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I will focus my comments to some degree on my interaction with minority Afro-American people. I grew up in New York City and, at least starting with grade school, we had many Afro-American students and the number increased with time. I guess in the early grades we had a small number and the neighborhood where I was living was changing in ethnicity. By the time I finished grade six and went to junior high school, we had a majority, maybe seventy percent, Afro-American students in my school. So I had a lot of contact with Afro-Americans as friends. I went to their homes and I got to know something about their culture, which was different from that in my house. I had some very close Afro-American friends, and my friends and I were part of this community group in a settlement house. We had various common activities. I had, for an average MIT faculty member, quite a large experience with Afro-Americans as a child.

When I went to high school, I went to one of the special high schools in New York City called Hunter College High School. There, the number of Afro-Americans was very small, but I continued living in a neighborhood that was predominantly Afro-American. I lived there through college. I went to college at Hunter College, which had a small number of Afro-Americans, but more than the high school that I went to. I didn't particularly have much contact with them either in high school or college. They were very, very small in number and they weren't focused in my particular areas of academic interest. There was one young Hispanic girl who was interested in my kind of

math-science stuff, so I interacted with her some. Her name was Rosario Morales. This goes back many, many years. But I just have no recollection of any black person in my high school class. It was a very small class. We only had eighty students per year. Maybe there weren't even any blacks, I don't remember, but if so it was a very small number.

Then in college I started out in elementary school education, where perhaps there were some more minority students, but later I concentrated in math and science—physics and chemistry—and there weren't any minority students. I had very little interaction with minorities until I became a professor, basically. When my kids were growing up, we had one minority family living in our neighborhood in Arlington. The father of the family, McLaughlin, was an MIT professor. I don't know if you remember him.



Edited and excerpted from an oral history interview conducted by Clarence G. Williams with Mildred S. Dresselhaus in Cambridge, Massachusetts, 6 November 1997.

*In mechanical engineering, Ronald McLaughlin.*

Ron McLaughlin. He was an extraordinary person and his wife was also extraordinary. I loved that family. That family was great. We lived about three blocks apart, and their daughter was in the same grade as my daughter. They were very good friends. They visited each other's houses and we had a good relationship.

The McLaughlins had quite a hard time, socially. As I remember, they were the only minority family in the whole neighborhood. They were high-intelligentsia people, and in every way very well-coordinated with the other people—who were predominantly professionals—who lived in the neighborhood, but they had a different color. Their social situation seemed to work out rather well until the kids became teenagers. As teenagers, their children had difficulty in the schools with social acceptance and so forth. So the parents put their kids in a private school and then they moved away. I lost contact with them. But I have a very, very positive impression of them, and their children had a very positive impact on my children. It was a wonderful family and I had quite a bit of dealings with them.

Shirley Jackson was one of the very early minority people I got to know at MIT. She surfaced, I think, just as I arrived at MIT in 1967. She was already here. She interacted with me a lot personally. She took one or more of my classes. We became life-long friends. At first, we had a mentor-student relation. I'm sure I am learning more from her now than she learned from me. Maybe she's mentoring me. She was an incredible person, and I remember the great respect that all the other minority students had for her, and the devotion that she had for them.

One of the young women I also mentored and who is also a life-long friend of mine, Aviva Brecher, was a very good friend of Shirley's when she was a student here. Aviva and I were two people to whom she could come and open up about all the problems that she was facing, and there were many.

*Do you recall some of the problems?*

She talked much about what she should do with her life. Women at that time were having not the greatest time at MIT. It was a question of acceptance and being taken seriously and all of that. Shirley had the extra burden of being of the wrong color. It was hard for her to be accepted.

Despite all of this, she was trying to provide leadership to the other minority students who were not even doing as well as she. She didn't think she was doing so well, but certainly she was hanging in there with some room to spare. She needed quite a bit of reinforcement at that time, just like many of the women students whom I mentored. She wasn't different from the other women students, but she had an additional big burden to face with regard to acceptance as an academic colleague in a white male environment.

We would talk about it. We would talk about it in terms of my feeling about supporting the women students here just across the board in all the departments, because there were just so few women faculty at that time. Shirley could see some of the parallels between women and minority students, and I think that helped her. I said to her, "Well, you know, I could write another paper or two in my research area." Of course, I've written many papers since coming here—that hasn't been a real problem—but at that time I said that probably I'd be remembered for my contributions to MIT more in terms of the people I mentored than in terms of all the papers that I've written. So if I write one or two less because of the time I'm putting into mentoring students, I think that that's a worthy tradeoff.

We would talk about that and I think it gave her a little bit of support for what she was doing. Perhaps she would have had a little higher grade in this course or another course or whatever, but I would tell her it was important for her to spend a little time to save some person who was about to fail, or leave, or do some awful thing to himself because of discouragement, et cetera. We used to have those kinds of discussions and I know Aviva had discussions with her too, not in my presence. Aviva speaks very fondly of those days and she feels that she—as a peer, and of the same age group—was able to offer a different kind of support and suggestions. I think I'm going a little bit off track with your question.

*I think you are doing exactly what is appropriate. Could you talk a little bit about your experience in your profession, particularly in your academic department? You've seen and worked with a number of black students. Have you seen any difficulties that they have faced in being able to go through the department that you would consider somewhat different from any other student?*

Yes, I believe that was true especially in the early days. I would say that the minority students that we've had more recently are more mainstream or mainline. There is much less academic difference in students of the '90s, and the minority students seem to have fewer problems socially with their peers. Shirley Jackson was a student of the '60s, or maybe very early '70s. She must have gotten her degree in '72 or '73, something like that. That was the pioneer era.

