

Women in academic STEM careers

A contribution from the Society of Biology to the
House of Commons Science and Technology Select Committee

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The Society of Biology is a single unified voice, representing a diverse membership of individuals, learned societies and other organisations. We are committed to ensuring that we provide Government and other policy makers - including funders of biological education and research – with a distinct point of access to authoritative, independent, and evidence-based opinion, representative of the widest range of bioscience disciplines.

The Society welcomes the interest of the Committee and is pleased to offer these comments structured around the four main questions set out by the inquiry and gathered in consultation with our members, member organisations and advisors.

Overview

1. The under-representation of women in the science, technology, engineering and maths (STEM) workforce is a persistent phenomenon that transcends national boundaries and employment sectors, with implications for both society and the economy. It has been estimated that increasing women's participation in the UK labour market could be worth between £15 billion and £23 billion (1.3–2.0% GDP)¹, with STEM accounting for at least £2 billion of this.²
2. The academic sector, as identified by the Committee, represents an area where the under-representation of women is particularly apparent. Women leave academia in larger proportions than men at every step of the postgraduate ladder and are under-represented in top positions across the spectrum of academia.³
3. Although the biosciences are typically thought of as the most gender-balanced of the sciences, the Society is concerned that this balance does not pertain to the top of the academic career ladder. In 2011/2012, 61% of bioscience postgraduate students were female while only 15% of professors were female.⁴ These figures indicate that there is a considerable problem with female retention in the academic biosciences, which must be urgently addressed.
4. The representation of women at higher levels of the academic biosciences is however improving, albeit slowly, with a 3% increase in female bioscience professors since 2007.⁵ The Society therefore welcomes this inquiry as a means by which to assess progress thus far and inform future thinking.
5. It is clear that the current system poses inequitable disadvantages to able women who wish to pursue an academic career in the sciences. However the paucity of evidence about these is both

¹ UK Women and Work Commission, 2009

² <http://www.theukrc.org>

³ The Royal Society of Edinburgh, *Tapping All Our Talents*, April 2012

⁴ 2011/2012 HESA data

⁵ 2007/2008 HESA data

concerning and a barrier to progress and this should be addressed. As a result we, like many others who address this and related topics, have encountered predominantly case studies and anecdotal evidence supplied by our members. Furthermore a lack of 'hard' evidence and a tendency towards the generalisation of many personal stories can serve to impede the constructive development of this topic.

Why do numbers of women in STEM academic careers decline further up the career ladder?

6. There is no single factor that accounts for the decline in the numbers of women at each stage of the academic career ladder. Instead a number of factors contribute, a selection of which are highlighted below:

PhD

7. At postgraduate level, the biosciences appear balanced in terms of gender. However it must be highlighted that this contrasts with the situation in other areas of science, for example in chemistry where a study has suggested that this phase results in a high level of attrition compared to the biosciences.⁶ It is apparent that there are different pinch points in different disciplines.

Post-doc

8. Short term contracts and the need to move to follow specialist research projects make this stage of an academic career difficult to juggle with other commitments. None the less, participation of women in the biosciences is still very high at this stage. However, the number of permanent lecturer/reader positions is much smaller than the number of qualified applicants and is declining, making career progression from postdoctoral trainee to principal investigator difficult. Post-doctoral positions are often short term, allowing for greater movement of early career researchers to expand training and skills development. Post-docs therefore exist in a precarious state with short-term or open-ended contracts conditional on grant funding, a limited timeframe in which to make the next career move, and few opportunities to progress up the academic career ladder. This uncertainty is a disincentive and can serve to discourage those who seek more secure employment. Research commissioned by the UKRC in 2009⁷ found that the insecurity of being on a fixed-term contract is one of the main barriers to successful academic careers faced by female researchers.

