Amy Wendt: Welcome to the first Denice D. Denton Memorial Lecture. And it is my distinct honor this afternoon to introduce our speaker Professor Nancy Hopkins of the Massachusetts Institute of Technology. And a few things before I hand the mike over to Nancy. I would first like to acknowledge the contributions that have made this lecture series possible – contributions from the UW Chancellor's Office, the Irvine Women Faculty Mentoring Program Fund, the Women in Science and Engineering Leadership Institute, and the Denice D. Denton Memorial Fund. I am Amy Wendt. I'm a faculty member in the Electrical and Computer Engineering Department and I am co-director of WISELI, the Women in Science and Engineering Leadership Institute, and I am part of the organizing committee for this event, the committee honoring Denice's memory, along with Vicki Bier, Lydia Zepeda, and Jenn Sheridan. And I'd also like to acknowledge all of the WISELI staff for their contributions in making this wonderful event possible. I would also like to say a little bit about Denice Denton. I got to know Denice when I joined the Electrical and Computer Engineering faculty in 1990 and she was an assistant professor in my department at that time, the only other woman in the department. And she went on among other things to be the first woman tenured in the College of Engineering at UW-Madison. And she went on from UW-Madison after a very distinguished career here; she went on to be Dean of Engineering at the University of Washington in Seattle and then Chancellor at UC-Santa Cruz before her tragic and untimely death in 2006. And she had a tremendous impact on this campus in many, many ways involving several passions of hers. And those included education, students and mentoring, diversity, and leadership. The latter being the topic of Dr. Hopkins's lecture today. And I'd like to read you a quote from former chancellor of UW-Madison, former Chancellor Donna Shalala, about Denice Denton:

She was bigger than life; she opened doors and stood in them to let others through. She mentored young scholars and students. Her enthusiasm for science was clear and infectious. She was a force, a magnificent force. She pushed the institutions she inhabited to be better than they wanted to be.

And that is the spirit of Denice Denton that we hope to keep alive through this lecture series. And after her death in 2006, a memorial fund was established with the goal of

endowing not only this lecture series but also a student scholarship that will go on indefinitely. And if you'd like to make a contribution to the fund, there are some pledge cards on the table on your way out, and I encourage you to pick one up. And our reason for establishing this lecture series – and let me apologize, my notes are really fragmented here, as a faculty member and a parent, I was faced this morning with an unexpectedly sick child and in the scramble to get her taken care of I left all of my notes for the introduction on my dining room table and so we scrambled to get something together, and my apologies for that. But we hope with this lecture series to not only carry on Denice's spirit but to use it as a mechanism to connect with our peers with a common interest to continue making this institution better than it wants to be. So with that, I would like to turn my introduction to Professor Nancy Hopkins. And I'm just delighted that Nancy agreed to join us today. When I originally invited her, she said, "Oh, I don't really do these lectures anymore and I don't have that much to say." But I think Nancy has a lot of interesting things to say. She is first, and foremost, a spectacular scientist and has made critical contributions to the field of genetics and I am going to paraphrase your work, and I am going to probably going to get it wrong. I haven't run this by her. But she has devised very clever ways to control gene expression in systematic ways to better understand how gene expression works. And her path as a scientist is a very interesting one. And I hope that she will share some of it with us today. And this path has led her to the position she's in today, which is the Amgen Professor of Biology at MIT. She's a fellow of the American Academy of Arts and Sciences. She is a member of the National Academy of Sciences and the Institute of Medicine of the National Academy of Sciences. In addition, since 1994, she has also worked to promote women in science. In 1995, she chaired the first Committee on Women Faculty in the School of Science at MIT. And in 1999, a summary of the findings of her committee, "The MIT Report on Women in Science," was published and widely publicized. She was present when Larry Summers made his famous comment about innate differences in the abilities of men and women and she had the courage to stand up and be vocal about those comments. And as a member of the National Academy of Sciences' Committee on Science and Engineering and Public Policy, she was instrumental in the formation of the committee that produced

the "Beyond Bias and Barriers" report, publication in 2006 that analyzes that status of women in academic science and engineering and proposes specific recommendations. So I would like to close here with a quote from a neurobiologist named Ben Barres. And Ben Barres made headlines with the "Nature" article in July of 2006 addressing sex and intelligence. And he has a unique perception as a transsexual male and reported on being treated differently as a male scientist and a female scientist. And I have a quote from Ben Barres about Nancy:

I'd like to say that I think Nancy Hopkins is a great American hero. She was ridiculed and depicted as a hysterical woman and this has to do with Larry Summers. But she was absolutely right to be angry about Larry Summers' comment denigrating women. It's tough to do what she has done. If more people had this kind of courage, the world would be a better place.

And I think that's what this event is all about. And I think it's really an exciting time and it's wonderful to have Nancy here at this moment when we're seeing more and more women in positions of academic leadership, including our new chancellor Biddy Martin, and during this time of a presidential campaign that has brought the topic of women in leadership to the forefront and with that, Nancy.

[Applause]

Nancy Hopkins: Oh, please, wow! Thank you so much. I've had a fabulous day here and I really appreciate all the people who took time to meet with me and I particularly appreciate Amy, inviting me and having the confidence in me that I could lead off in this lecture series to honor a person like Denice Denton. And I want to thank Jennifer – where are you, Jennifer? There she is. She has taken care of me from the time we started communicating and I've had just the best planned trip and a wonderful time here, so thank you to all of you. And I'm tremendously impressed by the women in this campus and what's been accomplished for women in science and throughout academia on this campus. It's had a national impact and I applaud what you've done. Denice, well, Denice was as you all know was inspiring, a leader, and a truly courageous person who had a

tremendous national impact on this problem. And I will talk a little bit about leadership at the end. Initially, I thought I would talk just about that but I'm going to talk about it at the end. So of course, I'll come back to talking about her. And she still really is very much a role model for us and an inspiration. So I'm going to begin and tell you just a brief introduction to what I'm going to talk about and then I'm going to tell you what I'm going to talk about. Okay? So, I'm 65 years old and it was my fate to live through two very interesting revolutions: one scientific and one social. And one of them I signed up for and one of them I didn't. I fell in love with science 45 years ago when I was a junior at Bradford College, which was then the girl's division of Harvard University. I decided to take a course in biology in my junior year and one of the professors was a man named Jim Watson. And this was the guy who discovered the structure of DNA ten years earlier. So even as an undergraduate, I could tell in one hour that this new field of molecular biology was going to transform our understanding of the biological world – I mean it was that obvious. And I thought this is the secret of life. So I rushed right over to Jim Watson's office, and I said, "I have to work here." So he said, "Okay." So I got to work in Jim's lab as an undergraduate. And it was 1963. The genetic code was still being cracked. I went on and got a PhD at Harvard, encouraged to do so by Jim. And ultimately become a professor at MIT. And I was right: it was a scientific revolution. And, P.S., molecular biologists actually did figure out the secret of life. Now, unbeknownst to me when I signed up to join the molecular biology revolution, I also was signing up for a second revolution at the same time and that one involved women's rights. And in my case the opportunity to actually get a job on the faculty of a great university. And that phase of the women's movement, which had been going on for centuries, I gather, really began the year after I discovered molecular biology in 1964, with the passage of the Civil Rights act. Exploded in the seventies – late sixties and early seventies – with the feminist movement. When I look back on all of this, I have to say that I would not have volunteered to be part of the women's movement. I really just ever wanted to be a scientist. That's all I ever really wanted. More surprising, perhaps, than that I didn't want to belong was that I didn't know it was necessary. It's really amazing. But I think now, as I look back from forty-five years' perspective, I'd have to say that the women's