Calvin Lowe was an Afro-American student who was here in the early 1980s. I don't know the dates precisely, but we were working on graphite intercalation compounds at that time. That sort of dates it, and I remember some of the people he interacted with here. So he was here in the very early 1980s. He had a twin brother at Stanford, whom I know also. It's really hard to say which of them has done better. They've both gone far beyond anything we could have imagined at the time they were students. That's true of Shirley Jackson, too.

To extrapolate, I'd say that just about every single Afro-American student on my list here, in terms of any comparison you could make with peers here, their careers have been much more meaningful and they did a lot more than we could have expected from them. These students have simply had a large impact. Calvin Lowe is really a good example. His parents were sharecroppers or something like that. Calvin and his brother came from very, very humble backgrounds—these two boys with a lot of talent, going to the opposite side of the country, but they were always in touch with each other somehow. They were twin brothers in so many ways.

Calvin's preparation was very humble compared to expectations that we had of the students here. He struggled—he struggled a great deal. I'd say he struggled in two dimensions, one with the academics and the second with the socialization. He was really quite unfamiliar with dealing with white people. He didn't quite know what the expectations were, what the standards were. There were just lots of problems that he had to face that other students didn't. Some of this had to do with his black color. I think the McLaughlin children, as I knew them, didn't have many of the socialization problems because they had grown up with white kids all along. Maybe they didn't know black culture, and they only knew how to deal

with white people—that could be, and this could also have been a problem for them.

But the MIT experience that Calvin had really seemed very, very difficult for him at the time. I arranged a special position for him at the University of Kentucky as a starting assistant professor, when he finally finished his thesis at MIT. We had to work really hard to graduate Calvin. I think that he has understood this and he has appreciated the effort and all that we tried to do for him. So when he graduated from MIT, I tried to arrange the next experience to be one where I thought he would have a good chance of success. I managed to talk somebody into giving him a junior faculty position. They were anxious to hire a minority person. This was back in 1982, very unusual at that time. The reason I placed him at the University of Kentucky is that I had a former group member there, Peter Eklund, somebody five to ten years older than him, who was well established in the department—already had tenure, could look after him, take him under wing. Not only that, this former group member was doing research quite close to what Calvin knew. Thus, he could not only have mentoring, but a good infrastructure for starting an academic research career. I told his mentor, "Here is your charge. I took care of Calvin at MIT and now you should look after Calvin, and see that he succeeds." Of course, I wasn't there to check it out and this guy was twenty years younger than me. But I know he put a lot of effort into Calvin and tried very hard to run interference for him.

I would say that Calvin's first job probably didn't work out up to Calvin's expectations or their expectations for him, but he learned a huge amount about himself and what not to do. Peter helped him get another job and the next job was at a black college. You probably know about his career better than I do. I visited with him recently and he's now sort of Number Two man at Hampton University.

*That's right.*

When I visited him at Hampton, the most amazing thing was to see what's happened to this guy. I could see the imprint of MIT all over him. Many of the things that he could not do himself as a student, he held up for Hampton students as standards. He had very, very high expectations for the students and he had ways of helping them to

achieve those expectations, maybe better than I had when I helped him. He was very creative and imaginative. He was very much involved in developing an information system for the University and many other plans for doing big things at Hampton. He was terrific at going out and raising funds.

I had involved him in many people-related activities at MIT. It was clear from the beginning that he was a good people-person. As a graduate student, he had people skills that were far beyond those of the other students. Even though he didn't really know how to interact with the white community so well, he knew how to interact with vendors, especially minority vendors, and more with ordinary non-technical people whom we had to interact with, such as workmen. I could recognize this skill when he was a graduate student. I gave him responsibilities in people-related activities, and he volunteered for responsibilities in dealing with these kinds of people and situations.

Now that I look back at Calvin, he has made a career in that. He has been very, very outstanding at what he does. He's probably the best student administrator regarding personnel I have had. I must have had about sixty graduate Ph.D.'s I've trained up till now, and I think he's Number One when it comes to administration and how to organize people, except possibly for Ibo Matthews, a current minority student. Calvin is very talented at this, he knows how to go out to get money, he knows how to make a strategic plan and how to execute it. He may have learned some of these things watching me, but he picked up a lot of these fringe things while he was at MIT. I was sort of focusing on the science for Calvin and getting him through that. On the side, I gave him these other assignments because he was so helpful and good at it, and these side assignments gave him a feeling of accomplishment and helped him gain the respect of his peers. It was interesting how these sideline activities turned out to direct his later career—science management. He is really exceptional at it.

*You bring up a very good point about Calvin that I think deserves some elaboration. You say you were sort of surprised at all of the things that he picked up or has become. Is that based on the fact that he rose higher than you really thought that he could?*

I think so, because normally the students we graduate from MIT show some correlation between

their physics knowledge and where they land up. Calvin was able to use what technical expertise he garnered here in ways that were much more general. He learned a lot of things from us here, but it wasn't only "f = ma" type things. I mean, he did adequate science work to get by. I believe that I judge students a lot on how well they do with their research accomplishments. Calvin never really excelled as a researcher, either as a student or later on when he went to his first job. He is certainly not the only student in this category. But I would say the great thing about Calvin is that he did well enough academically to build a career for himself in academics. He recognized early on where his talents were. He recognized how to use the technical skills that he did have along with the other skills that he had to make an exceptionally good career.

So Calvin was an unusual student and he became an unusual professional. I think we had some dealings with Calvin between us.

*Yes, we did.*

You remember that. I think that this experience had some impact on him, but not enough, because he ran into a different kind of difficulty in the responsibility area when he was at Kentucky.

*Do you have a sense about what that kind of difficulty was and how it was different?*

Well, it was sort of not paying attention to his teaching responsibilities, sometimes not showing up for class, and being too loose about his academic responsibilities. He certainly didn't get these bad habits at MIT, because at MIT we are very fussy about professional responsibilities in dealing with students.