Lectureships/PI positions

9. This is a major pinch point where many women opt for other careers. Much of the anecdotal evidence presented to us by our members indicated that this is because women disproportionately do not apply for the few jobs that are available. A range of possible reasons for this can be postulated. Many of our members highlighted the perception that academia remains a male-orientated network where traditional male working patterns and a 'macho' culture often prevail. Practices such as the routine holding of seminars and informal networking sessions out of hours and the frequent disproportionate assignment of pastoral roles to women were highlighted as serving to further this impression. The academic culture of long working hours and inappropriate focus on competition to achieve status through winning large research grants and publishing in high profile journals can also deter women from remaining in the academic sector.

⁶ Biochemical Society/RSC, *The Molecular Bioscience PhD and Women's Retention: A Survey and Comparison with Chemistry*, 2008

⁷ UKRC, *Female Attrition, Retention and Barriers to Careers in SET Academic Research*, December 2009

Promotion to senior lecturer/reader and Professor

10. Promotional systems often rely on the individual to be proactive in putting themselves forward, and it was frequently reported to us that women are typically less likely to do so. The definition of excellence used is often too narrowly focused on specific research-related metrics. They also tend to under-emphasise other activities such as student-oriented roles, including pastoral care and teaching, and community-oriented roles such as departmental administration or outreach work. Promotion procedures and academic working practises are also poor at taking career brakes into consideration. All these things tend to disadvantage women disproportionately in academic promotion.
11. Additionally, there are contributing factors which apply at each stage of the academic career ladder:

The difficulties associated with combining an academic career and parenthood

12. An academic career is, by its very nature, a cumulative exercise, usually involving the amassing of evidence of a productive research programme, such as publications. Any time taken out can have a detrimental effect. As such, longer (and multiple) maternity and parental leave periods can make it more difficult to retain presence and currency in the field. Moreover, STEM subjects change at an ever-increasing speed, which can serve to make it even harder for scientists to re-enter an academic career as knowledge and skills bases can be out-of-date following even short periods away from work. Since it is still predominantly the mother who takes most of the parental leave, this disproportionately affects women. Mechanisms to encourage equal sharing of parental leave between the parents could have a major impact here.
13. This problem is compounded by the fact that many academics work very long hours in order to drive their research forward and to fulfil the varied additional demands the career involves. Although there is a very high level of flexibility in the job, the absolute number of hours usually worked serve to make it very demanding. As described above, women still disproportionately assume the role of primary carer for their children and hence often find it challenging to 'juggle' responsibilities both at work and at home, choosing to move into a career in which it is easier to find a better work-life balance.

The lack of female role models

14. The low numbers of women in senior positions often leads to a perceived 'invisibility' of successful women in academic STEM careers. This scarcity of women is likely to perpetuate the problem by discouraging the anticipation of success among female scientists who wish to progress further, and perpetuating current cultural norms. Role models are essential not only to inspire and mentor students and early career researchers who are keen to succeed in an academic STEM career, but to evidence the possibility of success.

Examples of best practice

15. Kings College London has introduced a parenting leave fund which provides up to £20K for someone returning from maternity leave to spend in such a way that will keep their research moving – for example by extending the funding of a PhD student, buying a small piece of equipment to support work towards a new grant or providing funds to attend conferences.

16. University College London gives a one semester teaching sabbatical for maternity returners. Furthermore Bristol University has a Women Returners Scheme⁸ which offers up to 6 months of protected research leave. This is more flexible with returners able to use the money to fund a researcher.
17. Queen's University Belfast has a Gender Initiative⁹ involving a Director and two other staff. This initiative significantly helped QUB achieve Athena SWAN Silver (the first University to do this and it remains one of only three in the UK to hold Silver) and its School of Biological Sciences to be awarded a departmental gold award.
18. Nottingham University runs a highly successful Women's Development Programme of women-only courses aimed at providing skills, information and opportunities for networking.¹⁰ The programme offers 3 courses tailored to the specific needs of women at different stages of, and in different areas of, their academic STEM careers.
19. The Wellcome Trust Career Re-entry Fellowship and the Daphne Jackson Trust Fellowship are initiatives designed to facilitate the return of scientists, engineers and technologists to their careers after a break. They are flexible and often include a tailored training programme designed to update the skills and knowledge of the Fellow thus allowing them to return at the appropriate level to their career.

