EMBO reports

analysis

Losing them is not an option

Women in higher positions in the natural sciences are few and far between. As society cannot afford to lose them and the investment in their education, the question is, what to do about it?

Science is a man's world. By looking at the composition of most science societies, grant committees or the speaker lists of scientific meetings, it becomes clear that women are not equally represented in the scientific realm. This is all the more astonishing as women have successfully proven that they have the same capabilities as men. Is it because women are less interested in a career in academic life, or are men actively defending one of their last bastions against the intrusion of the other sex?

To address the question of whether the unequal representation of women in the life sciences is due to discrimination or decision, the European Molecular Biology Organisation organised a meeting entitled 'The glass ceiling for women in the life sciences' in Heidelberg, Germany. For two days in June 2001, more than 100 women scientists, many of them in leading positions in the European and US science landscapes—and unfortunately fewer than 10 men—met and discussed possible reasons for the gender inequality and measures to overcome the unfair male dominance of higher positions. The debates, often engaging and lively, showed that many men at the higher levels indeed still do not regard women as equally capable colleagues. 'And then I was more successful than all my colleagues [at the Max Planck Society], and they couldn't bear it,' Christiane Nüsslein-Volhard, a German Nobel laureate from the Max Planck Institute in Tübingen, described her experience as a women scientist rising through the male-dominated German research landscape. But apart from active discrimination at the higher levels, women also face other problems—particularly when faced with the decision about having children—that most men do not have to consider.

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The fact that there is a gender imbalance in the life sciences, particularly at the higher levels, was undisputed

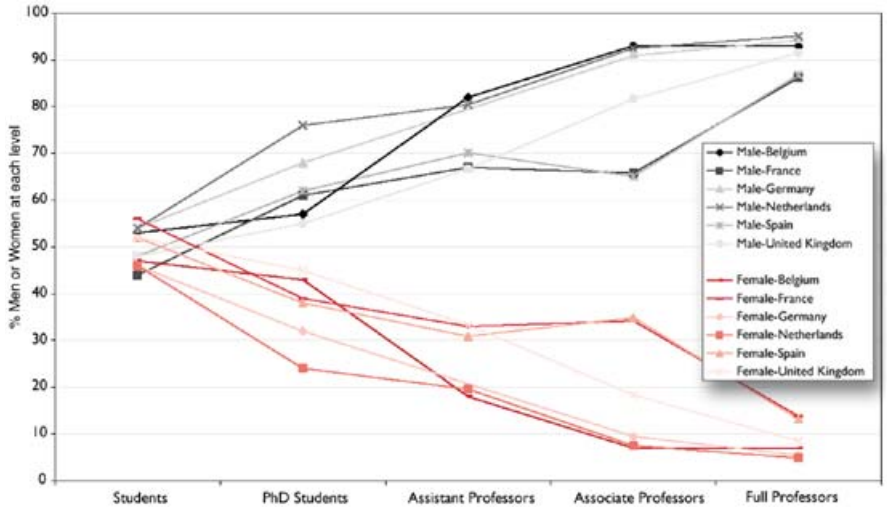

Fig. 1. Women and men in science in six EU member states. Data from the ETAN report.

even among the few men that attended the conference. Wanda Ward, from the US National Science Foundation summarised the consequences for women scientists: "We lose a lot of power at the highest echelons where the critical decisions are being made." Current statistics support this view. Mary Osborn from the Max Planck Institute in Göttingen, Germany, referred to results that the European Technology Assessment Network (ETAN) had gathered on Women and Science (ETAN report on Women and Science, 2000). These show that the gap between men and women widens the higher one goes up the scientific career ladder, from the Bachelor level to the full Professor level (Figure 1). Germany, Switzerland and The Netherlands fare particularly badly with women holding less than 6% of full professorial positions in the natural sciences (Table I). And although in many countries these numbers have increased over the last few decades (Figure 2), the rise is still too slow to satisfy women scientists today. 'Waiting is not a reasonable solution,' Osborn commented when presenting these data.

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In fact, the low number of professorships is not due to a low representation of female students. EU-wide, around 40% of students in the natural sciences are female, ranging from approximately 30% in Germany to more than 60% in Portugal. In the medical sciences, there are even more female than male students. This is true in all EU member states, with an average of 70% EU-wide (ETAN report, 2000). Consequently, a sizeable part of the meeting was devoted to discussing why and where most of these women disappear during their careers.