But, you know, young people go through changes in their lives. I mean, they're growing up when they're twenty and thirty, and they're maturing. I don't believe Calvin repeated any of these mistakes. All I can say is that since leaving Kentucky, Calvin has learned how to find out what the rules were and how to work with the rules as he proceeded, and in fact to make the rules work for him.

*Do you have any sense of why Calvin and Shirley and some of the others gravitated toward you?*

Well, all I can explain about Shirley, Calvin, and all these other Afro-American students on my list here, is that I'm a minority person also. I'm a different

kind of minority, but I am a minority person nevertheless. I have overcome some, but certainly not all, of the problems minority people face. I'm very positive that we as minorities have the power to effect change. I try to help women and minority students overcome obstacles by mentoring and by example. We could talk frankly.

Many of the faculty members, at least in the early days before we recognized affirmative action or whatever, didn't care to go the extra mile to help women and minority students. I was always interested in helping them, trying to do the best I could with them. The rewards have far exceeded any expectations, because both the women and minority students I mentored have had a huge impact individually and collectively. When I look back at the program at MIT in the minority area, I think it's pretty amazing. We have a great deal to be proud of. We were in there at an early time. From my standpoint, among the people who I think were leaders in my time was Jerry Wiesner, who had a very strong positive feeling that everybody should be given a chance. He felt that way about women and he felt that way about minorities also.

I agreed with him on that. I think my early experience of growing up in a neighborhood with many minority people helped me because I could see what they were like. They were not unknowns to me. I think those factors helped to lower the barriers, and therefore minority people came to me and talked to me about their problems at MIT, and they also sent their friends who were having problems.

There's another factor that I think is very important about minorities. I should mention my activities in the early '70s that I forgot about over here that I think had a big impact on minorities. I can't tell you the individual minority student names, but I do want to tell you about the academic subject I taught called "What is Engineering?" That program started about 1973. I did it for about three or four years and we worked up to about two hundred students per year in that subject, maybe more. Maybe three hundred students per year were taking that subject. The objective was to introduce freshmen and sophomores to what engineers do in careers.

I recognized that the number of women students was increasing in the early '70s. We went into a rapid rise in the enrollment of women. But

they were not going into the engineering school. Instead, they were going into certain selected departments and not into mainstream MIT. I thought this was a bad thing, because if women were ever going to become twenty percent or some reasonable fraction of the student body, which they actually became by the end of the decade, the enrollment of women would sort of bias or slant the focus of what MIT is all about. If women were to become a large part of the MIT organization and if they were in restricted academic areas, then women wouldn't be in other areas where MIT already had a large faculty and research commitment.

So it seemed to me that MIT should try to put some effort into mainstreaming women students so that they would feel free to go into all the academic departments. To address that issue, Sheila Widnall and I designed a special academic course. Sheila Widnall and I taught this course for several years, but I taught it most of the time. We launched the project together, but for whatever reason, I did more of the teaching than she did. We never kept score in terms of who did what, but between us we tried to cover the territory. She did the most she could do and I did the most I could do, but in this particular activity I spent more time than she did.

The reason we got into this course was to acquaint women with what was happening in the engineering school and telling them there was a place for them in engineering. We had an inordinately large fraction of the women students take that course when they were freshmen, just to explore many aspects of engineering as a career. A large fraction of women actually went into engineering, and many of them decided to go into some other major. That was fine. But in this way, many women at least had exposure to engineering in a friendly way, and I believe it was influential in broadening the distribution of women among academic departments.

At one time, I taught this subject two semesters a year—spring and fall—and we had a lot of students. Also coming to this subject were perhaps half or maybe two thirds of the minority students who were admitted in all departments. At these early times, minority students, like women, were tentative about going into engineering, by and large. They didn't know what it was, they didn't have dads who were doing it. So we had them

attend the classes—well, they elected to come—and they participated in the class.

In this way, I got a chance to know quite a few minority students and to mentor them. A lot of the activity in that course dealt with career counseling. It boiled down to mentoring, because we would have many discussions in class with guest engineers who would tell us what they did and how they became engineers. The subject was listed as a freshman seminar, so there would be a lot of discussion back and forth on different things. I think that this course also had some significant impact on getting minority students to take majors in the engineering school, or at least to take some fraction of a minor in engineering. In fact, engineering subjects are appropriate for some of the various non-engineering majors that we have at MIT. Some students minor in engineering along with a major in science or management or whatever else.

This subject, “What is Engineering,” was started in the early '70s. That was before Calvin Lowe's time. Later in the '70s, I had two African students. One was Augustine Mabatah from Nigeria, who just came around as would any other graduate student looking for research projects. I started him on a project that I selected particularly because I thought it wouldn't have such complicated equipment and he could make use of some of the laboratory experience when he went back to Nigeria. He did go back to Nigeria and he's still a professor there, after all these years. He's done well there. Physics was combined with optometry at his university, so he came back later to study optometry and we had some interaction when he came back to the U.S. to get another degree in optometry. He had no experience with optometry as a graduate student at MIT. He couldn't train optometrists on the basis of a physics Ph.D. here at MIT.

Augustine was a gifted student. He didn't have trouble with the academics. He was pretty much average with regard to getting through all the exams, completing a good thesis in the average time to graduation in that department. He integrated well into the MIT environment. He was a very pleasant individual and integrated well with the students in the research group and as a teaching assistant.

I believe that he knew this fellow Petero Kwizera, but I'm not really sure. Their overlap was

either non-existent or just by a couple of months. Kwizera was a guy from Uganda and Mabatah was from Nigeria. Those are different countries with different cultures, I guess, but in this country they were both Africans, so they had some connection to each other from our standpoint. I think they knew each other, and I believe that Mabatah might have had some difficulty at MIT before he came to me. I don't think I was his first supervisor. But once he came to me, he was with me for his whole stay at MIT. Wherever he was before, he wasn't there too long. We had a good relationship and he did a very good thesis and everything worked out well. I was particularly mindful of trying to train him in some kind of research direction that he could follow after returning to Nigeria. I tried to get him into an area that did not require a lot of very expensive equipment and procedures and clean rooms and all kind of infrastructure that he wouldn't have in Nigeria.