When women leave academia, what careers do they transition into? What are the consequences of scientifically trained women applying their skills in different employment sectors?

20. Some women who do not continue to work in the STEM sector have made positive choices to pursue careers in other sectors and will continue to make a valuable contribution to the economy. However, there is cause for concern regarding the large discrepancy between the proportions of men and women who make the decision to leave the STEM sector. Female STEM graduates are more likely than male STEM graduates to be unemployed or economically inactive, with an employment rate of 80.2% compared with 85.3% for men.¹¹
21. However, many women who leave academic careers are keen to remain in a science-related area and our membership indicated a number of preferred professions to which female scientists often migrate. Employers include science-based industries (in both research and development and management areas), learned societies, publishers, research funders, medical charities, or education charities. Additionally, some female scientists go into teaching and other professions such as banking, law and accountancy.
22. Often the impetus for such a change is to obtain a career that allows part-time positions and/or flexible working hours. Such positions are often perceived to be more compatible with caring responsibilities.
23. Our members were keen to stress that scientists – of both genders – have a variety of generic skills that are highly valued by a wide range of employers. They are generally highly experienced in project management, time management, communication (both written and oral), information retrieval and analysis, data analysis, team-based working, budget control and people management. Those

⁸ <https://www.bris.ac.uk/equalityanddiversity/act/protected/sex/swancharter/wrs>

⁹ www.qub.ac.uk/sites/QueensGenderInitiative/

¹⁰ <http://pd.nottingham.ac.uk/eng/Womens-Development>

¹¹ Office of National Statistics, 2010

who leave academic careers can bring a great deal to other sectors. Indeed there are many benefits that can result from scientifically qualified women and men entering a different sector as they can champion the importance of science and bring valuable understanding of science and scientific research to sectors such as government and the media.

24. The consequences of scientifically trained women applying their skills in other careers can be double-edged. Female scientists who become teachers can serve to highlight to girls that STEM subjects are not just for boys; but they can also reinforce the view to the next generation that women are unable to have a successful academic career and instead must pursue careers that allow better work-life balance. This is a complex relationship that must be addressed at all levels.

What should universities and the higher education sector do to retain women graduates and PhD students in academic careers?

Maintain 'Roberts funding' career support initiatives

25. Many excellent schemes were established with Roberts funding to allow post-doctoral researchers to develop a wide range of skills and to explore diverse career options. These schemes can provide all post-docs with increased confidence that a range of interesting career options are available to them, and help them to make considered choices about their next career move. These schemes can therefore reduce the insecurity that results in a disproportionate number of women leaving academia.

Establish mentorship schemes

26. An effective mentorship scheme can provide support and encouragement to female scientists. Mixed gender schemes should be advocated as far as possible to avoid increasing the pastoral care responsibilities of female academics over their male colleagues.

Address the promotional system

27. Line Managers and Heads of Departments should regularly review staff for promotion, particularly those who have been in one post for a long period of time. Staff appraisals should be held annually and promotion opportunities should be discussed. As previously highlighted, current promotion criteria generally value research disproportionately to other academic responsibilities. HEIs should endeavour to look at a wider range of contributions and take into consideration candidates that have successfully managed their career and caring responsibilities. Universities should also endeavour to address the gender pay gap.

Improve maternity and paternity leave support

28. HEIs should provide additional support to help scientists through the difficulties of running their research group while on maternity or paternity leave. Examples of this could include providing funding for a postdoc to support the lab in their absence and making effective use of keeping-in-touch (KIT) days.