One reason for the drop-out is lower funding received by female investigators to carry out their work. Representatives from the Wellcome Trust and the German Research Society (DFG) demonstrated that women, in general, receive less research money than their male colleagues. This is supported by an American study showing that National Institutes of Health research grants to men are 22% larger than those going to

Table I. Percentage of women professors in the natural sciences

Country	Year	Full Professor	Assoc. Professor	Assist. Professor
Turkey	1996/7	21.5	30.7	28.0
Finland	1998	18.4		
Portugal	1997	17.0	36.0	44.0
France	1997/8	13.8	34.2	
Spain	1995/6	13.2	34.9	30.9
Norway	1997	11.7	27.7	37.6
Sweden	1997/8	11.0	22.0	45.0
Italy	1997	11.0	27.0	40.0
Greece	1997/8	9.5	20.3	30.6
UK	1996/7	8.5	18.4	33.3
Iceland	1996	8.0	22.0	45.0
Israel	1996	7.8	16.0	30.8
Belgium (Fr)	1997	7.0	7.0	18.0
Denmark	1997	7.0	19.0	32.0
Ireland	1997/8	6.8	7.5	16.3
Austria	1999	6.0	7.0	12.0
Germany	1998	5.9	11.3	23.8
Switzerland	1996	5.7	19.2	25.6
Belgium (Fl)	1998	5.1	10.0	13.1
Netherlands	1998	5.0	7.0	20.0
Australia	1997	14.0	23.0	40.7
USA	1998	13.8	30.0	43.1
Canada	1998	12.0		
New Zealand	1998	10.4	10.3/23.5	45.5

Data from the ETAN report on Women and Science.
Belgium keeps two sets of statistics, one for the French (Fr) and one for the Flemish (Fl) part.
Numbers for Portugal include only academic staff performing R&D activities.

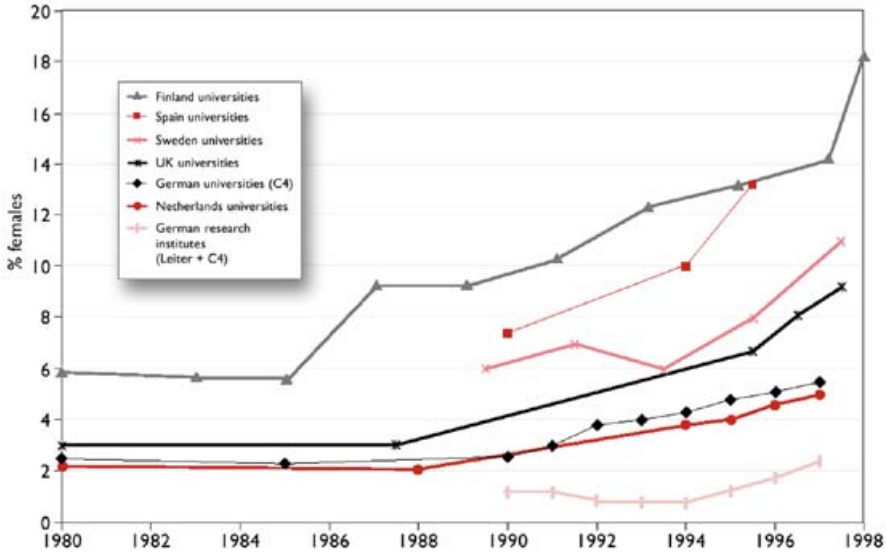

Fig. 2. Percentage of women professors in different EU member states over time. Data from the ETAN report.

women. The most 'obvious' explanation for such a discrepancy would, in most people's minds, be discrimination by the—predominantly male—committees that decide on grants and promotions. However, the speakers made it clear that women scientists in general actually ask for less research money when they apply for grants. Furthermore, of the women eligible for grants or promotions, fewer apply.

