



2009 Nobels: Break or Breakthrough for Women?

Until this month, women had never won more than one Nobel science prize in a single year. This year's quartet of laureates talk about what their success might mean for science and society

The first Nobel Prizes were awarded in 1901. But this is the first year that more than one woman has been chosen as a science laureate. Indeed, the four distinguished scientists in the class of 2009—Elizabeth Blackburn and Carol Greider in physiology or medicine, Ada Yonath in chemistry, and Elinor Ostrom in economics—raise the overall tally for women by 31%. But in absolute numbers, these 17 women scientists represent only 2.8% of the membership of this exclusive club.

What will it take to boost those numbers? This year's awardees (*Science*, 9 October, p. 212; 16 October, p. 346) agreed to tackle that question in a telephone roundtable with Jeffrey Mervis of *Science* magazine and Kate Travis of *Science* Careers. Here is an edited version of what they had to say.

Q: Although their presence has grown steadily for the past 3 decades, women hoping for a career in science still face many obstacles. What are the two or three most important steps that need to be taken right now to increase the number of women going into science and to improve conditions for those already in the field?

Elizabeth Blackburn: The big bottleneck in terms of women's advancement—and I'm speaking about biological sciences—is the transition from postdoctoral research to positions in academic or research-intensive insti-

tutions. And so the question is, 'How do you give people tools to deal with this?' One very practical thing I've seen at my institution—and I know it's not unique—is having the ability for postdoctoral fellows to attend laboratory leadership courses. They can be as little as 1 week. They don't waste a lot of time, and I've seen them be very effective.

Ada Yonath: Elizabeth talked about a very important stage in the development of a scientist, a man or woman. But I would like to refer to the steps before that. Although girls and young women are taking classes in the life sciences and chemistry, only a few of them make it to the next and the next and the next step. And this is maybe because there is not enough effort made in making them appreciate science and love science and develop their scientific curiosity. I think ... maybe it is because we, the established scientists, don't interact with the youth enough. When I talk to them, they say, 'Yeah, I want to study this because I want to be afterwards a lab assistant or a research helper.' Very few say, 'Because I want to solve a problem that interests me.'

Q: Why do you think that is?

A.Y.: I didn't have a mentor, nobody told me to go do a postdoc. I just was very excited and curious about science and solving the

problems when they came up instead of thinking from the beginning and then looking at science as a profession. I looked at science as somewhere that I go to satisfy my intellectual needs, and I found ways to bypass the day-to-day problems.

E.B.: Yes, I think that's so important. ... I see the difficulty, that they love the science and they

feel daunted at the same time. So how does one give them the confidence and the tools to be able to deal with those things that can end up deflecting them from the career that they might have wanted?

Carol Greider: In the past, there hasn't really been leadership courses and those kinds of more formal ways of informing oneself, and so I think that the current mentors don't necessarily know to recommend that [approach] to their younger students. But there is a culture change going on—I certainly have seen it over the last 10 years—of more focus on these kinds of tools to overcome any potential obstacles, to be able to go forward and do what you're excited about.

A.Y.: In Israel, we are doing it. The academicians set up an organization that goes to talk mainly to girls in high schools and in the first college years and try to convey to them the passion, the love, of science. I'm doing it almost four or five times a year, and it works.

Q: What do they ask you?

A.Y.: Well, there are those that talk about the personal aspects, so they ask, 'Why did you do it and how did you do it and how did you solve that or that problem?' And there are some that ask, 'So why was this the problem that interests you?'

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Q: Do they feel that they can do it, too, or that you are so high up that they could never aspire to the kind of success you have achieved?

A.Y.: First of all, I've been so high up only for a week, and I have been doing it for a few years, so until then I was just another professor. But my life, becoming a scientist, was quite difficult. I was an orphan, we were very poor, and I didn't have any help. Actually, I had to help my family. Let's not talk about it much. But when the girls find out that it could be done, [they think] maybe they can also do it.