*So you sort of prepared him to go back in a way that suited his culture.*

I did so to my best knowledge of his future situation. He was very academically oriented.

My next student from Africa was Kwizera. They almost overlapped. In my recollection, they were very close in time. When Kwizera came, he worked on several projects, but much of what he did was quite similar to what Mabatah did. I didn't have another student who pursued that track except for Kwizera, and for the same reasons. Kwizera was really quite different from Mabatah. Kwizera was interested in the bigger context of science in society, and as a graduate student he took some courses, I guess, at the management school. There was once an opportunity to participate in a workshop on developing countries that I heard about, and I asked if they would accept a student. They said that they would, and so I recommended Petero Kwizera. They had people of all ages at this conference. Of course, they were all Ph.D. physicists except for Petero. He made a remarkably good contribution to that conference. It was sort of clear to me at the time that this guy would be somewhat broader than an average American student, and his career in Africa has been a little bit like that.

He couldn't go back to Uganda because Amin, who was a crazy man in Uganda, was after his family. It was a very stressful situation for

Petero. While at MIT, he got married to a young lady, a West Indian or Afro-West Indian, I don't know how to call her—not an American because West Indians are not American, but they are somewhat close. She was a graduate student in one of the colleges in the Boston area, and they met here in Boston. I guess her country was one of the West Indian islands, but they decided to go back to Tanzania. They went back there together. It was very difficult for her at first because the Tanzanians accepted Petero all right—it wasn't such a big difference for him to go to Tanzania rather than Uganda—but it was a big difference for her. However, things seemed to work out well, and she's still there. They made some kind of career together in Tanzania and they raised a family, and had quite a few kids. I think everything has worked out well for them.

I see him from time to time. He comes by now and then. He's been back to MIT for a couple of months' study now and then, I guess it was sabbatical leave or something like that. I could therefore see what he's doing in his career. What he does is a combination of technical student and more management-oriented things.

*You have visited?*

No, no, no. He has invited me, but I've never gone—no time. He said he'd stop everything that he is doing and give me a month's tour of the Serengeti and this and that, I guess. He likes me a lot.

He came to me for the first time when he was in real, real trouble. I remember how I met him. It was an experience that at the time scared me a bit, but it started out our relation and we've been good friends ever since. At the end of the day, it was a winter day, it was dark in my office. I was over at 13-306 at that time. I walked into my office. It was totally dark and, of course, I didn't see him. I turned on the light and here was this black guy sitting in my office. I didn't know him. Who was this guy? So I asked him, "What are you doing here?" This is the way the conversation started. He said, "I'm waiting for you." Well, that scared me even more. But then he told me that it wasn't what I thought. He wasn't out to get me in any way. It was that he had had a terrible experience with his prior thesis advisor, and he was about to have to leave MIT and this was a big disgrace for his country, for him, and for his family.

He had heard that maybe I could help him. At least somebody told him that I could help him. I said, "Well, we'll try."

By that time, I had had more experience with minority students than at the outset. In the end, I remember that I did rather well with him. He did a good thesis, and when he had his thesis defense, I still remember that people on the thesis committee were very pleased with his thesis outcome.

*What I hear is that a lot of the students were referring students to you.*

Oh yes, all the minority students who came to me were referred. I never went out looking for minority or other students. I never had a minority student whom I recruited. They all came through the grapevine. I believe that there is a very strong grapevine going on here. I don't know anything about it, but word gets around.

Elias Towe is another student who comes to mind. He was a student of electrical engineering. I had him in several courses. He was a good student. I was on some of his departmental examinations. He did very well on them. He was a talented guy, very mature, reliable, and he was good at many things. When he finished his thesis, MIT offered him some kind of junior faculty position here that was between electrical engineering and materials science. He was in a bad situation in that position because it was sort of created just for him. It wasn't a mainline position, and as a result, people were looking at him this way and that way. The expectations that they had were totally unrealistic.

I advised him to look for a job somewhere else. I told him that I didn't think this position was going to lead to too much. It's hard to tell people things like that. I told him anyway, and I tried to help him get a better job. I wrote a lot of letters for him. He soon got a position at the University of Virginia and now he's a full professor there. He is very well liked and he has a very good research program. Right at the moment he's a program manager at DARPA.

*I know the young man you're talking about. I just remembered—a tall, slender fellow.*

Yes, very well spoken. He was an African. He was originally from Uganda, but you could hardly tell. He spoke American, but he didn't have a Southern accent or anything. He spoke like an MIT student. He didn't have problems dealing with white people ever, but he was put into a lot of very, very bad

situations that were totally unfair to him. People just didn't understand his situation.

So he went to the University of Virginia. I think the University of Virginia was looking for some minority faculty members and he was hired a little bit on an affirmative action plan, but I think his contribution has in practice been very good. He met the qualification of a regular faculty member, like we want it to be. He's excellent technically, I would expect. I've visited the University of Virginia a number of times since he's been there and I only get very good vibes about his performance. We never discussed the minority issue with faculty members at the University of Virginia. He's just a good faculty member. He works hard, he has a lot of students, he gets good support—federal funding.

*Why do you think he didn't make it here?*

I think a person who gets a degree from MIT should go somewhere else at the outset. People here looked at him like a student and he wasn't given resources like a regular faculty member coming from the outside. He had a poorly defined position. It was between two departments and everybody was looking to the other one to help him out. His sponsor, Gretchen Kalonji, was having trouble with the departmental administration. She was his big advocate, but she was having trouble herself with her career at MIT, and I think some of that reflected back on him.

