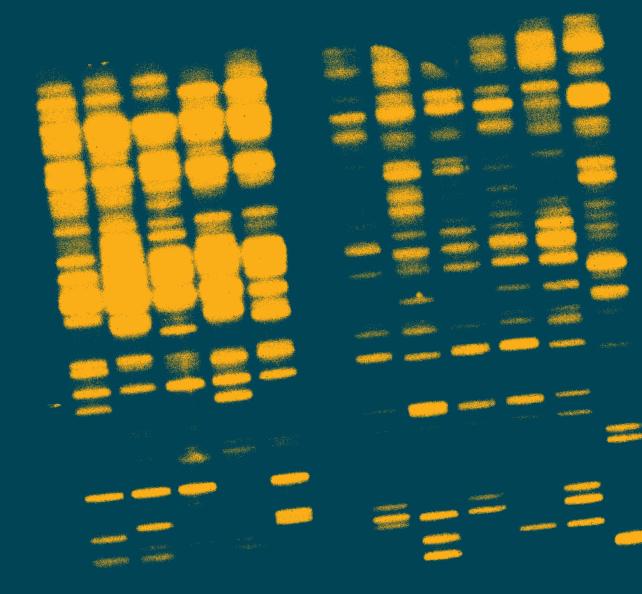# A picture of the UK scientific workforce

Diversity data analysis for the Royal Society
Executive summary

THE
ROYAL
SOCIETY

Executive Summary

Background

The Royal Society is concerned with excellent science wherever and by whomever it is done. A lack of diversity across the scientific community represents a potential loss of talent to the UK. This report is part of a four-year programme of work to understand any barriers to entry and progression in science, with a view to removing them.

This report describes the diversity of the UK's scientific workforce based on three separate commissioned analyses of different datasets. The first uses the Annual Population Survey 2011 to provide a snapshot of the current scientific workforce compared with the overall workforce. The second looks at the career progression of a cohort of mid-career individuals, using the longitudinal British Cohort Study of over 16,000 people who were born in 1970. The third focuses on the university sector, examining the destinations of people leaving higher education, based on data from the Higher Education Statistics Agency over a period of 5-6 years.

The datasets were collected for other purposes, and the extent to which it is possible to interrogate them to describe the diversity of the scientific workforce is necessarily limited. There are large gaps in the data, the questions and definitions in the cohort study have changed over time, and most significantly, there is no shared definition of the scientific workforce. Insofar as it is possible, the analyses presented here concentrate on individuals for whom their scientific knowledge, training, and skills are necessary for the work that they do.

The results present information about the gender, disability, ethnicity and socio-economic background of people in the scientific workforce. Other diversity characteristics tend not to be recorded in the datasets. The three commissioned studies are published separately.

Findings

The picture that emerges from the data is very complex but even with the highly imperfect nature of the available data, distinct patterns emerge.

Overall scientific workforce

- Approximately 20 per cent of the people in the UK workforce need scientific knowledge and training to do their current jobs.

- Approximately one half of these people work in the private sector, one quarter in different parts of the education system and one quarter in other parts of the public sector.

- Of the cohort of mid-career individuals, 47 per cent have at one time or another worked in science.

- As a whole, the scientific workforce is better paid than people in other occupations, but relatively few people who work in science are in the very highest wage band.

Gender

- Women are not underrepresented in the overall scientific workforce, but they are highly underrepresented at the most senior roles.

- Women are also underrepresented in certain subjects in academia; for example, the proportion of first degree students who are female varies from over 79% in subjects in Psychology and Behaviour Sciences and Veterinary Science to 9.6% in Mechanical Aero and Production Engineering subjects.

- For a cohort of mid-career individuals, those women who entered the scientific workforce took longer to do so after finishing education than men did. They were also less likely than men to remain in science throughout their careers.

- For the same cohort, women working in science were less likely to take career breaks than women who work in other occupations. When women working in science do take career breaks, the break is more often connected to the birth of a child than other reasons and are often shorter.

- Women are less likely than men to progress from a first degree to further research-based study.

- For mathematics, computer sciences, engineering and technology, men are more likely to be employed in science occupations after graduating from university than are women. In subjects allied to medicine the pattern is reversed and in other

disciplines, men and women are equally likely to go into employment in the scientific workforce.