Q: Ada, both you and Liz received the UNESCO-L'Oréal Award that honors exceptional women scientists. Do you feel that such gender-based awards are useful?

E.B.: They have a slogan that goes something like, "The world needs science, and science needs women." In any complicated endeavor like science, you need lots of different ways of thinking about things. And women probably do add ways of thinking about things that are scientific, which may be different than men, because of their cultural differences and so forth. Women bring a richness to the research in all fields, not just science.

And so I think this idea that science needs women is really right on target. I like what L'Oréal is doing.

A.Y.: Well, I totally agree. ... My little hesitation is, although everything is wonderful and the prize is good and their slogan is good, it's a bit too commercial. If it was less emphasis on L'Oréal, L'Oréal, L'Oréal, I think it would be more efficient. Because women associate L'Oréal with cosmetics, and the fact that it is mentioned so many times, and it's not only the ceremony but before and after for months we have to go and talk about our science but make sure we mention L'Oréal, I don't think it helps.

Q: How is it possible, in today's climate, for the director of the National Institutes of Health, for example, to launch a high-profile competition like the Pioneer Awards and wind up with an inaugural class of grantees that is all men?

Elinor Ostrom: It takes a while for the acceptance of women in multiple disciplines. That's happening more and more, and I think 10 years from now it will be a natural event that the distribution of women and men in their field does not represent the repression that women once faced in going to college or going into graduate school. The problem is the transition. So having it brought to people's attention that, gee, why is it all male repeatedly, is an important thing to do.

Q: Any thoughts on how to get through this transition period?

E.O.: Well, in our program, we have about 50% women applying to go to graduate school. I have a number of [women] colleagues here at Indiana who have full tenure. It's still not quite at the level it should be, but you don't make that [change] overnight.

E.B.: Speaking for the biological sciences, and perhaps to contrast a little bit with what might be the case in the world of economics, the pipeline has been very, very strong for quite a long time for women. They've been populating the Ph.D. and postdoctoral levels at about roughly half men, half women for really quite a long number of years.

Yet there's a very striking discrepancy in the careers after that. So I'm less optimistic that the problem is automatically solving itself. ... [This] massive hemorrhaging is nice for other fields but not very nice for the aspirations, perhaps, of the women who put so much of themselves into training for so many years. I think career structure is some-

Medals of honor. This year's crop of Nobelists includes, from far left, Elinor Ostrom in economics, Ada Yonath in chemistry, and Elizabeth Blackburn and Carol Greider in physiology or medicine.

thing we have to look at. For many women, the issue is, 'How am I going to have a family and a life and also tend to a career?'

Q: How did each of you deal with that issue?

E.O.: Well, as a somewhat older participant, I had a clear [choice]. And I made the decision not to have a family because, in earlier times, that would have been a very, very difficult thing to accomplish.

C.G.: I come from the other spectrum in that I was able to see around me a number of women, including Liz, who were able to have children and have a career. So just in the same way that you have to go forward with experiments sometime, not knowing what's going to happen, I just went forward with the experiment of having kids and the career and trying to do both full-time.

Q: To what extent do you have to blend your personal and your professional life to achieve a balance?

A.Y.: In my day-to-day life, I don't sit and think about this, it just comes. This is the way I am and this is the way I run my life, and I don't really sit and organize myself, [saying] tomorrow I have to do this or that. It just happens.

E.B.: Well, yes, I think that the message of balance is somewhat overplayed, because if you're doing something intense like having a family and doing science, they're both intense things. The idea that somehow every day is sort of balanced, I think it's really a bad message to try and send people. ... That sounds very boring to me, in this sort of 9-to-5 [world]. Go for these things intensely in the periods when you have to

go for them, and the balance will take care of itself over decades.