*Your advice was good, as usual.*

Well, I think that maybe it wasn't so easy to give him that advice. But it's always good to leave your institution after a Ph.D. and come back if you want to, after being gone for a little while, so that the people who are there can look at you afresh, so that you're not viewed as a student any more.

That was Elias Towe, and we're still in touch. He just called me up and invited me to give a presentation for his program. He wanted me to give a talk at DARPA about thermoelectricity. We talked about old times, but in quite positive terms. He always brings up old times.

I have Cynthia McIntyre on my list. I got to know her while she was an MIT graduate student. She must have been at MIT in the mid-'80s, some time around there. I had her in several classes, more than one class. I tried to encourage her especially. She had a bit of a self-confidence problem at first. After a while, her confidence grew. I think she's

doing rather well now. She's well respected, especially among minority physicists. She's active in science, but she's also doing a lot of things outside of just classroom teaching. Even when she was at MIT, she was kind of a broad person and she remains a broad person. I don't know what her career will be like, but I wouldn't be surprised if she branches out into quite different areas because I think she has talent in administration, people, and organizations. I guess that such a mixture makes quite a good career. Not all my people like a broad career, but some people.

Now we get to the present and recent people, in the 1980s. Gillian Reynolds got her Ph.D. maybe two or three years ago. It was curious how she got her job. I had dinner at the MIT president's house one evening, half a year or so before she finished her Ph.D., or maybe a year before. She had a lot to offer a potential employer. She was in a strong position, ready to look for a job, but we hadn't yet started looking. That night, I was sitting next to the head of R&D at Du Pont. The conversation came around to, "I wish we had some minority people on our technical staff, but they're just so hard to find." I said, "You know, I've got somebody in my group who's about to graduate. I think she would fit into your organization very well. Let me give you her name." So I gave him her name and a brief summary of her qualifications.

She soon got an interview and she got hired. She had several other interviews and job offers. She got to make a decision between good and very good, and she decided to go to Du Pont. She's still there. She's risen in the ranks. They put her in charge of their carbon nanotube program. This is the first project under her direction, and this R&D could possibly develop into a significant business. It has interesting science, it has business potential, and I know something about the field so I can offer this opinion. I therefore meet her at conferences from time to time. I was at a conference recently. She was the only black person there, the only Afro-American there, but you know, she handles all of this just fine. She loves her job, she likes Du Pont. She's bought her own house and is a happy camper.

She's a student who came to me when she had a lot of troubles. She didn't start her research work with me. She started somewhere else. I don't know anything about her prior history, but I know it was bad. She came to me really down in the



dumps, hating MIT and hating all the people here. She had some deep scars. You've seen that situation before, I'm sure.

*Yes, several of them have gone to you one way or the other.*

I think when she left MIT, she was a little bit more favorably disposed. We like to have happy campers. I don't like having a student leave and have bad feelings about MIT. I think that as the distance grows between her stay here, she sees more of the bright side of MIT and feels that MIT prepared her well, gave her good technical training to do her job. She has learned a lot of the other things at MIT that are necessary in a career besides just science—proposal writing, how to plan research, how to handle other people, and how to deal with peers and people less experienced than you are. She's a success story.

I have two students who are with me now, Ibo Matthews and Sandra Brown. You might know them.

*I've heard of them. I don't know them well.*

Ibo is a strong student. He just happens to be an Afro-American, but he's the strongest minority student technically that I've ever had. He's good in the science part of things, and he's extremely active in a zillion other activities. He headed up the National Black Physics Conference here. He has a talent for organization. He has a lot of good people skills. He's a graduate tutor at one of the dorms, the one where that girl got killed on Friday when crossing Memorial Drive. She was one of his charges. He was devastated by that incident. He went to the funeral in California. He's on his way back to MIT now.

He's a little bit like Shirley Jackson, twenty years later, with kind of broad interests. It's a little hard to figure out what he's going to do with his life. The other thing that Ibo has is a very deep interest in Japan. I've sent him to Japan on two different projects. He speaks Japanese. He has even written a piece for me for a study I was doing about his experiences in Japan. I wanted him to address how it is for minorities to operate there. Before he went, I asked some of my buddies in Japan, "How do you think it would be if I sent a minority student to work on a project?" They said, "Don't do it." Everyone said "Don't do it," and I had this terrible thing—what do I do? I got all this advice, "Don't do it."

But I did it anyway, and I would say that he made out very well in Japan, almost better than anybody else I sent there. He was well above average technically, in the upper echelons—top maybe five or ten students, on that order of magnitude. He did exceptionally well socially, he liked the experience very much, and he felt that the Japanese were very fair to him. He felt that his minority status actually helped him to relate to them better. He knew how it was to be in a place or in an atmosphere with different cultures. He could appreciate that they had a different culture from white Americans because he also had a different culture from the standard American culture. He emphasized that a lot. He felt that he had the maturity by the time he went that he could kind of take the lead in the minority status business—get that over with early in a conversation, you know, and then act like a regular guy. He could be more interested in their culture than most foreigners and be interested in how they do things, and he would not try to get them to do what he was doing.

*Because he knew better. He could appreciate it. He had been through it himself.*

Yes, he could appreciate multi-cultures and how people with different cultures could work together.

*Did you say you think he is one of the better students you've had?*

Yes. In general, I would say that he's one of the better students I've had, independent of Afro-American or anything. He's the best technically among the Afro-American students that I've had. I wouldn't hesitate in putting him in a faculty position somewhere. Right now, he wants to get some postdoc experience like the others do, which I think is good. He may want to go into industry. But whatever he does, I think that he's going to go into some kind of leadership job combining technical and management—a little different from Calvin, who is almost entirely management. I think that Ibo is much stronger in the science end of things, but he has a lot of the same skills that Calvin has. He doesn't have the same minority status.

