Taking the lead

Interview with Mildred S. Dresselhaus, Massachusetts Institute of Technology

The science community has long recognized Mildred Dresselhaus's pioneering research on the physics of solids and highly values her current work on carbon nanostructures. While researchers are familiar with her as a Professor of Electrical Engineering and Physics at the Massachusetts Institute of Technology, they may be less aware of her contributions to other aspects of the field. About nine years ago, she was interviewed for an anthology on women in leadership roles. Since she was the only scientist interviewed, her views presented a unique perspective from the usual assembly of political figures, CEOs, and university presidents for such collections. In the interview conducted by Mary S. Hartman, director of the Institute for Women's Leadership at Douglass College, the college for women at Rutgers University, and Martha A. Cotter, then vice chair for the graduate program of the Department of Chemistry at Rutgers University, Dresselhaus provides insight on how she became a leader and her choices on which activities to lead. This article contains excerpts of this interview, in which she speaks frankly about inspirations not typically discussed at scientific venues and shares her contributions to the science community as well as to society at-large.*

–Editors, MRS Bulletin

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Martha Cotter: You came from a situation of poverty and disadvantage and were offered little encouragement to pursue education.

Mary Hartman: What was it that made you set your sights on passing that entrance examination for Hunter High School [a very competitive high school in New York, then all-female], the experience of success that put you on the path to so much more success?

Mildred Dresselhaus: One of the overriding things for many who grow up in poverty is the simple desire to escape. I think it was sort of obvious to me that escape had to be through education. There is another side to my story that has to do with music school, which taught me a lot more than music by giving me an opportunity to meet people who were in easier socioeconomic circumstances. I was bound to ask myself, how do I go from where I am to where those kids are, and education was the means. It wasn't so much studying the violin, which I did and I'm still an avid player today. It was that cultural activities became an avenue to get to a new level. So what helped me is a vision of something different from what I saw around me.

MC: Let me back up a bit. You said you didn't have overall goals early on, save escaping poverty, and that you did not set out to be a leader. Was it then one goal at a time?

MD: Yes. Before I started high school, I had lots of menial jobs, jobs that everybody in our neighborhood would do for a lifetime. Working conditions were awful because people took advantage of little kids regarding both pay and working conditions. But this experience helped me in the end. People who have it too easy in early life have a disadvantage for later on, because they get to thinking that everything is going to be easy. Science is not that easy. You have to plug away to get at the laws of nature. They usually don't pop out at you, so you need diligence.

MC: Once you got to high school, was it easier?

MD: Well, it meant that I was mainstreamed all of a sudden. There was no particular discrimination against kids from the wrong side of the tracks except when it came to going to college and career planning.

MH: You mean to say that with that splendid high school record you weren't taken aside and encouraged to apply to various colleges?

MD: Oh, I did have a splendid record. But at that time, you know, and with no money, school advisers assumed I had to accept a simple college—not try for anything too fancy.

Hunter was a big school, like Rutgers, but also a little bit like Douglass College in that the students with some talents were given an unusual amount of encouragement.

Hunter cost five dollars a semester, which covered everything: tuition, lab fees, and books. We had a kind of all-college assembly at Hunter, where the president or the dean would talk, perhaps once a month. One message I recall very clearly, and which has in fact been a light of my career, was the following: "This free education is not free. We expect you to pay this back in service to society over your lifetime." I think that's a very good exchange for all concerned!

MH: I know that many distinguished graduates from Hunter are also very civic minded.

MD: Yes. Rosalyn Yalow [Nobel laureate in medicine] comes to mind. She's from about a decade ahead of me, and Gertrude Elion [another Nobel-winning scientist] is a decade beyond Rosalyn. We all have the same attitude and have discussed with one another how this message has influenced our lives.

Another message was also very strong. That has to do with the determination we developed at Hunter, the idea that somehow we would land on our feet and that we'd manage to figure it all out. What we didn't learn in the classroom, we'd learn by ourselves.

MH: Let me ask you some things about issues related to your lifetime in leadership, so to speak. You are, after all, an outstanding leader in research who early on achieved success and recognition. You have held many formal leadership positions in the profession. You were the first woman to chair your department here,

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you have headed many committees at MIT and on the national level, you are on government and industry boards, you're the president-elect of the American Association for the Advancement of Science, you're on the executive board of the National Research Council, you were the treasurer and first woman officer of the National Academy of Sciences….