movement produced as much change in society as the molecular biology revolution produced in science. And so, consider the following: as a student at Harvard, nine years undergraduate and graduate school, I never had a woman professor. Today the president of Harvard is a woman. So, it's extraordinary, and that's a lot of change. And, so, what I want to talk about today is the amazing amount of progress made for women in academic science that happened in my lifetime. And I think that my story and what happened to me is very typical of the women of my generation. I thought I was very unique. Of course I wasn't. I was just part of a wave of women who came through at a certain time. And so what happened to me, happened to most of the people in that wave. And let me tell you, though, the bottom line before I get into the actual things of what I learned. I think that the revolution in women's rights in academia has produced extraordinary progress for women in my lifetime. But curiously, this revolution is still incomplete – very frustrating. Women have risen from being zero, essentially, of the faculty in these great universities to being university presidents, but they're still not fully integrated in many fields of academia and that's true of other professions, as well. And I actually think that – it depends on which day of the week you ask me – I think that the pace could now be accelerated, and the reason I think so is twofold. One, we've learned a lot from this wave of women who came through. We know a lot about this problem. We really know from the work of the people here at WISELI. All of this extraordinary work has been done. We know a lot about what to do. And the other thing is that there are enough women in higher positions now to help accelerate this. So I think we should see an acceleration soon. I really do. And I'm very optimistic – most days of the week. I think Denice was, what was so remarkable about Denice Denton, many things were, but she was a pioneer way ahead of her time in realizing, for me, I think that a revolution in women's rights was needed and that women in our generation – mine and then hers – would have to fight this battle. And that really women themselves probably hold the key in the end to solving this. So, now I want to turn to talking about some of the progress that took place in my lifetime. And then I'll finally come to the point where I think we are and what needs to be done as we go forward. So the easiest progress to look at always in this situation is numbers and they're [inaudible]. So this graph shows the percent of MIT undergraduates

who were women as a function of time from 1901 to 2005. And what you see is that there were very few women – fewer than five percent – until the late sixties, early seventies and then the curve just goes straight up. And it's today about 45 percent, 46 percent undergraduate women at MIT. So, what is it that drove this curve up? And the answer is civil rights, affirmative action, and the women's movement is what caused this to go up. So, this really is what affirmative action looks like. So, you sort of have to always wonder when you do something as dramatic as this, what about quality for the people [inaudible] all these women were coming to MIT, what would happen to the quality? And the answer is –

[Laughter]

Nancy Hopkins: You're laughing, they really did. Anyway they don't anymore because what happens is, as you expand the pool guess what happens? The scores just keep going up and up, and it gets more and more competitive to get into college. And as every poor student knows that has to apply now, its hell because there are so many good students. And that's the sort of result of keeping expanding that pool. And that's what happened. So people got over their concerns and it's worked out very well. So this kind of curve led to the concept of a pipeline. Put people in one end, get people out the other. And people assume that if you just kept feeding women into the system that we would soon have more women going onto graduate school and more of them on the faculty. And remember when you see this curve at MIT, we're talking about women who are all interested in science and engineering and math. You don't go to MIT as an undergraduate unless you're very interested in math. So this curve really is the entrance of women into those fields and so that's a pretty dramatic change. So it's true that as this curve climbs, really [inaudible] almost the same time, the number of women who are going to graduate school also increased. And it increased nationally. So curves like this would apply for many universities across the country and it was true that it went up, the number of women getting PhDs went up. I don't have a slide that represents the PhD curve at MIT or nationally, but as I say, it would look very similar. Today at MIT, 50 percent of PhDs in

biology go to women, 35 percent of chemistry PhDs, 40 percent of earth science PhDs, and only math and physics remain mysterious. Twenty percent of women PhDs in math, and only twelve percent in physics. I don't know what on earth is wrong with physics. I give up on them.

[Laughter]

Nancy Hopkins: Okay. So, as sort of predicted, what happened is that this pipeline concept sort of began to work. And here's the graph that shows the number of women faculty in the School of Science as a function of time. And it begins in 1960 and it goes to 2005, I guess six. And the School of Science at MIT consists of six departments: biology, neuroscience, chemistry, math, physics, and earth sciences. And it has a total of about 270 faculty. And what we see here is that in 1960, there were zero women on the faculty at MIT and by 1970, there were two.

[Laughter]

Nancy Hopkins: And that number was about to increase tenfold to twenty just a few years later. And that increase [inaudible] and then it went up to about twenty or twenty-two. And then it stayed there for twenty years. And then it went up again to about thirty-two, four, five, six, and so forth. So, what is it that explains this curve? And this is a very complicated curve because it represents the sum of women who were hired, women who get tenure, women who don't, women who leave, and so forth. This is just the total number of women on the faculty. And this is – these numbers, you would be eight percent of the faculty would be women. Out of 270, we have about twenty-two. So that's about eight percent. So what is it that drove this very sudden rise? And the answer is the law Again, Civil Rights and Affirmative Action laws required universities to have plans to hire women onto the faculty. In 1971, the Secretary of Labor, George Schultz, under of all people Richard Nixon, signed what was called the Schultz Regs, which required universities to have written plans for hiring women. And so universities went out and

they hired women. And I was one of them, and I was something like number ten on this graph. I was about the tenth woman on science faculty at MIT. So, again, when this happened – and remember this is quite early on, when the pipeline was still quite small. The number of women from whom you could find women to hire was small. So don't you really have to worry about the quality? How did you go out and find these people? Did you scrape them up off the street? Where did they come from? So, you have to worry about the quality. One thing I'll say is that the women who were hired in the School of Science at MIT have gotten tenure at about the same rate as men from the beginning. So they hired people. Those people did well and about the same fraction got tenure as the men. Another measure of the success of the women is shown on this slide. The women who [inaudible] these women who were hired here, many of them, the ones who got tenure are still at MIT or they've gone on to comparable jobs at other universities. So you can say, well how successful were those women? And here is the data on the accomplishments of those women, who were the ones that ended up actually studying this problem. About fifteen or sixteen women became tenured, permanent members of the faculty. Two of them won the Presidential Medal of Science. Sixty-three percent have been to the National Academy. Seventy percent of them is the American Academy of for Arts and Sciences. So the women who were hired even in that early era were not lacking in quality. So I think that, you know, you have to say that we think of affirmative action in two different ways. Sometimes people think of it as a bad thing – well, not a bad thing but a thing that is sometimes needed to solve a problem, where you want to go out and lower the standards to solve the problem. But that's not what happened at these places. They went out and found people of the quality needed to do well at MIT, brought them there, and those people did well. And I think that, what sort of tells you right off the bat is you had to do something deliberate. Okay? So, in other words, this didn't just happen because time passed. It happened because lots of things caused it to happen. Civil rights, affirmative action, the law, the Schultz Regs, and the deliberate process of going out and finding those women and hiring them. Then the curve went flat. And rose again. Why did it go flat? And I think there are several reasons. Part of it was the pipeline was still not very full. There was the women still coming and getting PhDs, though the pool was still

small. It's hard work to hire people when they are a small part of the pool. It's hard work to go and find them. And so the processes that were used here were really driven by a kind of pressure. It kind of let up and people said, "Okay, well, we've got this problem solved, and now time will take care of this." And once again, it turned out that really time did not take care of it. Time never takes care of it. It always seems to take deliberate, constructive, thoughtful action to make these problems move forward. And this rise here, the second rise, occurred as the result of the action of the tenured women faculty in science themselves, noticing that they hadn't continued hiring going on for a long time and doing something about it. Now when people look at this, they always often say, "Oh well, that's MIT. Well, what to expect, you know?" But this is not the case because in fact this was happening at all universities. It wasn't just MIT whose curves had gone flat. So when we had eight percent women in our science faculty, for example, Harvard had five percent. And when this data was published, Harvard University said, "Well, we really glad that MIT is dealing with their problems."

