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News & Views

Gender bias remains prevalent in the biological sciences

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With undergraduate courses in the biological sciences now populated by at least as many female students as males, common-sense should predict an imminent end to the gender bias that has existed in these disciplines until now. But, according to Gerd Karin Bjørhovde, Chair of the Norwegian Committee for Mainstreaming Women in Science and Professor/Pro Rector of the University of Tromsø, Norway, who led a workshop on women in science at last month's annual FEBS Congress in Athens, Greece, the ideal of a 50–50 gender balance is far from becoming a reality (see [Figures 1 and 2](#)).

Despite the increasing pool of female graduates and post-doctoral candidates from which institutions can now choose, according to Bjørhovde, the higher up the career ladder you look, women are successively unequally represented in science, and their career progression is not comparable to their male colleagues.

Terming this phenomenon the “leaky pipeline effect” Bjørhovde explains that while there is a high proportion of women at lower levels, when you get to the higher levels, professors for example, there are very few women. “In medicine in Norway, 50% of associate professors are women, but full professors it is only about 15%,” she said. “What we want to know is what makes it so difficult to make this progression?”

Although Bjørhovde's data come from Norway, her conclusions are by no means restricted to her country's context. The generalised problem of how to increase proportions of women in high-level scientific jobs is something that gained momentum in academic circles during the 1980s, and became a serious issue for policymakers during the 1990s – prompted by the concern that if women are unfairly excluded from high-level positions, science may be missing out on potentially highly skilled individuals to drive forward progress.

A Swedish study funded by the national medical research council in the 1990s provided firm evidence of discrimination in funding allocations, to add to the accumulating anecdotal evidence of gender bias in university appointments. Describing the significance of the findings in an article published in *Nature*, Nancy Lane, who, in addition to her academic responsibilities 1574-7891/\$ – see front matter
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runs Cambridge University's programme for Women in Science, is a member of UNESCO's Scientific Committee for Women in Science and Technology, and chaired the UK Government's Working Party on Women in Science, Engineering and Technology in the early 1990s, reported that the Swedish study “startled the scientific community” because it provided the first clear evidence of discrimination. “It showed that women had to be about 2.2 times more productive than their male counterparts to be as successful in securing financial support,” she wrote.

Perhaps the most important implication of the finding was that it showed the reasons for the gender imbalance in science were not just to do with women themselves and the choices they make – for instance, prioritising child-rearing over career advancement – but that there is real discrimination in the system of scientific appointments and promotions.

Subsequent studies investigated the issue further in different countries and across disciplines, and there is now a library of published articles detailing gender disparities at various levels of academia and different subjects. Although roughly equal numbers of male and female undergraduates read biological sciences, the proportion of female undergraduates studying the physical, mathematical and computer sciences is far smaller.

Lesley Yellowlees, University of Edinburgh, who also spoke at the FEBS workshop, reports that, in the UK, 45% of appointments at researcher level are women. But as you go from lecturer to senior lecturer and professor there is a decrease in proportion of women across the board. And the numbers of women who have been elected to fellowships of prestigious professional bodies such as the Royal Society fall well below 10%. In chemistry, Yellowlees' own specialty, only 6% of individuals in the top jobs are women. “We haven't got a leaky pipeline, we have cannon ball holes in it,” she says. Although conceding that chemistry fares significantly worse than the biological sciences – where the proportion of female researchers is nearly equal to males – at professor level females still account for just 14% in these subjects.

Figure 1 – Professor Gerd Karin Bjørhovde, Chair of the Norwegian Committee for Mainstreaming Women in Science, delivering her presentation to the FEBS Congress audience.

However, adds Yellowlees, these figures hide a paradox: overall student numbers show that higher education is increasingly a female environment. In 2000, she explains, 45% of undergraduates were female compared with 34% of postgraduates. Now, nearly 60% of undergraduates are women and over 50% of postgraduates. “There is an overall increasing trend from 1990 to 2007,” says Yellowlees. “Women are in the majority now.”

These seemingly contradictory observations can be explained if you look at the actual numbers, says Yellowlees. “The increasing proportion of women is mainly due to a significant decline in numbers of men applying – which is a worrying finding because if we are really going to succeed [in advancing science] we need more and more young people to take up science and engineering.”

1. Behind the statistics

In an effort to explain the different approaches of men and women to careers, Yellowlees and colleagues in the Athena

Figure 2 – This year’s FEBS Congress in Athens, Greece, is just the second to host a workshop organised by the FEBS Working Group on Women in Science.

project – which was established in 1999 by the UK higher education funding councils, Universities UK, and Office of Science and Technology, Department of Trade and Industry to promote the careers of women in science, engineering and technology in higher education and research – did a series of qualitative investigations. Through interviews, they found that both women and men had concerns about long hours, low pay, and career structure but women alone were concerned about poor working conditions, had an emphasis on results rather than process, and were anxious about isolation and segregation. The conclusion was that the working environment in academic chemistry deters large numbers of women from remaining and the structure of departments and the nature of the subject creates barriers to their promotion.