*What do you mean?*

Well, he can deal well with people who are not minority people and feels comfortable with them. He deals with everybody. He went to UC

Davis, so he's been in a more broad spectrum of situations.

*Calvin came from North Carolina A&T, which is a totally black institution.*

Yes, and he grew up in a kind of black environment. I think that Ibo has been in a mixed community all the time. He's really interested in science and technology. He really loves it. I imagine that he'll stay with that at some level for a while.

Sandra Brown is my other black student presently. She comes from the West Indies. Her background is almost the same as Gillian Reynolds. I think Gillian sent her to me. These students bring each other to a degree. Sandra showed up one fine day and asked if she could join our group. She also was in some other group before coming to me. Everybody was in some other group. She was in some other group and didn't have a real good experience, so she came to me pretty early in her career. I would say she's about two years from being done and Ibo is about one year from being done. He must be one to one-and-a-half years ahead of her.

She's got a tremendously sweet personality. Everybody likes her and everybody depends a lot on her. Gillian was like that, too. Gillian was a person who did a lot, in a personal way, for the other students. She's spending the summer in Germany now. She's interested in Europe, in European cultures. She's been in the German program here, studying German, and she also can speak French. I don't know if this is common. She's now an American citizen, having been naturalized, but she's part of this new movement that is interested in exploring the world. So I'm helping her to get a position in Germany for the summer. She wants to be in industry. She says she's been in university all her recent life and she wants to see what life is like in industry. A black woman in German industry or in a German university, I don't know how it's going to work out.

*You make it your business to continue the legacy of yourself. You take these individuals and let them go where they want to go. Usually, these are people who go into places where they actually are unique, because the people in that particular arena are not accustomed to seeing people like that there. You have been the same way.*

We talk about that and I try to stack the cards so that they succeed.

*How do you do that?*

Well, for example, take Ibo. Ibo has been to Japan on two or three different assignments, maybe four assignments. I have worked things out with the professors and researchers there. Some of it has been in academia, some has been in industry. Then he was in the JAMS—Japan American Mathematics and Science—program. So he has done a lot of different things with the Japanese. But I do some ground work before he gets there, so that he has opportunities and is successful. I think that's important to do with every student when you send them abroad, not only for Afro-American students.

*What groundwork would you say you do?*

Well, the groundwork I do is we define exactly the problem that they're going to work on and what the expectations for them and from them are. The professor knows what he or she is expecting, so that the student has appropriate access to the equipment and he has some other student or researcher helping him get started with the use of the equipment and facilities. The students have always succeeded in accomplishing what we've discussed because the student and the professor both know what each is expecting and the students don't want to disappoint me or themselves.

Now, what that means in practice is that the students have to interact with the other students and researchers in the group where they are visiting. I sort of set up the visit schedule for them because I have other people I would like them to interact with while they visit the country, and they do this quite happily. Through this approach, the student gets a chance to visit four or five different locations and meet different research groups. He stays for two or three days at each place, and at the main research location he may stay for a month. There he completes his main project and different sized projects at the other places where he does short visits. I think that that's been a good approach. Then with the company, I arrange for a good supervisor. I select a top person there who speaks good English and has been to the West, so that the supervisor knows a little bit about the student's expectations. Supervisors tend to treat employees differently in Japan than they do in the U.S. I think it's important to realize some of these distinctions.

But I do that with all the students I send abroad. Ibo was not the only one who was given an opportunity to work abroad as a graduate student. One reason that you have to have rules is fairness. A second reason is accountability, since I often have foreign exchange programs such as the NSF exchange programs. I currently have such a grant, and I've had different grants in the past. These agencies want to have a report on what was accomplished on each trip. Well, I found that unless I arrange it carefully before sending them, the students don't accomplish much.

*It's amazing in one sense. You said that you do that for all students, and I'm sure you do.*

I don't treat the minority students differently.

*That is why they gravitate to you, I suspect, because they don't see any differences in terms of how you deal with them than anybody else. The biggest problem is when I hear students saying that they are treated differently. They don't want to be given something as opposed to working on it.*

Well, not every student goes for foreign experience, only selected students. They have to be, first, quite senior because I won't send them when they would be a burden to the group where they're going. They have to be a good contributing research member. They have to gain a certain level of technical competence before they go and they have to be interested in going. The receiving person meets them first, so they already know who's coming. In this way, it's not a surprise to them. The student and receiving person have usually already worked together, usually published a paper together before the visit, so that there's usually some established contact.

With the German visit, we're doing that one a little differently, because Sandra Brown started doing the arranging on her own for some reason and then told me after she started. I said, "Well, you should have told me to begin with, because I would have fixed you up with somebody I already know." But she started working things out with somebody on her own and tried to arrange a visit. We looked through the various things that this researcher worked on and we had some technical discussions before the visit started. When the professor is more actively engaged in the planning stages, the outcomes are usually better. However, we should not discourage students.

So what I did with Sandra regarding this visit is that as soon as I heard she wanted to do this trip to Germany, we selected a topic that made sense. However, as it turned out, she worked on something else that was in her background before coming to MIT. They're doing some things at this German company that will help Sandra with her thesis work. She knows enough about research generally and she has enough background so that she can talk to all the people around her when she's in the German company. She learned that from our group. Sandra is very good at interacting with all the members of our group, so she'll just do the same thing with them.

I took her to a conference recently. We went together and we roomed together. We were roommates. Sandra was very popular at the conference. In fact, she was the most popular student at the whole conference. I was in my room at night, but she was out there with the guys having a good time. I think that she's learned how to interact with a wide range of people.

I have students who interact strongly with visitors. We have a lot of visitors who come to our group. Some of the students are very shy and they don't know how to interact with the visitors. Maybe half of them interact strongly and they learn a lot from the visitors.