[Laughter]

Nancy Hopkins: "Now it's true we only have five percent. But it's not those kind of problems they have over at MIT. Oh, no." You know? So, the truth of the matter is that this picture was a national picture. It really had happened that MIT was not an exception. So, okay, well that's the numbers and that's the progress. And I should just say that the dean who caused this to happen, a man named Bob Birgeneau, who left MIT at this point. And somebody else came along who took their eyes off the ball. And we have now another dean and accosted me in the hall last week to tell me that the curve was on the way up again. So this is good. So this tells us something about the numbers that changed in one lifetime. And now I am going to talk about the experiences of the women who were at the front of these waves that came through that were supposed to be the beginning of this pipeline. What happened to those women? Once the doors opened and women were allowed in, was this problem solved? Which is what really I think most people assume, including myself. And the answer turned out to be no. And I think as I

look back on it now, what is so odd about this problem is I, myself, believed that the only problem was that women weren't allowed to get jobs in universities. And all you had to do was remove that barrier, open the doors, let them in, and everything else would just take care of itself. And this turned out not to be the case. And what happened was that as that wave of women came through the system, they discovered a series of barriers that I really believe couldn't have been anticipated, were not anticipated. And what we've seen looking back over those thirty-five years is that women first had to identify the barrier – slow, painful process of identifying the barrier. Then they had to convince somebody there was a barrier – slow, painful process. Then they had to devise, everybody had to get together and devise some solutions. And then they had to test them out and then they had to see if they worked. And then if they worked, they had to install them and implement them and keep doing that for about twenty or thirty years. And this is what has happened repeatedly as women came through the system. So now I'm going to say – well, just refer to a few of these barriers. This is from a historical [inaudible] so here is a little history on what the barriers were. So if we go back to these students who were the first wave that came through, what was happening to these first wave of women undergraduate students who came through? What barriers did they encounter? And the answer, I think, is that the first thing they encountered was sexual harassment. So, when I arrived at MIT as a junior faculty member, there was a wonderful woman there named Mary Rowe. You probably know her. And she was an ombudsperson. And she spent the majority of her time trying to figure out how to get pin-ups of naked women off the backs of the doors and how to deal with male faculty who wanted to date undergraduate students. And people were saying, "Well, what can we do about this? This is nature taking its course. You put men and women together, what can we expect? Of course things are going to happen." Yes, so true, true. However, some people were smarter, well they were at least forward-looking people who were taking a lot of abuse, who were saying, "Yes, that's fine, but, you know, really, if nature takes its course, we're going to have these problems because how can a person work in an environment where their grade may depend on whether they accept a date with their professor or whether they go out with the person who is setting their salary?" And so it took, really, lawyers and feminist lawyers, people like Catharine

MacKinnon, who realized that you could not advance in a workplace where this was happening. You just couldn't. And therefore, it was a form of discrimination. So this was a tremendous insight to realize that these kind of things, which were perfectly normal, natural human behavior somewhere else, in the workplace were actually a form of discrimination and therefore there were illegal under Title VII. So the result of this was that today every workplace has to have guidelines and rules to educate people about sexual harassment and how to deal with it because it's the law. So that's just a typical example. Women come in, problem was discovered, somebody realized that this wasn't going to work. Now they try to convince people. In that case they were able to make it illegal and to set-up a bunch of rules and laws and regulations, which were put in place. But I'm sure you all know, sexual harassment has disappeared to a very large extent from the workplace but it has not disappeared. And so it's still true that all these processes still have to be worked on by committees of people. And so it's very tedious and exhausting. But there you are. That's what happened. So that was the first one of these so-called 'invisible barriers' was the sexual harassment one. And I think that the second one, okay you could say, "What happened to those students as they moved on into graduate school?" And, oh, I forgot to say one thing about sexual harassment. People always say, "Okay, well you were there. Were you sexually harassed because you were the age when people were being sexually harassed? You were one of those students; you were right in that age group." And I have to say that the answer is telling, okay. The answer is yes and no. So I'm going to – here's an example. This is a little bit embarrassing but it tells you exactly what the problem was. Okay, one day I'm an undergraduate. I'm a junior in college and I'm 19 years old. I'm sitting at my desk, little lab next to Jim Watson's office. And I'm sitting there writing lab notes. The door [inaudible] flies open and this man comes flying through the door. And he stands, before I know what's happened, the man is standing behind me, and he goes like this [Nancy grabs chest] and he says, "Oh, what are you working on?" In other words – oh and well, I did recognize immediately it was Francis Crick.

[Laughter]

Nancy Hopkins: So, of course. Now you have to say, he was visiting Jim that day to give a lecture. And so of course I knew he was coming and plus I recognized him from his pictures. That it was Francis Crick. And so you might say did I feel that I was being harassed? And the answer is no. I was thrilled that he was interested in my experiment.

[Laughter]

Nancy Hopkins: I was extremely embarrassed but the single most important thing was to make sure that he was not embarrassed. The great man could not be embarrassed. And I had to get out of it without letting him think that he had done anything wrong. And the most important thing was for me, was to refocus his attention back on my experiments so I could ask him some scientific questions. And the thing that's so interesting, as I look back on it is that, as a young person, if somebody had said this is sexual harassment – the term did not exist then. So how could I have known it was sexual harassment? I didn't even know the words. But it didn't seem, you know, like a problem and I think that it was – as a young person I didn't understand why a person who puts their hands on your breasts is probably not that interested in your experiment.

[Laughter]

Nancy Hopkins: And that's why it's so hard for young people to understand these things. They see that this is a little bit of a problem. Of course I handled it brilliantly. I mean, I went to a party that night at Jim's house. Francis was there. We had a wonderful time. Nobody said anything, nothing happened. No problem. I was able to interact with these people. It all went swimmingly, I thought. You know, I thought I handled that well. But you don't understand what it actually means. And unfortunately, as I say, there were smarter people than I was that did. Okay so the next problem women encountered is, they went on to graduate school and many of them found that they really were at sea and lost. They didn't have mentors. And everybody knew that mentoring was a terribly important

part of a man's career but people assumed that it would happen for women, I think, the way it happened for men. When I was a student, I never heard of a mentoring program. There were no mentoring programs. They didn't exist and people were simply mentored. You went in and the faculty were interested in you because you were a graduate student and they took care of you. I mean, Jim Watson was my mentor. And he told me what to do and how to apply to apply to graduate school and what to do next and where to go. He created a career for me and for many, many, many male and a few female students. And I think what happened is again when women came into the system, they just didn't look like the majority of faculty and there was a disconnect between the mentors and the mentees. And this natural process which was happening normally in hallways and men's rooms and wherever it happened, did not happen for the women. And so what we learned in the seventies and eighties was the importance of mentoring and having to have really formal programs that could actually take care of this problem. And this is one place where Denice was an absolute pioneer and became really a national leader in the importance of these and developing programs. And we went to Denice ultimately to get the programs that are used at MIT. Well, so, we got through mentoring. And then what was the next thing? So then we had now this wave of women who had come in and were now on the faculty and what was it that they were about to discover? And here I will tell you very much from a personal point of view what my own experience was. And I think again it illustrates why this is so slow and hard to fix these problems. So I joined the faculty thirty-five years ago and I totally believed that gender discrimination was a thing of the past. I thought it consisted only of the inability to get a job. My friend Barbara McClintock, a woman who ultimately won the Nobel Prize, could not get a job in a university. She worked in a research institute because you could only get a job in a home economics department if you were a scientist. So that was a thing of the past, and I thought, "Well, that wasn't the current era, that happened a thousand years ago. It has nothing to do with me. I'm in the post-Civil Rights era. I'm going to get a job. Not a problem." To me it was pretty obvious why there were so few women on the faculty at Harvard and MIT and that was that the men who were doing this fabulous, revolutionary molecular biology were working seventy hours a week. And if you wanted to have

children and be a mother, how could you possibly do these two jobs, right? So, I didn't think there were any invisible barriers. I thought there was one, big visible barrier: you couldn't be a mother and be a scientist. It was so obvious. I didn't even mention this to anybody, didn't discuss it. There was no one to talk to about it, anyway but it was just not even worth talking about because it was so obvious. You can't work seventy hours a work in the lab and also be a primary caretaker of children. Unless you are rich or whatever, who knows? So what happened to me was that I got married very early as people did in that era. And my plan, my little secret plan, was that I was going to be a scientist until I had a child and then I would quit and follow my husband, who was an academic, to wherever he got a job and give up science. That was my plan. Instead, when I was twenty-nine, thirty I got divorced. So I had to make a new plan. So I made a very conscious decision that I would not be married. I would not have children. I would just be a scientist. So, having made that decision, which was quite a complicated decision, I spent a lot of time thinking about it, clear cut, decided it, done deal. No problem. All I was going to do was be a scientist. The fact that I was a woman was irrelevant. I still didn't understand why there needed to be a feminist movement. I fled from feminists. I thought they were too radical. I thought they were embarrassing. I thought that we should stay away from them. I totally believed that if you were good enough you could make it on your own and if you complained of being discriminated against, it simply meant that you weren't good enough. That was where I was coming from. Now, you've got to remember this is thirty-five years ago. Okay? Sound familiar? Sounds like young people today? Well, that's what I thought thirty-five years ago, too. But, I was wrong. And it took me twenty years to figure out I was wrong and I began to figure it out by watching the treatment of other women in science. And there weren't very many of them. And I like to think this is part of the reason it took me so long to figure this out. The thing that I gradually observed by watching both women at MIT and women in science outside MIT was if a man and a woman made a discovery of equal scientific importance, that man and that woman were not valued equally. This was so completely counter to my profound belief that science was a meritocracy that I refused to believe this for a very, very long time. It just didn't seem possible because I thought we understood the importance of

scientific discoveries and that we always knew how to rank their merit, and therefore, it was not possible that it would matter who actually made that discovery. But after fifteen years of observing, I actually was certain that it was the case. These women who were really very, very outstanding scientists were not valued equally in that system. And once I realized that, I cannot tell you how demoralizing it was. I really, really felt demoralized. But the thing that kept me going and the thing that's most surprising is I absolutely knew that I was the one exception. That is to say –