The history of appointments in particular departments also seemed to play a role in the gender of future appointees, Yellowlees and colleagues found. By analysing a checklist sent to chemistry departments which were found to have unusually high proportions of women, and following up responses with a telephone interview, they concluded that good management practice has an identifiable impact on the willingness of women to apply to and remain within departments. “The personality and personal circumstances of the head of the department are really significant in determining good management practice,” says Yellowlees. “So institutions have a role in ensuring that selection procedures for department heads prevent departments selecting leaders in their own image. There is a grave danger that departments tend to select leaders as they have always done, so history becomes very important.”

An interesting observation supporting the crucial influence of history is that newer UK universities – ones that used to be known as polytechnics or technical colleges – are among the institutions that have made the best progress in increasing proportions of female researchers. This trend underlines anecdotal views that traditional higher education institutions have a deep-rooted male-dominated culture that hinders the advancement of women to leadership roles.

2. Addressing the imbalance

With accruing evidence detailing the extent of the gender imbalance that exists among Europe’s higher education institutions, attention of policymakers is now focused on how to address it. Norway’s Bjørhovde, whose committee was established in 2004 for the purposes of pushing policy proposals, said there are two key approaches to increasing the proportion of women in research: earmarking and mainstreaming.

Because the system of higher education financing in Norway sets aside a proportion of annual budgets that are linked to results, the government can specify certain targets which, if met, result in more money for a particular institution. This enables a system of rewards for parameters such as numbers of women appointed, number of doctorates awarded, outside funded projects, or publications. This strategy has already proved successful in Norway; however, explains Bjørhovde, there are ways to expand this approach with new money specifically promoting women.

One new idea put forward by the committee, to be considered by the Ministry of Education and Research for the next budget, is “joint ventures”, an initiative in which funding could be a 50–50 combination of fresh money from government and individual institutions “thus ensuring both a combination of national incentive and local commitment and of national strategy and institutional priorities.” This funding could be used to support doctoral or permanent positions specifically for women and therefore improve their representation.

But, cautions Bjørhovde, earmarking can only be justified as a measure to remove significant inequalities, such as in fields like technology. “One of the reasons earmarking has been successful in Norway is that it has been made available to the sciences who had no women because they could get extra positions and therefore increase the faculty.” This would not be so effective in areas where a better existing gender balance would simply mean swapping existing positions from males to females.

Lane, who spoke from the audience at the FEBS workshop, added an extra note of caution about the political sensitivity of earmarking policies and the importance of considering national legal restrictions. “Canada set up special professorships for women, but in the end they had to withdraw them because the men were outraged. It is illegal also in England to set up specific professorships for women. We can say ‘women are encouraged’ but you can’t give preferentially,” she explains, adding that one UK effort to set up academic prizes in the name of famous women hoping to avoid legal restrictions on inviting only women applicants didn’t work as a policy because men applied for them too.

Mainstreaming the issue of women in science is the other main focus of activities for Bjørhovde’s committee. Such activities involve things like initiatives to promote of research on women in academia and expanding academic leadership opportunities for women by, for example, setting aside special funding to build research groups led by women. These measures should help create a more clearly defined career path and more permanent positions that can act to counter the influences prompting women to leave academic science. However, adds Bjørhovde, there is no one right approach. “We need to tackle this issue in a variety of ways, with several incentives – and with long-term policy in mind. It is a complicated matter. You can’t say we want to go from 10% to 50% and sit back and wait. There are several things that have to happen and there has to be a long-term policy in mind. We need commitment

from leadership at all levels. And we need to have faculties as well as departments involved,” she says.

One side effect of the committee’s coordination role it has created for itself is to improve dialogue between institutions, policymakers and research funders on gender bias. This management dialogue, according to Bjørhovde, can be used to introduce compulsory reporting to help get better data on whether the institutions are contributing to gender imbalance through their appointment procedures. This could solve one of the main problems policymakers currently experience in designing appropriate intervention strategies: a lack of data about the real extent of the problem. Although there are statistics that show some of the challenges associated with achieving gender equality in academia, some think these overall figures provide limited information.

3. Sharing good practice

Sweden is alone among European nations in being close to achieving a balance between the sexes, but there are several examples of good practice within other countries, individual institutions, or even departments, that could be documented and replicated to substantially improve the situation for women without high-level policy interventions.

Acknowledging the crucial role of individual approaches, Yellowlees and colleagues have been working on identifying places that are acting well and sharing knowledge from these. “Good practice is patchy and we need to spread it,” she says. “We have to see what works and we have to gain from everybody else’s experience.”

Importantly, she notes, actions to promote change should be largely gender neutral. “We should aim to create a better employment environment for both men and women,” she says. “Both men and women benefit from good practice; however, women in particular are adversely affected by bad practice. Of course men don’t like it if you create prizes for women. We wouldn’t like it if there were prizes specifically for men! But everybody benefits from good practice and that makes it easier to sell.”

Bjørhovde agrees “We need all the talents available. I take it for granted that women are as talented and as intelligent as men. So in a perfect world we would have a better distribution than at present.”