and post-depression years, and her father eked out a living in a series of never-quite-successful ventures in the world of delicatessens. He worked round the clock, with grim determination, as long as his health permitted. Her mother, sorely challenged by the difficulties of raising three children alone, remained home.

"Education provided the only visible means of progress, and all three of us children pursued success in our studies, ultimately shaping our lives around academic careers. Before their lives were out, my parents had the pleasure of seeing us all succeed, beyond both their dreams and their comprehension. Even their own lives had begun to acquire comfort, as my father's lifelong efforts began to pay off in the affluence of the fifties and early sixties.

"Once again, I live in New York, now with my children, Jeffrey and Sarah. Their father, from whom I am recently separated, lives close by."

Anne Lasoff, the oldest of three children of Russian immigrants, was born in Brooklyn in 1922 and has lived there all her life. "My father, who died in 1952, was a radical, an ardent socialist born before his time. He worked as a brick-layer; at the age of forty he was permanently disabled by an accident on the job. My mother, a practical, hard-headed woman, says she was never young, that she always had responsibility, even as a young child in Russia. In order to support the family after my father's accident, she opened a small retail store in which she worked until her reluctant retirement at the age of seventy-six."

For most of her life Anne Lasoff considered herself a typical high-school-educated, middle-class housewife and mother. Her only aspiration was to raise a happy family. She and her husband have four children ranging in age from twelve to twenty-eight.

About ten years ago, because of the family crisis she describes, she underwent a metamorphosis. She discovered a latent ability to write and a need to use it. She eventually returned to school to take writing and literature courses at the New School for Social Research in New York. Her essay, "Saturday's Mother," which discusses the impact of today's changing social mores on traditional family structure, was published in *The Indignant Years*, a collection of essays from the *New York Times*. Anne Lasoff says, "I'm both a participant and a journalist in the drama of family life."

alice atkinson lyndon was born in 1935 in Indiana to Charles and Elizabeth Hall Atkinson. Her mother has always been a housewife. Her father (son of farmers) has been principally a contractor, also a farmer, milkman, gas station owner, and real estate agent. Both have worked all their lives. "My mother's aunt wanted her to be a newspaperwoman, but my mother opted for marriage and Charles Atkinson, to my great-aunt's dismay."

alice lyndon is a product of three public schools: Eagle Township (Indiana) Schools, Indiana University, and the University of California at Berkeley. She also studied sculpture and architectural history in France and Denmark. She has taught at the University of California at Berkeley, the University of Oregon, and Wellesley College. She has traveled and learned a good deal outside of schools, and considers herself basically self-taught in sculpture and photography.

"My life today includes a lot of sculpture, an increasing number of negatives, one husband, Donlyn, three children, Andrew, Audrey, and Laura-Kate,