Facilitate those returning from extended career breaks

29. As well as improving support for those returning from maternity/paternity leave, universities should consider establishing mechanisms for supporting those returning from an extended career break, such as scientists who have taken substantial time out to focus on their caring responsibilities. The

development of training programmes and provision of opportunities for 'work experience' would aid returners in becoming 'up to date' once again.

Support those with caring responsibilities

30. We previously identified that a key impetus behind a career change for many female scientists is to seek a job that allows strategically organised part-time working that allows for a research focus. Thus, if universities were to offer and facilitate these options, a huge benefit could be gained for scientists with caring responsibilities. However, HEIs must recognise that outputs will not be as great as those working full time and take this into account when considering promotions. Efforts to hold key meetings (and as many others as possible) during core hours would also be valuable.

Promote equal distribution of teaching and pastoral responsibilities

31. HEIs should monitor the allocation of non-research-based commitments and ensure that these are fairly distributed, so that women do not carry a greater proportion of responsibility than men in particular areas - especially while there remains iniquitous recognition of these as valuable activities. Again, this has implications for career progression and promotion.

What role should the Government have in encouraging the retention of women in academic STEM careers?

Develop, promote and engage with diversity initiatives

32. *The Government should ensure there is adequate resourcing for, and aid in the development of, initiatives to tackle gender segregation in the STEM sector. The Government should consider the National Science Foundation ADVANCE programme¹² as a model of good practice.*

33. *The UK Government should appoint a 'Diversity and STEM' champion to drive a cross-governmental, cross-departmental and integrated strategy to tackle gender segregation in the STEM sector. The champion should ensure that there are adequate funding, monitoring and feedback arrangements in place so that the effectiveness of the strategy can be assured.*

34. *The Government, through the Higher Education Funding Councils should expect universities to develop a strategy within a two-year period to bring all their STEM departments up to the level of an Athena SWAN award or equivalent (such as JUNO). Furthermore their progress in achieving this level of performance should be monitored and the Government should commit to ensuring that there is adequate funding for such gender initiatives.*

Address the provisions for those combining an academic career with caring responsibilities

35. Akin to serious efforts made by the National Health Service to retain female doctors and consultants by promoting part-time employment contracts as part of their Improving Working Lives (IWL) initiative introduced in 2000,¹³ the Government should endorse the introduction of such a scheme in HEIs. The Government should also ensure the availability of affordable high quality childcare both for pre-school children, to support parents wishing to return to work after the birth of their children, and for school-age children, to allow parents to balance effectively work and parenting.

¹² <http://www.nsf.gov/about/>

¹³ http://www.jobs.nhs.uk/about_nhs.html

Address the gender pay gap

36. There is evidence of a gender pay gap in the biosciences. Median hourly pay for biological scientists and biochemists (excluding overtime for full-time employees) stood at £16.38 for men but only £15.08 for women in 2006.¹⁴ This represents an 8% pay gap at that time. This can lead some women to prioritising a male partner's career over their own. The Government should reaffirm its commitment to eliminating this gap by the introduction of statutory pay audits, and a requirement on public sector organisations to demonstrate their plans and actions for closing the gender pay gap within an agreed timescale.

Investigate recruitment

37. In employing head hunters to fill vacancies for top positions including Chief Scientific Advisor roles and Chairs of Committees, the UK Government should ensure that representative numbers of male and female candidates are provided which reflect the proportions of women at the top of the academic career ladder.

Commission research

38. The evidence base must be strengthened surrounding women's attrition in academic STEM careers. Research projects, including longitudinal studies, should be carried out to enable a deeper understanding of why and when women leave specific science areas and what can be done to increase retention rates. The Government should also act to improve the availability and dissemination of gender disaggregated statistics covering women in STEM.

The Society of Biology is pleased for this report to be publically available. For any queries, please contact The Society of Biology Policy Team at Society of Biology, Charles Darwin House, 12 Roger Street, London, WC1N 2JU. Email: policy@societyofbiology.org

¹⁴ Office of National Statistics, 2006

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