[Laughter]

Nancy Hopkins: I was certain that this unfair judgment of my female colleagues did not happen to me. Of course everybody thought I was wonderful. Of course, I was having an extremely different time professionally. It's not that I was happy. I wasn't; I was miserable. I was having a very difficult time but in my own case, each time something went wrong I thought, "Ah, I've run into another difficult man. Very aggressive, very difficult person." Or maybe, you know, maybe it was my own fault. I thought it was my own mistake. I made a mistake. I thought you know if I was more – different personality and of course what I thought secretly maybe if I was a better scientist, maybe I wouldn't be having this problem. So that went on for twenty years, and I – still it was so hard to give up this belief that if you really did a great experiment, if you discovered the structure of DNA, they'd have to acknowledge that you were good. They'd have to give you the Nobel Prize. Unless your name was Rosalind Franklin. Then maybe they wouldn't.

[Laughter, applause]

Nancy Hopkins: Well, looking back on this, honestly it's extremely hard to understand why I was so slow to recognize that what was happening to the other women was also happening to me and that I too was being discriminated against. And believe me there were plenty of signs that should have tipped me off. So one day, for example, a

department chairman said to me that I was seriously underpaid. I said, "Thank you so much for telling me." I was thrilled that he had told me. I thought, "What a nice man!"

[Laughter]

Nancy Hopkins: It turned out I was not alone and the women in my department got a twenty percent raise right away. One day a woman who was washing the glassware for our laboratories came to me and said, "How come you have so little space and equipment compared to all these men?" And I thought, "Wow, it must be pretty obvious. That's so interesting." But I still didn't figure it out and I think the answer is that honestly, I was in denial. But I think so. And this was a very good place to be. Denial is good. Denial makes you happy. Because when I finally figured it out, I was really unhappy. So what happened is I'd gone into a new field of research and by then I was a full professor. And I needed a very small amount of space and equipment – tiny, two hundred square feet of space and a microscope. That was it. And this was so little by MIT standards and people were given this, you know, had so much more. And I tried for nearly a year to get this space and everyday I'd get up and think, "What good argument can I use today to try to get the two hundred square feet of space?" You know. And I knew by then – I was old enough to realize that this was not an outlandish request. This was standard, routine stuff that was given out. And finally, I don't know, it just dawned on me that the reason I couldn't get it was because I was a woman. The space tsar, the man who was in charge of space, told me he didn't think what I was doing was very interesting. He didn't know if I would be capable of running a larger lab.

[Laughter]

Nancy Hopkins: He said, "You know Nancy, some people are just more talented than others. Etcetera, etcetera." So you know if you're young, you believe that stuff. But by the time I was that age, I knew enough and had enough data to know this was really just not correct and it wasn't right and so forth. And finally the penny dropped. I realized you

could get a job and you could still be discriminated against. And I was by then fifty years old. So I have to say that when you realize, after all those years that the colleagues who you really thought you were one of and you finally realize that no, they really never thought of you the same way they thought of other people. And they didn't value you commensurate with what you had accomplished. It was so devastating that my first and only desire was to get out of there. I just wanted to retire and never go back to science. And this really serious depression set in, but very good news: it only lasted a week.

[Laughter]

Nancy Hopkins: And then, it turned to absolute rage and that was a really important thing. So, I knew the space tsar was wrong but just to be absolutely sure I did go and check it out with a lawyer. And took him all the data and everything. He said, "But don't deal with that guy anymore. Forget him." So I decided I would try to fix the problem: go to higher levels of the MIT administration. They have good people there. I'm sure somebody would listen to you. And that's when I began my trek up the ladder, looking for somebody who would listen to this problem, which I had made this important discovery that there was this invisible discrimination going on and people didn't know about it. And once they heard about it, I was certain they'd want to fix it. So, I just started up the administrative command. They weren't all that enthused, I can tell you. But finally in fact I got to the president's level and I decided to write him a letter. I was a little intimidated just to knock on his door, and say, "Well, by the way." So, I wrote him a letter and I said, "There's a lot of discrimination here. You really ought to do it. I'm sure you're a good man, you'll want to fix this." But before mailing the letter, I decided I better check it out with another woman and see what she thought. So I picked out a colleague named Mary-Lou Pardue who was a wonderful biologist. The first woman professor at MIT to be elected to the National Academy. And she read the letter and she, I assumed would think badly of me, thinking, "Oh God, this whining woman. Why is she complaining? If she was any good, of course she wouldn't have to complain." She said, "I'd like to sign this letter. I think we ought to go and see the president. I agree with

everything you've said." And that was a tremendously important moment for me. It changed my life and led to everything that else that happened at MIT.

[Pause]

Nancy Hopkins: Right. So what we did was, we went and talked to the other tenured women and that was when we actually first discovered how few people there were. So this was in 1994. There were 190 tenured men and 15 tenured women in the School of Science. This is the untenured professors. And so it was shocking to us to even discover there were so few but it made it very easy to find out what they thought about this problem.

[Laughter]

Nancy Hopkins: In fact, I insisted that we look for more. There had to be more women, I told them. They must list them separately. I really thought they must be listed on a separate page somewhere in the back, you know.

[Laughter]

Nancy Hopkins: So [inaudible] took the entire catalog and we managed to find two more women who were actually in the School of Engineering but they had joint appointments with Sciences. Good enough. We'll count them in.

[Laughter]

Nancy Hopkins: So, yes seventeen. And there were only sixteen and then we were two so it was only fourteen to talk to. It only took a day. You know. And basically they all said, "Huh, you recognized it, too?" And they wanted to sign on so that's what we did. So we got together. Over the summer, we made a bonded group and we got together and we

wrote a letter to the Dean of Science, who was Bob Birgeneau, rather than to the president. And we said, "Look, we've discovered this problem and it's a serious issue. It's serious for our students. It's serious for us. We'd like to study it so you can understand it and do something about it and fix it." So this time I went – went to see the Dean as a group and he really listened to us. And the president really backed him up. And we established a committee and I chaired the committee that studied the problem. And we worked together and it was an extraordinary experience. It took two years, a lot of data gathering, lots of interviews, blah, blah. Write a long report and what we discovered was that each generation of women had come to MIT believing then that discrimination was a thing of the past. Just like young women today think, "There is no such thing. It's a thing of the past." And they thought it was all solved but then, as they progressed – they also of course thought family was a huge, the problem. Family demands were the only problem. But then as they progressed through their careers and usually sometime after tenure, I'd say people by about late forties to fifties, about when they figure it out that something was wrong. They looked around at the men who would come in with them and they had different lives. And the women were successful scientists but they were doing it alone by working incredibly hard in an isolated way. And the men were networked together and they were doing extremely well. And it was easier for them because they were writing group grants and they were – they were just, they had a marriage, children, were outside. And companies were running the department, were running, had all the resources, in charge of all the resources. And women were in a different state. And I think what we found was there was this really unidentified barrier and the word we used that came to summarize it was marginalization. They were marginalized as they got older and progressed toward senior faculty. They became more marginalized and under-valued. And so to compensate for that – because they were very driven people – they just work, work, work, work. But it was a much different life. So they were working harder. They were out of the loop. They lacked access to the amazing resources that are available at MIT. And also we found, of course as I had found, when you did ask for them you really couldn't get them. So in summary marginalization, undervaluation, and exclusion lead to lower promotion and tenure rates, which leads to [inaudible] few or no women in

academic administration and that means the resources, compensation, space. So there are real consequences to this. So, what could you do? Well, what could you do? How do you explain this? I realize I am falling way behind in my lecture and I'm thinking I should cut out some stuff. Let's see. Which period of time do you not want to know about?