In fact, representatives from several research and funding organisations—including the Laboratory of Molecular Biology at the Medical Research Council (MRC) in Cambridge, the European Molecular Biology Organisation, the European Commission, the Human Frontiers Science Program, the DFG and the Wellcome Trust—presented their decision-making procedures and showed statistics which revealed no obvious bias against women during the early stages of selection. But they recognised a slight tendency among committee members to favour men over women with equal qualifications. Frank Gannon from the European Molecular Biology Organisation, presenting data from the long-term EMBO fellowship scheme, conceded that committee members—including women—consistently rank men higher than women.

Higher up the career ladder, however, discrimination often becomes more blatant. Christiane Nüsslein-Volhard from the Max Planck Society and Mariann Bienz from the MRC experienced outright discrimination when they had been automatically granted smaller research budgets and salaries than their male colleagues.

> As it is becoming increasingly difficult to attract young people to pursue a career in the life sciences, it only makes matters worse if one-half of them are left behind

The most obvious strategy in overcoming discrimination—whether subtle or blatant—is affirmative action, which the USA has already been employing for some years. "When I broke through the glass ceiling […], we decided that we would not support any conferences or meetings that do not have women speakers," Mary Clutter from the US National Science Foundation said, 'That policy now has been adopted by the NIH too.' In addition, the NSF provides extra grants exclusively for women. According to Clutter, these have had great success in helping female scientists to climb the career ladder, as well as having encouraged women scientists to apply for grants and research jobs more generally. But positive discrimination was not seen as a favourable option among the mostly European participants. 'I think we can do

Mary Clutter: 'It's better to be in a position of power than not to be in a position of power'.

more harm than good by earmarking positions for women,' Susan Gasser from the University of Geneva maintained. Clutter countered: "It's better to be in a position of power than not to be in a position of power."

Most Europeans indeed felt that what is most needed are measures to raise women's interest in science and to

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encourage them to actively pursue careers in academia—since female scientists tend to be more modest about their career options. Furthermore, according to the DFG, women are often not aware that many funding agencies provide additional money for female scientists with children and that they take into account in their decision-making the fact that women take breaks in their careers to bear and raise children. Clearly, 'the greatest discrimination that I can see is self-discrimination,' Elena Conti, a group leader at the European Molecular Biology Laboratory in Heidelberg, Germany, said about the experience of younger scientists in middle positions.

But regardless of whether positive discrimination or active encouragement is the better strategy, the participants agreed that it is necessary to increase the number of women in higher positions to serve as role models for young female scientists, as well as providing a countermeasure to male dominance. 'My biggest effort is to raise the proportion of women in the higher positions of the Max Planck Society and then [the problem] will take care of itself,' Nüsslein-Volhard said about her objectives. Indeed, this challenge could soon be met in Germany, where 50% of full professors will retire within the next 5 years. As Helga Ebeling from the German Ministry for Education and Research pointed out, this is a unique opportunity to achieve a better gender representation in her country's science landscape. 'What is coming out of this discussion is that if you want a job you have to apply, and we have to encourage women to apply,' Osborn said.

However, apart from discrimination in the higher echelons, there is also the social context that eventually makes many women turn away from science. Certainly, children play a very important role in the decision-making for many young women. Many attendees complained that raising children and pursuing a scientific career often seem incompatible, as many countries do not provide the necessary infrastructure. Germany was cited as a notably bad example, as it does not provide a sufficient number of kindergartens, has a tax code that punishes working couples and school services that are available only half-day, forcing mothers to take care of their children in the afternoon. But even within a better social context, pursuing a career in academic science often means giving up other things. 'I have my professional life which is great, but my social life as a mother is zero,' Martine Collart from the University of Geneva said. 'I can imagine that for many women this is a problem.'

This problem is further exacerbated by the need for young scientists to gain international experience during their early careers. Louise Ackers from the University of Lancaster, UK, suspected that the demand for mobility among postdoctoral researchers might be a reason for the higher drop-out rate among women compared to men. "We found that families tend to prioritise male careers, she said. 'At some point, something clicks and the male career proceeds at a slightly faster rate.' In fact, men are less likely to give up their work and follow their partners abroad than are women. 'Men move in the knowledge that their wives would follow them,' Ackers described results from a survey among Marie Curie Fellows, who receive grants for a fellowship abroad. Often, for women this attitude translates into jobs at lower positions and with lower salaries, which impedes their further career prospects in the academic environment.