Disability

- Disabled people are underrepresented in the workforce as a whole, but they are no more underrepresented in the scientific workforce than in other occupations.

- They are less likely to be in the most senior roles than people who are not disabled, but this trend is less pronounced in science than in other sectors.

Ethnicity

- The pattern of ethnicity in the scientific workforce is extremely complex.

- Overall in the scientific workforce, black and minority ethnic workers are relatively concentrated at the two ends of the spectrum – they are overrepresented in the most senior and most junior parts of the scientific workforce. However, black and black British people are slightly underrepresented in the most senior roles. Other ethnic groups, most notably Chinese, are overrepresented in the most senior roles.

- For the mid-career cohort, people from white ethnic backgrounds were 1.5 times as likely to have worked in science at some stage of their careers so far than those from black or minority ethnic communities.

- For the same cohort, an individual's ethnic group is also related to sector of employment – for example, people from white ethnic backgrounds who work in science are more likely to work in manufacturing or academia than those from black and minority ethnic backgrounds.

- Black and minority ethnic students are less likely to progress to scientific jobs after graduating than white students.

Socio-economic background

- Socio-economic background has a strong effect on an individual's likelihood of entering the scientific workforce. For the mid-career cohort, science workers living in households in the highest income bracket (£20,800 or over[1]) at age

16 in 1986 are more than five times as likely to progress to a professional level occupation than those in the lowest household income bracket (less than £5,199 pa[2]).

- For the same cohort, people with better educated parents and people from middle-income families were most likely to enter science.

- Individuals from lower socio-economic backgrounds who did enter the scientific workforce took longer to do so than those from higher socio-economic backgrounds.

Recommendations

The Society believes that in order to better understand the diversity makeup of the scientific workforce and entry, progression and retention within the workforce future analysis of datasets could be improved through:

1. An agreed definition of the scientific workforce used across and by government departments and dataset owners would allow data to be compared and help improve understanding of entry into and progress through the STEMM workforce for underrepresented groups.

2. Consistency between the definitions of and variables within diversity characteristics which would allow better data collection and analysis of multiple datasets on the STEMM workforce.

3. Improved links between existing datasets to better understand the diversity of the scientific workforce and community, from school through to vocational, further and higher education and into the workplace, across the full range of STEMM sectors.

4. Better data for the private sector to build a full picture of the scientific workforce in relation to diversity and entry into and progression within the scientific workforce.

5. Further exploration of graduate outcomes by ethnicity, disability, gender and parental occupation (a measure for socio-economic background).

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1 Adjusted for inflation, this was approximately £51,667 or over per annum in 2012.
2 Adjusted for inflation, this was approximately less than £12,915 per annum in 2012.

A picture of the UK Scientific Workforce

As part of the Royal Society's diversity programme the Society set out to analyse and understand the composition of the scientific workforce in terms of gender, disability, ethnicity and socio-economic status and background. We commissioned several data gathering exercises to explore these issues.

Copies of the summary report, accompanying research reports and data tables can be downloaded from our diversity web pages. The research reports include:

• TBR and the Science Council (2012) 'Leading the way: increasing the diversity of the UK Science workforce'

• TBR, (2013) 'Leading the way; increasing the diversity of the science workforce. Project two: exploring the impact of socio-economic background on careers in science'

• Point Research Limited (2013) 'The diversity of the UK science workforce: Quantitative analysis of the Annual Population Survey'

• Oxford Research & Policy (2013) 'Summaries of observations on the destinations of STEMM leavers from higher education and on higher education staff including their previous employment and leaving destinations'

The Royal Society

The Royal Society is a self-governing Fellowship of many of the world's most distinguished scientists drawn from all areas of science, engineering, and medicine. The Society's fundamental purpose, reflected in its founding Charters of the 1660s, is to recognise, promote, and support excellence in science and to encourage the development and use of science for the benefit of humanity.

The Society's strategic priorities are:

• Promoting science and its benefits
• Recognising excellence in science
• Supporting outstanding science
• Providing scientific advice for policy
• Fostering international and global cooperation
• Education and public engagement

Founded in 1660, the Royal Society is the independent scientific academy of the UK, dedicated to promoting excellence in science

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Cover image: one of the first examples of genetic fingerprinting developed by Alec Jeffreys FRS, 1984.