[Laughter]

Nancy Hopkins: Let's see. Well, let me say, what explains all this? Had I listened to psychologists, I'd have been a whole lot better off. What have they had to tell us? Well, a lot. What could explain the findings? And I think that certainly it was not intentional discrimination. I think that the answer to what happened to women as they went to these fields comes out of the field of psychology and unintentional gender bias and stereotyping. And I think many people now are aware of this. If you are, I will not go into it but its enormously important research in psychology. And this is now, there are tons of experiments that document that if you take a manuscript, you Xerox it, two identical – put John Smith and Jane Smith. Send them out for review and it comes back and says John's article is better than Jane's article. And what's really depressing is that it doesn't matter if you send it to men or women. They all think that John's better than Jane. Both men and women think that the man is better. And well, that's pretty discouraging but you can certainly see how that would be a problem in academia, where you're judged constantly. And everything you do and everything you have to do depends upon the merit of the thing you're being judged for. So you could see how that would slow you down a lot. And I think it's profoundly important research and I hope that, you know, gradually everybody in the world will become familiar with this research. And what's very interesting, recent research from a wonderful woman at Harvard, in psychology, named Mahzarin Banaji. At what age do people acquire the belief that women are inferior? When do they learn this bad news? Okay. This bad information? And psychologists have been try to devise experiments to test this, right? And it's very difficult with very young children. The bad news is they now think it's between three and nine months of age.

[Laughter]

Nancy Hopkins: The good news is they are looking, they're doing experiments to try to figure out what can you do about it? You know, can you actually – and do experiments where you say, look you show a picture of a woman in the lab coat, does that help, you know, the nine month old some?

[Laughter]

Nancy Hopkins: So, it's very fascinating, very important research. But it shows you why it's so difficult to change these deeply held cultural beliefs that we acquire very early on. Even if your parents have good attitudes and think differently, you still can't escape the cultural beliefs of your society. So what happened is that Bob Birgeneau fixed everything he could fit – oh, a summary of all that. Both men and women slightly overvalue work done by a man and undervalue work done by a woman. So what did Bob Birgeneau do? He tried to address all the problems we've identified about inequities and space. And they were very small issues but you know they can make you crazy. And he also created this bump, the Birgeneau bump. And what he did was, he said, "We've got to solve this problem with more women." So he went out and he was going to hire more women. And he said, "[Inaudible] to departments. Give me the names of great women." And he got on airplanes and he flew out to try to get these women to come to MIT. And he really produced that rise and the people he hired were terrific and half of them were hired with tenure, which is not so good – he stole them. And half of them were hired without tenure but about half have gotten tenure, the ones that weren't hired. And they are just outstanding people. A couple of them have already been elected, at an early age to the National Academy. They're really good. So, that was terrific. And we were thrilled. And the other thing he did that was enormously important was to put women in the administration. There'd never been a woman chairman of a department at MIT – science department or engineering department. He made associate department heads; he put women as head of laboratories. It had a huge, huge effect, just as you've seen here I'm

sure because it's the same that you've seen here. So that was terrific. And I think that we all went back to our labs and said, "Well, that was great." Of course, we all knew that if Bob Birgeneau left MIT we'd be right back where we started. But we were so happy to be better off, off we went. What happened was, by chance, the MIT [inaudible] been done by a woman that came to our [inaudible] and asked us to write a brief summary of your 150-page report, which was never made public. And so I wrote a twenty page summary for the faculty newsletter and we asked the president of MIT, Chuck Vest, to write a comment to accompany it because we didn't want him to look as though he had been blindsided by a bunch of women who had been acting behind his back, which we hadn't. We'd been working with Bob Birgeneau. So Chuck Vest wrote this comment that said he had always believed that discrimination was part perception, part reality. But now because this study, he understood the reality of it. And that comment, just like the [inaudible] MIT [inaudible] reported on the front page of New York Times: MIT [inaudible] inspires young female professors. And after that, it really became very well known. It was a very courageous thing of Chuck Vest to do. And you know you always have to love a person who did that. It was something unimaginable to us that it could have ever happened in our lifetime, but it did. And after that, lots of things happened to fix the problems that had been identified. And Chuck said, "We're not going to have anymore inequities in my university and I want this thing fixed." So what that consisted of, really, primarily, was a lot of committees – lots and lots and lots. And this shows some of them. They appointed me to a position to sit on the highest, the level that has the deans and the president and provost and created a council with the provost that I chaired with the provost. We had committees in each of the five schools of MIT and these were called 'gender equity committees' and they reviewed data on equity issues in those schools. And so they can deal directly with the dean. Can get things fixed in a timely fashion. The chairs of those committees meet as a group and we – so it made a network of women faculty in the kind of parallel of administration almost to take care of these issues more quickly. Recruited more women to administration, wrote guidelines on hiring and which we got from Denice, then at the University of Washington. And so I'd say that, you know, all that changed MIT very much. I mean it's really very, very, different.

And much, much better environment than it was. However, you know, did it really completely fix this problem? And the answer of course, is no. And when we were reviewing all of this, Chuck used to say – Chuck Vest used to say, "Well, Nancy." You know he would sit and think about this and we'd sit and have these meetings and we'd talk about how do you fix this? How do you fix this? And we didn't really understand I didn't know all the literature in psychology at that time. He said, "We can fix inequities. That's the easy part. But how do you fix the underlying problem, the undervaluation and marginalization of women that comes from these beliefs, from our own biases?" Perhaps the biggest advance in that area resulted indirectly from the MIT Report. Not in administrative actions of these type. But rather, it was the accident of the fact that after this report became public, I was asked to give a lot of talks on this topic as was Chuck and others. And one of them happened to be over at Harvard at this National Bureau of Economic Research conference. And the topic there was how to increase the representation of women and minorities in STEM fields. And the lunch-time speaker was the former president of Harvard, Larry Summers. He did not attend my talk but I did stay for his.

[Laughter]

Nancy Hopkins: His talk hypothesized that there were three reasons why women are not represented in large numbers at universities like ours. And he said there were three reasons. Women choose family over career. Though I certainly agreed with that, I was very disappointed that as the most powerful perhaps person in academia, you might argue – he's president of Harvard, he could say something and do something – that he wasn't out to try to solve this problem. Okay we've identified the problem. Now the trick is to try to fix it, to make careers and patterns where people can have families and great careers. That's the goal. So we'd hoped he'd come with innovative possibilities. As an economist you ought to have great ideas but unfortunately he just said, "This is why they leave." Then he said that they were genetically inferior, and I thought, "This may not be the talk for me." And then he said, "Well, harassment probably exists but it can't explain

this because if Harvard was discriminating against women, then some other university would hire those great women and then they would become a greater university. And so economic theory predicts that discrimination will disappear." And I thought, "Oh dear, this man has a lot to learn." So I just did leave that talk in protest. And it seemed to me it was just like being set back ten years. It was as if all this work we'd done and the progress we'd seen, which was so really wonderful for us, had disappeared. And I did not call the press, as is sometimes reported. However, I did know a lot of people in the press because of the MIT Report and it just so happened, by chance, that a woman named Marcella Bombardieri, who works for the *Boston Globe*, was emailing with me that day about an unrelated story where I had been providing her with some information about something at MIT was unrelated to this. And she said, "Oh by the way," by email, "How was President Summers' talk over at the NBER today?"

