



2 April 2012

## **Postgraduate Education Inquiry – Call for Evidence**

### **EVIDENCE SUBMITTED BY THE SOCIETY FOR GENERAL MICROBIOLOGY**

#### **Introduction**

The Society for General Microbiology (SGM), founded in 1945, is an independent learned and professional scientific body dedicated to promoting microbial science. It has established itself as one of the two major societies in its field globally, with over 5,000 expert members in the UK and abroad, and is a publisher of key academic journals in microbiology and virology and an event manager of international scientific meetings. Further information about SGM is provided in Appendix 1.

#### **Responses to consultation questions**

**Question 1:** How well does the current postgraduate system meet the needs of businesses? How can the system become more responsive?

**Response to question 1:** Microbiology is the scientific study of bacteria, viruses, fungi and related microscopic organisms. Microbiological knowledge has many direct connections with business and trade, particularly in disease detection and control in crops and farm animals; preservation of stored agricultural products; healthcare; and in fermentation processes in chemical production. In the near future, microbiologists expect to have central roles in the manufacture of biofuels and in the development of 'green' feedstock technologies for the chemical industry. As such, we believe that microbiology training remains an important part of our technical and scientific education system in support of industry.

Microbiology is currently represented in the UK by about 60 Masters courses with microbiological content that are taught in universities, hospitals and colleges. This taught postgraduate system sits alongside research training at PhD level. Although comprehensive national statistics are unavailable, we estimate that there are over 1000 PhD students with an interest in microbiological research in the UK.

Collaboration with industry is already a feature of postgraduate courses, but collaboration needs to be emphasized as it allows industry and academia to understand one another, and for academic microbiologists to respond to the needs of business in designing courses.

PhD training co-supervised by industrial and academic partners, with placement of the student with the industrial partner during the PhD, is one way of forging strong links between industrial and academic research at the grassroots level and ensuring the research is of industrial relevance. The

reasons why CASE studentships, which met these criteria, proved difficult to fill at the level desired by the Research Councils should be investigated.

Another point to make is that there has been a reduction in the number of courses in microbiology at the *undergraduate* level. As such, there is a continued need to support taught postgraduate 'conversion' courses that allow undergraduate students from other technical disciplines, such as the biomedical sciences, agriculture and chemical engineering to develop skills in microbiology.

**Question 2a:** What is required for the UK to maintain its ability to attract and retain high-quality international students and international researchers?

**Response to question 2a:** Given our strengths in microbiology, the UK already has the potential to attract and retain students and researchers from overseas, but we must always be mindful of the need to maintain our international competitiveness. The recently-introduced UK Border Agency restrictions on entry and right-to-stay for international scholars and researchers have severely reduced the attractiveness of the UK as a destination of choice for researchers in microbiology. Part of the evidential basis for this is the Australian experience and, following the Knight Review (2011), the Australian Government has now reduced the restrictions on student entry in an attempt to redress a fall in applications.

**Question 2b:** What are the long-term implications of the postgraduate sector's dependence on international students?

**Response to question 2b:** There is currently buoyant demand from international students for courses in microbiology and long-term this may build connections to global leaders in currently emerging nations, strengthening future links between the UK and other economies. Micro-organisms do not respect political borders – economically-destructive infections of crops and farm animals as well as pandemic diseases such as influenza that infect people reflect the trans-national movements characteristic of globalization. Thus, building global networks of researchers is essential to understanding and controlling pandemic disease and disseminating good practice in managing technologies such as genetic modification. International networks of experts trained in the UK, and with a commonality of purpose, enhance our response to emerging issues in microbiology. However, the dependence of Universities on international students potentially undermines the long-term prospects for an expert knowledge base in the UK, assuming a significant proportion of UK-trained students return to their native countries (or, at least, depart the UK).

**Question 2c:** How might UK-domiciled students be encouraged to engage in doctoral study?

**Response to question 2c:** UK postgraduate provision needs to be benchmarked against the best international practices and curricula regularly reviewed. Beyond this, there are two major disincentives to engaging UK students in doctoral study. First, the fee burden that such students accumulate during their undergraduate degrees, for which compensation needs to be made when they undertake postgraduate research. Second, UK students often lack the numeracy and practical

skills in their undergraduate training that are to be found in students trained elsewhere in the EU, and they may find the commitment to a practical PhD to be outside their experience. Accordingly, they face a very steep learning curve. Potential supervisors frequently express a preference for students trained outside the UK. While many UK-based undergraduate courses in microbiology are certainly world-leading, there needs to be greater practical training across the board in relevant 'feeder' undergraduate courses in the UK.

**Question 2d:** In what areas can UK postgraduate provision be considered outstanding internationally?

**Response to question 2d:** UK training in microbial genetics and genomics, in microbial pathogenesis and in infectious disease is outstanding. UK universities also offer a broad range of microbiology courses in environmental microbiology.

**Question 3:** How well does current practice support smooth transitions from postgraduate education into industry and academia?

**Response to question 3:** For microbiologists, the transition to academia after one or more postdoctoral positions is a well-tried and standard route. The number of academic jobs is much smaller than the number of potential applicants. Consequently, this bottleneck of secure and attractive employment beyond postgraduate study, particularly at the post-PhD level, is constraining the recruitment of the best minds into postgraduate education. A more structured academic career path, less entirely dependent on achieving the few highly-prized principal investigator positions would alleviate the bottleneck. Alternate routes should be considered as a way of utilizing the skilled workforce that is produced. One example would be transition to Experimental Officer on an open contract in support of an academic Principal Investigator.

Transition of post-docs into industry is an important route for the future of UK bio-industries, yet is bedevilled by the small number of companies in the UK that have a strong microbiological research base. Over the last two decades, many corporate laboratories have closed down and SMEs have been bought out by global companies with no research base in the UK. Where transitions do work well, there is industrial engagement in the training component.