*Are many of these foreign visitors?*

Most of them come from different countries, yes. Some of them come for a few days and some of them come for months. Sandra is very interested in people from different cultures, and so is Ibo. They are outgoing, so they get to know these visitors on average better than the other folks.

I don't throw minority students into situations without some prior discussion. They interact with visitors on their own, but I encourage it. That's important for all concerned. They know it because, when they leave MIT, these are the contacts that they have worldwide and they use those contacts in their later careers after MIT. Also, race differences really disappear because they have a contact who introduced them. Minority students become regular guys that way. I think that it is really important for minority students to have these contacts worldwide.

*What advice do you have based on your experiences with black students? Your experience is quite extensive in comparison to the average faculty member.*

Well, I have three minority students right now. I have Ibo and Sandra and I have Joe Habib, who is of Egyptian origin. He doesn't look so much like a minority student. He's sort of on the fringe of looking like a minority person. He, however, does activities on his own in minority camps for Afro-American students and stuff like that, so he considers himself a minority student. He's going to be getting his degree.

We didn't talk about him before. He's a little different case because he doesn't look like a minority person when you look at him, but he does have many minority aspects to him. He went to poor schools in Washington, D.C. He came to MIT very unprepared and it was a culture shock for him here. He had a big shock on how it feels to work hard academically. He has never seen people work the way MIT students work. He's had a lot of troubles as a student with the academics and getting through this place. I think I'm going to try to get him some kind of postdoc position, and then we'll see. Maybe industry will be his first choice. We're at the point now of having his first *Physical Review* paper. It's taken a long time relative to other students in the group, but he has it and I think it's a good paper. I like it. It's taken a long time to get to that paper. We worked through many drafts, but it's there now and we're going to be sending it off to the journal this week or next week. It's at that point. Once he gets past that, I expect that we will make a phase transition with regard to becoming a professional, and then I will feel that he can start interviewing.

Until students get to that point, they're not in the category of looking for jobs. I don't want to embarrass the student or MIT, and I don't want to waste the time of the interviewer. We have some standards in reaching the final stages of the degree program. Joe has reached that point and we can now start talking about careers. We have talked about it a little bit, but I'm not really too sure what he wants to do. He's a guy that could go to academia if he wants. There are jobs for a person like him. If he does that, I think he should have a postdoc and get to see research at some other places.

*You have talked about all the students that you can remember.*

I'm not sure that they were all the students, but they're the ones I can remember.

*I'm sure they're not, because I remember at least one other. I can't remember his name, but I know he talked about how much you were helpful to him and how you worked with him, although he did not get what he came here for. I know that for a fact. That was about the mid-'70s, when I was down in the Graduate School office. And I know there are many others. Several others. You're very modest.*

I think I mentioned most of the students with whom I had a strong interaction. There were some other people when I was department head over in EECS in the early '70s. I made a special effort to have lunch or some kind of social interactions with the minority students. I think that was very useful, but I don't remember their names because we didn't work on any research problems together.

*What advice would you offer particularly to black faculty and black students?*

Let's start with students, because I think the students and faculty are kind of different issues maybe. For MIT, it is important for the Admissions Office to select students who will succeed, and I think you're getting much better at it. I think in the early times, back in the 1970s, some students who came here weren't well matched to MIT. I would say the ones I've seen in recent years are much better academically. For whatever reason, you're doing a better job in selection.

I think selection is important. All the students who come here, even the ones who don't make it, are very gifted students. Then if they don't make it, they have this burden all their lives that they didn't make it. We don't need that. I think it's better to try to match the student and the place, so that they're not so marginalized—or not so marginal.

I think some of the projects that you have are very good. You have sort of a getting-up-to-speed program for the undergraduates, and I think that's good. It shouldn't be only for minorities, and I think you do have other students who could join this early-bird program, students who have some deficiencies in their training. I think such an introductory program is a good program for minorities even if they are not disadvantaged—just to get to know the place and the people and to socialize. I think that's good. I think that especially during the freshman year, it's important to have some kind of activities for minority students—get-togethers where they can meet other minority and non-minority students. You also have a good tutoring

program. I would say that it's been good. I don't know if they all use it, or if those that should do so, but I think it's a good thing.

The most important thing is that MIT cares about them and that they're introduced into the network here, and that they make a network with each other. When they run into some kind of harassment situation, they can then discuss it with another student who has also run into a related situation before and say, "This is what we did." Or they come talk to their advisor or other resource person. I think those kinds of support systems are important.

Then when the students get a little bit toward the end of their degree programs, they need quite a bit of career counseling. The physics department puts on a dinner once a semester for minority students that is enjoyed both by the minority students and their faculty supervisors. I think that these dinner parties work very well. I always go to them when I'm in town. My students all show up and it's a jolly affair. They all see each other and it's just a nice, nice friendly social event. If all the departments could do something like that, I think it would be very beneficial—not that expensive, I think, but anyway a good investment. Every department could probably figure a way to do such a program.

*I have looked at our history relative to blacks from the beginning of the Institute to the present. One of the things that strikes me quite vividly is the fact that the physics department has always, particularly in the late '60s, been progressive on race.*

A lot of that has to do with Al Hill. He was a strong supporter of minority students, and he put effort and resources into it. He believed in it, and many of these things that we have today were started by him. The impact of the MIT black students on physics nationwide is incredible. When you look at U.S. physics broadly, and when you see black people who have made it in physics, a large fraction come from MIT. Many of them have complimentary things to say about Al Hill and the MIT support system, even though many say the work was very difficult. So that could be a benchmark for what other departments could do. I would say that Al Hill was a role model.