[Laughter]

Nancy Hopkins: And, I said, I wrote back, "Oh, God, I had to leave. My blood pressure, I had to worry about it. And it sounds like eugenics to me." So she said, "Do you think it's a story?" I said, "No, because I left early, I'm sure he must have had some way of pulling himself out of this hole he dug. I don't know but I'm too old to deal with this." So Marcella contacted another woman who was at that meeting, Denice Denton, and met with her the next morning over breakfast. And boy, did she get an earful. Denice brought along some other women who had been at the meeting and who were just appalled. And they told her, "Well, things got worse after Nancy left." So the *Globe* decided to go with the story in January of 2005. So we're talking just three years ago. This is three years ago, the president of Harvard believes that women are genetically less qualified to do math, science, engineering, be at the top of these professions. But this story did lead to a national discussion of the topic of gender bias. And it also led really to the Academy's deciding to do this report "Beyond Bias and Barriers," to review the literature, of which there was tons, saying he was wrong. And the end result was their efforts on this report, which was dedicated to Denice Denton and the committee was chaired by Donna Shalala,

was to say, "Family responsibilities impact women's careers? You better believe they do. True. Let's do something about it." Two, differences in terms of aptitude, no evidence to date despite decades of research. [Inaudible] So that was very helpful. And where do we stand now on that topic? I think the answer is if you take the speech that Summers gave and you were to hand it out to students today, what would they say? And I have no idea what the numbers would be but I know that when people read it, some people say, "I can't believe the president of Harvard actually said this," and other people say, "I see absolutely nothing wrong with this talk. Why isn't this man allowed to say this?" So, there we are. Either you get it or you don't. I'm sorry to say that but that's the way it is. Because that talk is what discrimination sort of looks like. So this brings me to the final part and I'm racing along because we're finally getting to leadership. Residual barrier is this unconscious bias that really underlies these problems. And here, first of all, I direct you to the absolutely fabulous memo that somebody else sent me, Abby Stuart sent me 'the memo to leadership,' I call it. "Advice to the Top" from the WISELI group. I can't think of anything better to read if you want to know who is it that is supposed to address a barrier like this. Okay when Chuck Vest said, "How do we deal with this? How do we deal with the fact that women are undervalued and there is this unconscious bias, a belief that women are less good? How do you deal with that?" And I think we didn't know at the time. We still don't really know but I think one thing we really think is that leadership is critical. And we need people from the top to do something about this. So I think we saw, for example, the impact that Chuck Vest's comments had. And they were enormous. And this, of course, does bring me back to Denice because Denice was the kind of person who really knew how to lead on this issue. So turning to the final topic, what about women in leadership positions? Because here we have a tremendous event in recent years, this is a milestone female presidents of [inaudible] and research universities over the past, you know, thirty years. The first one of any research university was Hanna Greg, University of Chicago in 1978. Ten years pass and we have Donna Shalala at the University of Wisconsin. Five years pass. We had Nan Keohane, Judith Good, Jill Jackson. And then we have a bunch of people coming along as a kind of group. And this is an astonishing and profound change, I believe. Astonishing. And what is the impact of

such a thing? And does it make any difference if you have women at the top? And one thing I'll say is an anecdote that I think says a lot. And that is, when Susan Hockfield became the president of MIT, she was introduced in a room like this and it was packed. In fact, the people were standing, the walls. And she came and she gave a lovely introduction and it was very exciting. And afterwards, I was accosted by a young professor and she said to me, "You know I never wanted to be a college president but until I saw Susan Hockfield walk into that room, I hadn't realized that I could be." And that is huge. It's just huge. So just the presence of these people, I think, is going to have an enormous impact. These are incredible people. I think they're all doing a superb job. I think you know some are taking really courageous stands. Shirley Tillman, Ruth Simmons, Denice of course. What about specific issues? Do we yet know the impact it will have on a lot of these issues I've talked about? And the answer is no. I called around, in fact, because I was going to give this talk and I wanted to know, what's the impact we know? And it turns out we don't have the studies yet to really know what is the impact of having them there, on the numbers of women, on the faculty, in the administration, solving all these problems that we talked about. I'm just going to leave you with one sort of thought. You might agree with me or disagree with me on this. I don't know what but I'd be interested to hear. I was very discouraged last summer in June to, by mistake – why did I even do this? Go the commencement issue of The Harvard Crimson to look up the graduation address of J.K. Rowling, which somebody told me was a terrific speech. So I thought, "Oh, I'd like to read that." So I go there and I go there to look this up and I discover the five most emailed articles in this commencement – Harvard puts out a student publication at commencement. And it's a thick issue. It reviews all the events of the year. And it has lots of articles. And they had J.K. Rowling's address, Bernanke's class-day address. They had Ted Kennedy receiving an honorary degree [inaudible]. And this was one of the most emailed, five emailed articles from this very thick issue which is seen by about a hundred thousand people. And I was quite discouraged to see this comment from one of Harvard's faculty members, Professor Harvey Mansfield. Feminists don't believe in diversity. They [inaudible] power by [inaudible] treated unfairly. Feminists don't want to argue. [Inaudible] exactly what got Summers in trouble.

[Inaudible] Hopkins [inaudible]. I was not pleased to be so treated by my alma mater. And first, so I called up a couple of women that I know in the higher administration of Harvard and I said, "You know, I am not happy about this at all." And I said, "What I'm particularly not happy about is, besides being insulted publicly and again by Harvard, is the fact that your students aren't really learning that this is what discrimination looks like. They don't get it, okay?" And how could they get it? Because although Mr. Summers is a great economist, he deserves every honor there is, after he made his speech the Harvard Corporation backed him. They did not say there was anything wrong. They did not ask, demand a transcript of this speech. They stood behind him, including Patty Ray, and now they give an honorary degree. When you step down they give an honorary professorship and so forth. And these women say, "Oh well, you know that's just the way it is." And I said, "Oh yes it is. But you know who then is going to educate the students?" They said, "Besides, you have to understand Harvey Mansfield is a very outgoing gentleman and one day he'll retire." I said, "Yes, that's fine," but the problem is that behind Harvey Mansfield comes Steve Pinker and Steve Pinker is not an old man. Steve Pinker, haven't backed you up. Okay.

[Laughter]

Nancy Hopkins: Oh, maybe I'm not allowed to say this.

[Laughter]

Nancy Hopkins: I'm being censored. You know Steve Pinker is not an old man. He's a young man. And in fact, the comments of Steve Pinker in his book, *The Blank Slate*, were, was the so-called data from which poor Larry Summers drew his remarks. So this is a young person, a powerful and influential person and he has attacked me repeatedly in the press. And I'm like sick of it. You know? [Inaudible] So now he and Alan Dershowitz teach classes at the law school about freedom of speech and academic freedom and, you know, but this is what discrimination is. And they certainly are free to say whatever they

want. But who is standing up to explain to students what's wrong with this picture? So I thought that I ought to take it upon myself to write to the president of Harvard and say, "I'm upset about this and I think you ought to do something about it." So I did.

[Laughter]

Nancy Hopkins: And well I wrote to Drew Faust, wonderful woman, feminist – I mean she was the head of Women Studies at Penn and she's [inaudible] great scholarly accomplishment. And understands these issues and has been – and so forth. And she said she really didn't think it was appropriate to reply to it because it would draw attention to it and she was working to make Harvard a more welcoming environment for women. And I said I was only sorry that it did not include me. And I just question, you know, if we don't, how will Harvard students ever understand what this issue is about because we don't have the courage to stand up to them and say, "This is what discrimination looks like"? Harvard Corporation didn't want to stand up to them and say, "This is what it looks like." And even though I admire Larry Summers very much as an economist and I appreciate the fact that he apologized and he said he was sorry because he had discouraged young women, still he has not explained why the comments he made have no scientific basis in fact. Despite tons of research, men [inaudible] they discourage women all the time. And so, I guess that's my question. This is the last of the barriers that I am familiar with, of the invisible barriers that we did not really know existed when I started out, and how are we going to take this on? And every one of these barriers you know all of the work that has gone into identifying them, to devising programs and then thirty more years of working on those programs, all has to be done for all of these. But maybe if we could just get rid of this one, it would help us to solve all of those others. And maybe we need more women leaders, like Denice Denton, who are willing to speak up and say what's wrong with this picture. And here's why we have to do it. This is just a photograph I love of some very talented young people. This is our future. And if we continue to drive half of them away, then, you know, what hope have we got? Thank you very much.

[Applause]

Audience member: I wonder what Pinker's response would have been if Summers said that the whites versus blacks.

Nancy Hopkins: Yes, I don't know Pinker's reaction on that but I think we saw the difference when Jim Watson made similar comments. I should tell you that Jim Watson remained my friend for forty years until the Larry Summers affair, when he came to my office and said, "Nancy, if you don't make a public apology to Larry Summers, you'll never see me again because Larry Summers was right. Girls can't do science."