C.G.: Many professional women face this kind of issue, and I tell people that it's actually very nice to be in science because what we're judged on in the end is how productive we are and what we get done, and it's not necessarily 9 to 5, and so I feel like I do have a lot of freedom. You know, I'll go out for my son's play at school at two o'clock in the afternoon and then come back again, and that kind of freedom to have a flexible schedule, I think, is not always true in other professions.

Q: Many reports have said that women leave academic science because they are looking for more regular hours and a more predictable schedule.

E.B.: Right. People have been giving them bad information. I think there's a lot of conventional ideas about being a mother and, you know, certain sorts of formulary and stereotypes are there. And I really think that they're not terribly helpful.

Q: Has anything helped you be successful in terms of managing your time?

E.B.: Is it time to tell the Bagel Bites story? ... It's about producing beautiful cookies or cupcakes with beautiful icing and you're up till 2 a.m. making them for your children. This is what motherhood is supposed to be like, right? Well, it turns out that if you go to your supermarket, you can buy these little Bagel Bite things, they're called commercially, and you put them in the oven and they have cheese on the top and they bubble and they're lovely and brown and taste wonderful. And you take them to any children's function, and the children swarm over them, they love them, ... and it takes 12 minutes in the oven to cook. So my feeling is there's plenty of time ... to catch the essence of what it is that people like mothers to do, but you don't have to do it in a very laborious, conventional way.

Q: Now that you have a bully pulpit, are there things that you can do to increase awareness of the importance of attracting women into science?

C.G.: I think just getting out there and talking to people about the opportunities that have come up puts science into the minds of the

public. And then by simply being a woman scientist, you have the opportunity to be there and talk about your science.

Q: Will you be disappointed if next year's awards, and those for the following years, do not include women?



E.B.: Oh, we'd like to [achieve] the biological ratio, which is 50–50, so all we're doing this year, I would say, is just approaching a more normal situation.

Q: What about in economics and political science?

E.O.: We wouldn't expect that, every year from now on, we would have one woman and one man receiving the prize in economics. That would be wonderful, but over a period of a decade, beginning to approach 50–50 makes eminent good sense. And if it doesn't, that is something we can be addressing.

Q: How would you address that in the context of the Nobels?

E.O.: Well, it's a delicate problem. But indeed, if 10 years from now the ratio had gone way, way down and someone asked

me, I would be very honest and say I was deeply disappointed. Because I know there are very able women out there who aren't being recognized.

Q: Would it say something about the process of recognizing scientific achievement?

E.O.: Well, I think it says something about the processes in academia. As a person who was strongly advised against going to graduate school because I was a woman, I'm at least relieved that that has stopped and that, slowly but surely, we are seeing many more women becoming full professors, being given awards, et cetera. I think we will be seeing a continuation of that, but if we don't, then we better speak up and indicate that something's wrong.

Q: Ada, in chemistry you were the first woman chosen in 45 years. What do you think the prospects are?

A.Y.: It's very nice that women get it, and it's very nice that there is a half-half this year. It was not very nice that the community had to wait 45 years for a woman. But I think the prize should be given for excellence and not pay attention to anything else. And if there is an excellent woman, she should get it. She should not be discriminated against but also not discriminated for. ... It's just one prize, and how the [Nobel] committee in Sweden make the decision is above and beyond my understanding. Yet I don't think that gender has to be part of their consideration.

Q: The next time you talk to a 12-year-old girl who shows a passion for science, what would you most want her to know?

C.G.: Well, I was just talking to a group of 9-year-old girls that were interested in science at my daughter's school, actually, and they asked me some of those questions, and what I said was, 'Do what excites you. Follow your passion. Don't necessarily worry about what obstacles might be there, because there are always ways to overcome them. But the most exciting thing is to be able to do what you love, and just don't let anything stand in the way of that.'

E.O.: I think that captured it very well. If you don't choose to do what you're really fascinated by, and then get yourself ready to do it, then your life is not a very worthwhile life.