**Question 4:** How can postgraduate provision in the UK be made more accessible for students from less-advantaged backgrounds?

**Response to question 4:** At one level, raising the aspirations of such students to undertake postgraduate training is essential. This can be done through public engagement activities and ensuring that research careers are valued. Data on the earning potential and employment opportunities of PG-qualified individuals needs to be gathered across the disciplines and made visible to candidates. In addition, students from less advantaged backgrounds are unlikely to have their full undergraduate costs covered, even with the most generous of bursary schemes. Postgraduate stipends which cover their full living costs will be essential.

**Question 5:** What impact will the changes to undergraduate provision outlined in the recent Higher Education White Paper have on the postgraduate sector?

**Response to question 5:** Although we are not aware of any modelling of the effect of marketization in the undergraduate sector on postgraduate provision in microbiology, we remain concerned about the impact of market signals on our technical and scientific education system. What matters is maintaining and developing our research and training and supplying realistic career progression for students and researchers in microbiology and related fields. We would hope in any future policy that these remain central to the development of our subject.

**Question 6:** How should postgraduate education be funded?

**Response to question 6:** If the government is serious about a Knowledge Economy, postgraduate provision should receive significant public funds. At present, the Research Councils have withdrawn from funding Masters courses and have significantly reduced the number of PhD studentships and focused those that are funded to specific areas. This is a retrograde step that may not provide the skills base that we need when these students are research leaders in future. The question is whether HEFCE and other Funding Councils will be able to supply the funding deficit in taught Masters courses. Industry and other Government Departments (e.g. DEFRA) should help fund PG training relevant to their remits and requirements.

**Question 7:** Are you aware of any distinctive models of delivering postgraduate education which have been deployed with success in other countries?

**Response to question 7:** Training in employment (“research apprenticeship”) is used in a number of countries. The Teaching Assistant positions in the US, for example, allow PhD students to be funded from teaching income. The Scandinavian system at PhD level – with a thesis committee in charge of supervision and a more flexible approach to training – should be examined as a model. Furthermore, we need to pay closer attention to the Bologna Process and its effects on provision in specific subjects such as microbiology.

**Question 8:** How effective are quality assurance and student feedback mechanisms for postgraduate provision?

**Response to question 8:** Postgraduate research is only now being brought fully into the Quality Assurance Agency framework. It is too early to say how effective this process will be. The external examiner system at Masters level has been useful, but is nearly always a measure of the outcomes and not the effectiveness and efficiency of the process.

## **Sources**

This response is based on evidence submitted by the microbiologists Prof Hilary Lappin-Scott (Pro-Vice-Chancellor and Professor of Environmental Microbiology, Swansea University); Prof Nigel L. Brown (Senior Vice-Principal and Professor of Molecular Microbiology, University of Edinburgh); Prof David Blackbourn (Professor of Virology, University of Birmingham); and Dr Karen Robinson (Associate Professor, University of Nottingham).

## Appendix 1

The Society for General Microbiology (SGM) was founded in 1945 and is now the largest microbiological society in Europe. It has over 5,000 individual members of whom 75% are resident in the UK. The remainder are located in more than 60 countries throughout the world. More than 700 schools and a number of companies are corporate members.

The Society provides a common meeting ground for scientists working in academic centres and in fields with applications in microbiology (medicine, dentistry, veterinary medicine, pharmaceuticals, numerous industries, agriculture, food and beverages, the environment and education). The majority of Society members are employees of universities, research institutes, health services, government agencies and small to multinational companies.

The science of microbiology covers a great diversity of life forms: disease-related molecular structures such as prions and viruses, Archaea, bacteria, fungi, protozoa and algae. Microbes are of crucial importance in processes affecting all life on Earth: the cause and control of disease, fertility of soils and aquatic environments, fermentation, biodegradation of waste materials and dead biomass, bioprocessing steps in drug and antibiotic production, and molecular biotechnology.

The Society's objective is to advance the art and science of microbiology. It does this by:

- Organizing regular scientific meetings at centres throughout the UK and abroad, where microbiologists meet to hear and discuss the latest research findings. The largest meetings last 4 days and involve up to 1400 participants.
- Publishing four major international learned journals: *Microbiology*, *Journal of General Virology*, *Journal of Medical Microbiology* and *International Journal of Systematic and Evolutionary Microbiology*. The journals are available online through HighWire Press ([www.sgmjournals.org](http://www.sgmjournals.org)).
- Representing the science and profession of microbiology to policy-makers and the media. The Society is represented on a number of biological and biomedical committees and organizations, in the UK and internationally, thereby exerting influence on science policy and education, regulatory affairs and international collaboration.
- Promoting microbiology as a career for young people, by increasing awareness of microbiology in schools and aiding the development of teaching resources. The Society also provides grants for young scientists to attend scientific meetings and training courses.
- Keeping members informed of current developments in professional and scientific matters in microbiology, through publication of the magazine *Microbiology Today* and by other means.

The Society is a Charity registered in England and Wales (No. 264017) and in Scotland (No. SC039250) and a Company Limited by Guarantee, registered in England and Wales (No. 1039582). It is governed by a Council drawn and elected from the membership. The Society employs over 30 staff at its headquarters.

Marlborough House  
Basingstoke Road  
Spencers Wood  
Reading RG7 1AG, UK

Telephone: +44 (0) 118-988 1829  
Fax: +44 (0) 118-988 5656  
Web: [www.sgm.ac.uk](http://www.sgm.ac.uk)

Contact: Dr William Burns, Policy Officer [w.burns@sgm.ac.uk](mailto:w.burns@sgm.ac.uk)