Minority faculty is a more complicated topic. In our department, we've had Cardinal Warde. He had some rocky times in the early years where

people didn't believe in him that much. You probably know the details of that as well as I do, and probably better than I do. Then the next phase is that he did get tenure, and I think he's doing a good job for us. I think he has worldwide recognition for his research. He's really been focused on the academics and in supervising graduate students, training graduate students, being a good teacher and innovator, and he has a certain field of optics applications that he's a world expert in. But it wasn't easy for him to get there. Especially in his young years, he had a really hard time gaining acceptance. I would say that he also worked out much better than anybody expected at that early time.

Wes Harris is another example. I don't know if he had a hard time or didn't have a hard time. I don't know exactly where he is now, but I run into him here and there.

*He's back as a full professor here.*

He was around a lot in many places and he has done a lot of interesting things. He's gained a lot of recognition for himself and people have a lot of respect for him.

*But he had a person just like you who worked with him and continues to work with him behind the scenes, just as you've done with all these students you're talking about—I mean, almost an identical-type person.*

When I see him in various contexts, I would say that his contribution to the country—in all different dimensions, because he's contributed in a lot of different dimensions—has been far beyond what we could have expected back in the early days.

*Leon Trilling had a lot to do with it.*

That's interesting. Leon's a guy with a lot of patience.

*Well, you are too.*

We're very different. I'm very impatient compared to Leon. We have a new fellow in our department, Akinwande. He's a Nigerian and he has a lot of industrial experience. It will be interesting to see how he makes it here. We did a little project together on ethics. We were just sort of understudies to Steve Senturia, who was the master of the program. I was involved with it too, but Tayo Akinwande did a lot more than I did. He really has a lot of concern for the students. He has done a good job with the ethics project, but he seems to be coming along more broadly.

*I know that you recommended Shirley Jackson for the faculty here.*

Yes, I did. I recommended her for the faculty here, but I recommended her for a lot of other things, too.

*I know, and probably many things that I don't even know about. But I know about this one area. What do you think was the problem there?*

I think people don't appreciate Shirley's strengths. People were looking at her impact on physics because that would be the department that she'd be in, that's what she's been working in. So they compare her physics to other candidates in that age group. I think that was where her problem was. What they don't look at is all the other things that Shirley has done, can do, and does do. She's on many boards and became well known long before she ever applied for any position. She's on more boards than anybody I know. It's not only that she's on these boards, but she's a terrific board member. I've been at different conferences and on various committees with her. She's so sensible and she has such an acute mind. She just focuses on the essence of things so well. She far surpasses almost everybody I know on these committees. But somehow the faculty members don't put these attributes into the equation. So, from that I conclude that being a faculty member at MIT isn't the right job for her, because she wouldn't be appreciated.

Well, let's look around—Sheila Widnall. She had a pretty hard time here at various stages of her career and she has made it much bigger outside, where people could appreciate the spectrum of things she can do well. People were very late to recognize her attributes.

Shirley's probably the best person they've ever had in her present position at the NRC, the Nuclear Regulatory Commission, both technically and administratively. She's a real hard-nosed person who pays attention to details and has a lot of guts, and works hard. I could predict all of that, but I think that many people were surprised that she is as good as she is. Some people say that she is a black woman and for that reason was given a political appointment—the President wants to have black women in this administration.

*But you knew better.*

I know what she is. This job seems to me to be just her cup of tea. She has performed very well, but

I'm saying she has better qualifications than anybody I know who has had that job before. But people, in thinking about her, probably thought this was just one of the president's political moves and didn't take her at face value.

Take Margaret MacVicar. She was another good example of an under-appreciated woman faculty member for much of her career. She had a very hard time in gaining any acceptance here. There were many people who didn't recognize her capabilities. It was kind of interesting that when they had her eulogy, we heard all the good things that people had to say, but I remember very well all the years when some of those same people were having a hard time accepting her.

So what does this all mean? It means that women and minorities, and minority women in particular, have a hard time in being accepted for what they can do. I know that. It's like that with me, too. I have had the same problem to some extent. People don't think I can do many of the things that I actually do.

*You prove time after time, though, that that's not an issue.*

Hopefully we all do that, but I think that the important thing for this century is to make sure that minority students and faculty have a full spectrum of opportunities. I've done many public service and other activities—not because I particularly wanted to do the specific things I did, but rather because I felt it was time that a woman got a chance to do this or that. We should do these things well and get on with the job, ensuring that these barriers in the future will be lowered—maybe not to zero, but lowered, anyway. I believe that the minority people are in exactly the same situation. The majority people tend to overlook minority groups because we don't look similar and because we don't approach things in the same way. It is true that we really don't approach things in the same way.

*You think we look at things totally differently in the way we come at a problem?*

Well, maybe it's that we don't take ourselves so seriously. I think that's part of it. We don't usually consider ourselves to be such important people. We don't expect a whole lot of attributions. We do various good things because they are the right things to do, or we're asked to do them. That could be part of looking at issues differently.

Maybe you have some insights. You're doing this study; you'll get a lot of insight. I believe that a student who has been here, maybe the biggest attribute that they get from MIT through this mentoring relation is that we try to look out for them for the long term. We try at least to establish the first or the second interface for them in their career paths. You give them the introductions and you tell them what's expected, and then they're off and running. If they do all that, I think they have almost equal future access. If you start off at a low level which is below your ability level, this is not a reasonable place for you to be, and then I think you have a hard time catching up later in your career. I think we have some obligation to try to start minority students off on the right level and with the maximum opportunities.

*Well, I really appreciate your comments. You're quite a remarkable person, even though I'm sure you would not think so.*

What I've done as a mentor is part of my job. Working with the black students has been remarkably rewarding. We get outstanding people in the majority population to come to MIT. The minority students are way up there in the very tippity-top of the minority group, I believe. They have such a high motivation level. They really want to succeed, and I believe that this thirst and hunger is a large part of why they do succeed. It's our privilege to work with them and to try to make them succeed better.