[Laughter]

Nancy Hopkins: I was, of course, quite upset, and I said, "But I can't do that because here at MIT, fifty percent of the science majors are women that do just as well as men. So I really can't say that was really true." But he – you know, Jim again is eighty years old and he was on a book tour. He wrote a book and he also managed to insult me in his book. So I was quite upset about that too. And he was on a book tour and I was tracking his book tour because he was saying [inaudible]. And I thought, "Oh my God, he's going to say girls can't do science." You know? But instead he said blacks can't do science. Right. He was fired within two weeks. He lost his job within two weeks. And that, I think, was appropriate – I mean I love Jim [inaudible]. But in this area, he has aged and he hasn't really caught up to the reality of the science. I mean forget about what your biases are. This is not what science tells us, okay. It just ain't true. So it's bias. It's not science. And I think his institution did what you have to do and I think Harvard did not do what you have to do, really. But I do think there's a difference. I think, yes if Larry Summers had said that, I think he would have been fired within a week also. I think this kind of comment about women is still socially acceptable and I think part of it is women are not speaking up enough to say, to explain it. I think people just plain don't know.

Now, Harvey Mansfield, who knows what he's thinking? It is beyond me. He may know and not care. He may be [inaudible].

Audience member: Mildred Dresselhaus was an early woman at MIT. She was of course in engineering, not science, but was she any help? She preceded you, for example. Was she any help at all in setting the tone at MIT or being a mentor or a role model?

Nancy Hopkins: I think she's a phenomenon and she was a mentor for many, many, many women. If you look at, you know, the numbers of women in her department, they never changed at all. And I mean Milly is one of my heroines. I totally love her. But she's kind of like the Sarah Palin of her generation, right? Here's a woman with five children who is forty-four [inaudible]. Some people can do a lot more than others. I mean, what can I say? I think she just – so people used to say to you, "What's wrong with you? I don't know why you're having a problem. How come you don't have any children? Milly has four." So here was a woman who was, you know, the top of everything, won every prize, did everything right and managed to have four children. You know, I don't know. She's amazing. And she was part of our group actually and she signed our letters. I think she at first was very skeptical of it because she has a kind of attitude; I was so willing to be there. So what if I earned less money if my salary is less? So I don't really know how she managed it. She is amazing. I mean so every hundred years, along comes a Milly Dresselhaus. And that's great, but there's just not many Milly Dresselhauses. You know, she's amazing.

Audience member: How do you get the whole faculty, women faculty at MIT and Harvard – you said that it was getting flat [inaudible]. So what do you propose or what is to do now? Because there's a lot of qualified women, I don' think that's the issue.

Nancy Hopkins: I had an interesting conversation with your provost today and he asked me the same question: why do you think it's so slow? And I think that we know lots of problems. We know about these barriers that women have faced. And we know they

exist. There's no question about it. A [inaudible] reason that there aren't more women – that we don't know. We have no clue of the connection between it. But, I mean, it's not an unreasonable thing. And I think – where is [inaudible] is not here but she said something to me once. I think young women, they look around and they, somehow they sense the environment. They understand is this going to be a good life for me if I do this? And I think some of them are smarter than others. It took me to be fifty years old before I said, "I spent my life in the wrong thing because this is not the way to live your life." My guess is that some of them figure it out earlier. So I think the answer is we need to fix these problems. I mean a young person – a woman and a man – has to be able to look at this profession and say, "This is this going to be a great life." And instead they look and say, "How the heck have I chosen to do that? I see how hard they work. They can't get." I mean you see all these things and so it's still differential between men and women. More women are dropping out than men. A lot of men are also choosing other things. You know, but more [inaudible] it doesn't look as attractive to women as it does for men. So I think we need to keep fixing these problems and make it something where people are fighting to get in instead of dropping out. But I don't have the answers to the question of the numbers. And yet, as I say, if there are more women who are realizing what I realized when I was fifty, I can see why they wouldn't choose that. If you feel you're not going to be a full participant in this thing to which you're going to give so much of your life. Which, I had a discussion with a woman here today whose daughter was a Master's at MIT and got a PhD at Harvard and is now leaving. And I said, "Why?" She said, "The same reason. Because the climate is such that it isn't fun to be there." But that's just not okay. It's not okay. I don't care how many people are there because [inaudible]. So it's a problem.

Audience member: You know, I think that as I've looked at the sequence of reasons that you listed, the one that seemed most problematic to me in my professional life – I'm currently now retired form the clinical practice of anesthesiology – and that is the one of attitudinal, unconscious attitudinal bias. And several comments there, one of which is that it hurt so much to see it, that very often, in retrospect, I resorted to denial. And often,

what I would do is blame the victim. You know say, "Well in fact maybe she isn't as good as I think she is. Maybe they're really right. Sometimes, in fact, maybe a woman, for instance, when I first went into private practice there were very few women over at, in the anesthesia group over at Meriter Hospital. And in fact maybe sometimes they would choose somebody that they knew was liable to fail. This is something that I think has also happened. But the only thing that I can think that will really – I mean, until this day, every single instance that I see that appears to me to be an attitudinal bias, unconscious bias or discrimination. To this day, I still, it's still so painful to me that my tendency is to explain it away some other way.

Audience member: I was going to say that as a – even in the biotech community, I have a PhD and I've been seeing this same pattern occur in the industry as well. And you have to think about those fifty percent of women graduating in biology, biochemistry. The rates are there. Where are all these women going? Because they are not advanced CEOs or CSOs in the, they're not starting up companies, they're not getting the funding from venture capital. I think it is a very interesting question. [Inaudible] of course women are going in – my son's doing the college thing now and [inaudible]. And you know, young women they're being graded, hopefully, fairly. They come in, they're graduating, they're performing, they're doing their work. When they finish, you know, are they making this decision? [Inaudible] they make this decision because it's not [inaudible]. But it's very interesting I think then to say, well what are these women doing? Whether it's in academia or in industry. What are they choosing to do? And that maybe will help shed some light on [inaudible].

Nancy Hopkins: Yes. I don't know the answer and I agree with you. And [inaudible] do the study, I don't even know how to do it. And we never did it. Where do they go? And also it's different in different fields where they drop-out. In physics it's the first year of college when they disappear, [inaudible] in high school when they disappear, biology it's post-doc, between post-doc and – so you have to look at each field almost separately now.

Audience member: To answer that question, or my take on that question of why, you know [inaudible] it gets back to the pipeline issue. I think in addition to all the factors you identified and you stated there are family issues. And even the simple two-career problem, I'd just like to give two examples from UW. I believe the first woman who was tenured in Chemistry, Laura Loner, left here because [inaudible] tenure because her husband couldn't get a job here. And most recently, Physics had a female chairperson for three years. Her husband didn't get tenure right away and it took intervention at a higher level of university before he got tenure. It doesn't seem to be like the university – at a high level, I mean, eventually they caught on, but that institutional will that you know, when you have, if you want to keep women in faculty jobs, you have to think about the spouse. It's still unfortunately true that more women are married, have a spouse who is looking for an academic job or a high-level job. That's still more true than it is for men even though it's becoming more even. So I think the family issue is something that has to be dealt with. And that the institution could build the [inaudible].

Audience member: I have a question too about income. And I don't know how this breaks down in academia but in [inaudible] I know because it's [inaudible] such as [inaudible] men that are in these positions, commonly, very commonly do not [inaudible]. And you know when you think about, myself personally, I, my husband and I do have three children but my husband has sacrificed his career to help me move mine forward. Because it is an incredible challenge [inaudible] children. [Inaudible] it is to be able to have a very successful career for two people in the family wanting to pursue that [inaudible].

Colleen Hayes: I just want to thank you for coming and I want to pick up on something that you did and let people know here that it's very important. I am Colleen Hayes. I am the first woman [inaudible] Biochemistry and to date the only woman tenured in Biochemistry.

Nancy Hopkins: Speak up. Could you speak louder?