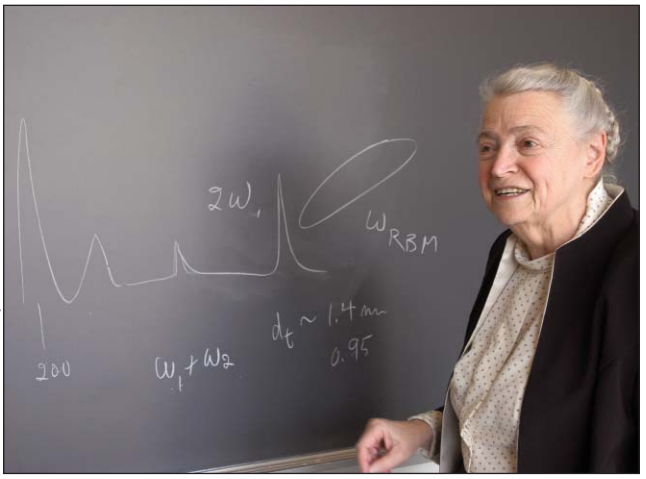

Photo credit: Donna Coveney/MIT

MC: And the former president of the American Physical Society![†]

MH: How have you approached these and many other leadership roles? Have you felt that you couldn't really do what needed to be done unless you were in a position of leadership? Or have people more often singled you out and said, "Mildred, we want you to head up this or that because it is very important and we know you would do the best job"? How do you balance these demands others have on you and also your feeling that if you are in a particular place, you will be able to make a difference?

MD: You have asked a lot of questions all at once. Let me start with something that you didn't ask. All the leadership positions that I have had have one common denominator: none has required that I give up my science work. You have to remember that, because there are a lot of leadership positions that I could have aspired to or been asked to do. But I've always discouraged anybody from going further with such discussions because I like my students and I like my research. I don't want to give them up.

So first, there's a limit to what kind of leadership stuff I will do. That's an important thing to understand and perhaps has something to do with why there aren't more women leaders. Maybe many of us don't really want to do it all the time. I think the best job I could have is the one I have. I don't think being head of X, Y, or Z or of some government agency—being a senator or something!—are things I really want to do, or are things that are anywhere nearly as interesting as what I'm doing.

MC: So you do not take any primary satisfaction from holding leadership positions per se?

MD: Well, I would be just as happy doing none of them. I would say the ones that I've done, I've done because I think it's very important to break through this glass ceiling and give a message to women that they can do it too. So I've done a lot of the leadership things out of duty, not because they really were things I wanted to do.

MC: In your experience, do women and men lead differently?

MD: As I said, I wouldn't have had any interest if I hadn't felt this obligation to other women and also the need to do such jobs well because that goes along with the responsibility to other women. There's another thing that I'm not sure is a woman thing or a personality thing, and you can be the judge. I look around to see what needs to be done. It isn't that I do the same thing with every organization. If I think an organization is doing poorly because of administration, I pay attention to that, or if it's inhuman to people I pay attention to that, or if its science is lagging I pay attention to that.

More of the men who have taken over various leadership responsibilities, I think, look at these jobs as a way of beating their own hobbyhorse. Whether they're into environmental issues or whatever, they get into these positions and they just pursue those hobbyhorses. That's not a good way to help the organization achieve success; you're doing that for yourself, not for the organization.

MH: On a related issue, women leaders in different areas have often stated that their jobs were more difficult because they were women—either because they were being watched more closely and expectations were higher or that people on the inside, women and men, made it harder for them to do the job than if a man were in it. Did you ever experience this?

MD: Not very much. Let me give you some reasons why. Most of my jobs have been science related. I think such jobs are different because they can be quantified more clearly. I took over the Materials Center at MIT. When I took over, we were about to lose our federal funding, a bad situation! I took the job out of obligation, but after thinking about it, I said to myself, "Well, maybe I could do OK here; at least I have some ideas about what's wrong with the place."

So I took a number of steps, not all so popular. Some steps were against my best friends. When you're leading something, friendship has to be second place, unfortunately. After it was over, I had a lot of respect and support, since I'd turned our situation around within one year. We went from almost losing our whole funding to being sort of the best. I got the supplemental funds that were available for high performance every time, and I worked hard to do this. People were sorry to see me go. But I had said to myself I would stay for just six years. I became president of the American Physical Society at that time, so I couldn't do both jobs anyway. By then, I had got the needed money for the Materials Center, and I did quite a few things against the advice of the National Science Foundation sponsors. Still, the fact that we were so successful scientifically meant that everybody started using the same methods and approaches at other schools. That is why I say that leadership in science is much more quantitative.

I really don't see setups for failure that women leaders have reported. Maybe in middle management positions that happens, though. I think women should be very cautious about taking positions like that. Often they are tokens, and things may work badly in such cases.

I think one of the things we should try to teach all our students is that everything that they might do in life is somehow connected with everything else; whatever they learn will be useful, not necessarily the specific knowledge, but the general approach, the methodology. □

[†]Dresselhaus has also served as the director of the Office of Science at the U.S. Department of Energy (2000–2001), and chair of the governing board of the American Institute of Physics (2003–2008).

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