Ironically, lower salaries might work in favour of women. Aslihan Tohun from the Bogazici University in Istanbul, Turkey, explained that the notably high number of female professors in her country—and in many other Mediterranean countries—is due to the fact that scientists are paid relatively low salaries, which turns many men away from a career in academic science. This led Mary Osborn to comment, 'If you want to increase the number of women in science, cut the salaries.'

But this is not the only reason why Turkey, Portugal and Spain have a higher number of female professors than most North and Mid-European countries. Some participants from the Mediterranean countries pointed out that women there are less likely to give up their careers to take care of their children. As Flora De Pablo from the Centro de Investigaciones Biológicas in Madrid, Spain, commented, 'There are choices: you can take 10 days off [to bear a child] or 18 months, but then your career will suffer.' Other participants supported this position. 'I don't

Mary Osborn: 'It is wasteful to educate and train young women scientists but then not to use their skills'.

think that having children prevents anyone from having a career,' Ruth Arnon from the Weizmann Institute of Science in Rehovot, Israel, said when she presented the situation of women scientists in Israel. Nevertheless, Tohun and Arnon conceded that in many Mediterranean countries families play an important role in

supporting women scientists by helping them to raise their children.

Finally, many women feel strongly that academic science is a working environment that favours what are perceived as being male characteristics—aggressiveness and competitiveness. 'I think we essentially suffer from the fact that success is measured by a male yardstick,' Daniela Rhodes from the MRC said. She also expressed her disappointment with the fact that only a few men attended the conference as the issue of gender equality affects them as well.

Ruth Arnon: 'There is a glass ceiling, but if you're strong-headed, you can break it.'

Indeed, it is a problem that men and society cannot afford to ignore. It is becoming increasingly difficult to attract young people to pursue a career in the life sciences, so it only makes matters worse if one-half of them are left behind. And, as Helga Ebeling from the German Ministry of Education and Research pointed out, with every woman leaving science, Germany loses around 1 million Marks (500 000 Euros) of public and private investments into her education and career. 'For me the strongest argument is the efficiency argument: it is wasteful to educate and train young women scientists but then not to use their skills in employment,' Osborn said.

There is no doubt that there is a glass ceiling for women in the life sciences. But it seems that is has been rising over the last few years, which could clearly be seen among the panelists who discussed the problem of discrimination. While the older women in higher positions talked about experiences of outright discrimination that they faced from their male colleagues, it was encouraging that the younger women did not yet share their experiences. Elena Conti and Sonja Schwarzl, a graduate student at the University of Heidelberg, expressed their opinion that women nowadays are in general regarded as equal professionals. Furthermore, a greater awareness of gender issues as well as more support for young women have removed many of the obstacles that older women had to face in their careers. 'The common knowledge in the lab these days is that it's easier for a woman to be in science than for a man to be in science,' Conti said.

The expectation is that with many male professors retiring and more women climbing the career ladder, the glass ceiling will rise further until it eventually disappears. Hopefully, many of the younger women will not face the problem of unequal treatment at all. However, for those who reach the ceiling, it is up to them to stay in or leave science. And this decision is independent of any man-made or other obstacles. 'There is a glass ceiling, but if you're strong-headed, you can break it,' Arnon said.

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Searching for discrimination

Are women treated fairly in the EMBO postdoctoral fellowship scheme?

The publication of the Swedish Medical Research Council's analysis of its grant selection scheme (Wenneras and Wold, 1997) came as a wake-up call for many other funding agencies in the life sciences. As it showed an inherent discrimination against women applicants, many of those responsible for giving grants to young scientists became worried. It was indeed appalling to read that women in the Swedish system needed 2.5 times more publications to be successful, but the question was asked whether this was an isolated case? Furthermore, how would other funding programmes fare if subjected to the same scrutiny as the Swedish Medical Research Council?

Such questions triggered an analysis of the EMBO Long Term Fellowship granting scheme in order to find out whether there is any similar discrimination within this programme. The troubling outcome was that, at face value, there does seem to be a bias. Further analysis of the data, however, could also point to a slightly lower quality of the female applicants when judged by certain criteria. Figure 1 illustrates the potential problem. When the success rate is calculated for the spring and autumn session for the years

When the success rate is calculated for the spring and autumn session for the years 1996–2001, the female applicants were, on average, 20% less successful than the males