Colleen Hayes: So I am the first woman appointed in Biochemistry [inaudible]. And I am a contemporary in the essence of you coming through with your [inaudible]. And she and her colleagues there did something that I think is really, really important: they acted together. So I have at various times in my thirty-year career here taken steps to try and address problems but I did it by myself. And the outcome wasn't good. So I would like to encourage the people here at Wisconsin, when you see a problem, to do what Nancy and Joyce Duffy and the other women at MIT did. They got together, talked it through and acted together. And I think that's a recipe for success. And I can tell you that acting singly is a recipe for failure.

[Applause]

Audience member: More of a comment than a question, it occurs to me that one of the problems with the whole Larry Summers debate was that it got framed as feminists are not willing to listen to opposition. And we as scientists, have a particular talent, I hope, and as teachers, for presenting data. And there actually is an enormous quantity of data in the literature that examines the question of whether women are mentally and behaviorally different from men. And it's robust, it's published in peer reviewed literature, it's subject to all kind of scrutiny. And it's a great opportunity every time you step into the classroom and looking for an example to use in teaching, to draw on one of these studies. Even if the class that we're teaching has to do with something else, often you're just looking for a good example of you know why you want to look at the median rather than the mean. Well, if you can look at one of these notorious studies that purports to find a sex difference and then re-examined turns out to be looking at an edge effect instead. Okay, you've just taught some statistics but you've also carried some data across to your undergraduate audience.

Nancy Hopkins: Well, that's the thing [inaudible] but I basically you know asked the president of Harvard now to do. I think what could be a better discussion? I mean, what could be more important for students than to learn this? If it's not, if you never say anything, if these things happen and you don't draw our attention to it, then how can people learn it? And I think faculty should do it. And I think presidents should do it and I think deans should do it. You know, I agree.

Audience member: Data's what we've got.

Nancy Hopkins: Data's what we've got.

Audience member: My question is, it's all well and good that you're [inaudible] you want to get 50% women. But I come from the Mechanical Engineering and my department is five percent female in undergrad. Every year I've been here – I'm a PhD candidate; I've been here for eight years. Every year I've been here we have less women apply, less women enter, and less women finish. So what are we doing wrong? Because we have a mentorship program, we have the WISELI that works with engineering. Their office is in the ME department. How, how is cell biology retaining these women even to graduation? We can't even – in my graduating class in undergrad, was six women [inaudible]. And I can tell you a lot of those women aren't engineers. They're lawyers; all of them are patent lawyers. [Inaudible]

Nancy Hopkins: I mean that's a mystery. I don't know. I don't know the answer to your question; I can encourage you by telling you that the chairman of Mechanical Engineering is a woman.

Audience member: We have a female chair, too. And she is one of two professors.

[Inaudible]

Nancy Hopkins: Yeah, I mean, something I don't understand is if you look at the different fields of engineering – civil, chemical, mechanical, electric – you know mechanical and electrical are the ones that are almost no women. And civil and chemical have lots of women [inaudible]. I don't know, I don't know. I just don't know why that is. I do not know.

Audience member: Did you find anything like—

Nancy Hopkins: I don't know of anything that explains it.

Amy Wendt: I have some ideas but I don't have data to back them up. I think there's a real pipeline issue. I'm in Electrical and Computer Engineering, so this is an issue that's a big concern to me as well. But I think when you look back at the age range when girls are starting to make decisions about what they might want to pursue as career and there is data that shows that – and this was a study that was sponsored by the National Academy – a there is data that shows that girls have an interest in professions that involve helping people. And I think if you look at that kind of middle school age range and you look at the biological sciences, I think people see the medical profession as part of our daily lives. We all see doctors. And they seek direct connection between all of the biological sciences, extending to biomedical engineering, and this idea of helping people. And you look at the kind of activities that are done to recruit kids at this age range into engineering and what do they have? Battling robot competitions. And so I think the message that's going out to kids at that level is one that doesn't represent what engineers do in helping society. And in fact a freshman course was started this last spring in the College of Engineering by one of my colleagues, Professor Susan Hagness. And it's a course to introduce engineering to freshman in the context of society's grand challenges and to show how all of the engineering professions play a very important role in those challenges. And we hope to get that message out not only at the freshman level but earlier, before kids make the decision about where to, what professions to pursue in college. And we'll see if that has an impact on attracting more women.

Audience member: I just wanted to comment on another issue I've noticed and it's the [inaudible] issue and how you propose mitigating. It's the problem that I think females have shared with other minorities who are first trying to break through these kinds of discrimination, bias. It's the fear of being a representative of your group and the fear of as representative you might influence people's bias even further. To use myself as an example, I was recently an undergraduate at MIT and where nearly half of the college was female, I always felt well supported. And if I struggled with a difficult math and science class, I felt like, well, I was just another individual who was struggling with the class and you know, deal with it appropriately. But then coming here to a smaller graduate department, where the hard science is generally mostly men and few women. Only one of two women in my classes, I feel if I'm struggling with a class, I'm worried that I was one of two women in my classes—I feel like I'm struggling with class I'm worried that, you know, my colleagues will think, "Oh, she's struggling with class, more evidence that females are bad at math and science." And just, you know, that there might be other girls out there who have this fear in class and what do you think might be a good way to counteract that?

Nancy Hopkins: Well, I think the problem again is the bias that girls that can't do this. The same in fact [inaudible] this bias. And it actually influences performance. I mean experiments by psychologists that involve stereotype threat – if you think that people think badly of you, you do worse. And that was what was so devastating to me about Larry Summers. He's the president of the university of half women and he believes that? Because you know what the consequences of that are. That's what creates that fear. It's that belief. And that's why it's so critical that, you know, [inaudible] it's not a trivial thing. When I was young, of course I knew that. People thought girls couldn't do biology. Today they think, "Oh, girls love biology, they're people oriented." When I was young, they said, "We don't know if girls can be biologists." You know. Of course there were none in that science [inaudible]. But I thought, "Oh, well, so what? What does it matter they think? If you do well, you do well. If you don't do well, you don't do well."

Again, as I said before, I just didn't see the consequences of those beliefs and that's what the Harvard students today are saying. So what if Larry Summers thinks I can't do math? I'm majoring in math, I'm doing well. They don't understand the consequences of that set of beliefs. But over a lifetime, you know what they are. They're devastating. And that's why it's a serious thing. It's not a trivial thing. You know if it was just somebody saying silly things, so what? But it has real consequences.

Amy Wendt: Well, I think, we need to limit it to a couple more questions because Nancy has a flight to catch, one here –

Audience member: So, Dr. Hopkins, what did you do to make it by? Forty-five years and you come in there. What did you do to make it by?

Nancy Hopkins: Well you know first of all, I mean I think it's a good question. I think that's, the other hand is sort of that these women at MIT I worked with, they love science more than most people. I mean they're just off the charts. And I was one of those people. I mean I really fell in love with microbiology [inaudible], never ended. You know it was most of my life, except for my current husband – I got married last year.

[Laughter, applause]

Nancy Hopkins: But so, I think it was a passion that you really could not do without because it's such a passion. And the other thing is, I look back on it and I say, "Despite that the first twenty years of my life at MIT, I would not relive. But the last fifteen, after that group of women got together and supported each other it has been a different life." And after the president supported us, it was a wild, different life and I had a wonderful time. So, there were two different lives: before and after that happened. But the science was the sustaining thing, you know. But still, nobody should have to pay that price to do the thing you love. I mean it's ridiculous.

Audience member: I'd like to thank you again for the wonderful talk laced with wonderful humor. I also wanted to say that, you know, if you live with things like stereotype threat, the denial that you still deal with this threat no matter how long it took you to [inaudible]. But there's [inaudible] another element, which has to do with this deep cultural assumption that girls are supposed to be nice. And I wanted to bring that back around to Denice, because one of the things that we all, those of us who knew Denice, know is that she wasn't interested in whether or not people thought she was nice. And that made a big difference. If you can let that go, it's a big way, big step towards naming the stereotype threat. It enables you to name it and it enables you to get over denial because you don't have to worry about being perceived as nice. So it's just an additional thought that goes into those issues of the invisible barriers.

Amy Wendt: And with that, I would like to thank Nancy again. Not only for making the trip here and spending a wonderful day with us and sharing all her stories and her work, but also for the work that you've done in this area and for the impact that you've had that really has benefited us all and will continue to benefit us all.

[Applause]