Strategically Important and Vulnerable *Niche* Bioscience Research Skills - Consultation

The Biotechnology and Biological Sciences Research Council (BBSRC), with the support of the Biosciences Federation (BSF), is holding a consultation with the UK bioscience research community regarding concerns over potential shortages in *strategically important and vulnerable* 'niche' research skill areas.

Niche research skills are areas of specialist research expertise where the number of expert individuals need not necessarily be large, but where there may be an important requirement for the UK to retain some expertise in the area concerned. Areas of niche research expertise can be particularly vulnerable due to a number of factors – for example, limited training or career opportunities for individuals, or the retirement of existing specialists over time, etc.

BBSRC invites individuals and organisations from the academic, commercial and institute research sectors to provide information and evidence regarding concerns over specific niche areas of research expertise.

The BSF will be encouraging its Member Organisations to submit responses to the consultation, and will be holding a Task Force meeting in early June.

Please return your responses to clare.nixon@bbsrc.ac.uk by 3 July 2009

This information will be used by BBSRC and its advisory panel, the *Bioscience Skills and Careers* panel, to consider whether BBSRC action may be needed to address concerns, and if so, what interventions would have maximum benefit.

If you have any queries regarding this consultation please contact the BBSRC on [specific BBSRC email address]

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If you are responding on behalf of a society or organisation, please provide details here.	Biosciences Federation

Areas of Niche Research Expertise

Q1) Please list here the area(s) about which you are providing information.

i) *In vivo* sciences including toxicology, pre-clinical pharmacology, pathology and whole-animal physiology. Much of the evidence provided is detailed in the BSF/ABPI report 'In vivo sciences in the UK: sustaining the supply of skills in the 21st century' (available at http://www.bsf.ac.uk/asg/reports/invivo_brochure.pdf).

ii) systematics and taxonomy. Further details can be found in the BSF response to the House of Lords Science & Technology Committee inquiry into Systematics and Taxonomy (available at http://www.bsf.ac.uk/responses/IOB_BSF_BES_response_systematics_Feb08%20final.pdf).

iii) Plant sciences e.g plant breeding, plant pathology and soil science.

Q2) For the area(s) listed in Q1, please indicate whether the concerns are confined to potential shortages at research degree level, or if there are related skills shortages at lower levels (e.g. undergraduate or taught postgraduate).

i) Shortages in i) in vivo skills ii) taxonomic skills and iii) plant sciences relate to both undergraduate and research degree levels.

Strategic Importance

Q3) Please provide evidence for the strategic importance of the area(s) listed, referring to the main 'end-users' or beneficiaries of the research expertise in the UK

i) *In vivo* sciences include all core disciplines essential for the successful development of new medicines and for fundamental research into disease and disease pathways. The main 'end users' of such research are the biotech and pharmaceutical industries, biomedical research organisations including universities, public sector institutes and charities, the NHS and patients.

ii) Systematics and taxonomy are enabling sciences that are fundamental in answering policy and research questions for the major scientific and social challenges of this century: preserving biodiversity, maintaining ecosystem services and adapting to climate change. They underpin many other areas of bioscience, support economically important activities, and enable the UK to comply with its legal and moral obligations to protect the environment and its natural resources. The end users of these skills are varied and included Government Departments such as Defra, DfID, DoH (identification of emerging diseases and disease surveillance), environmental monitoring services, and the agriculture and forestry industries.

iii) Plant science is fundamental to agriculture, forestry, land management and ecology. Without these skills we will be unable to meet the increasing demands for food-crop production or effectively harness the unique contribution of plant biotechnology to energy security and alleviating global climate change. The main end users of these skills are the relevant industries, government departments and the consumers of these industries.

Q4) For the area(s) listed, please explain whether and why it is strategically important for the UK to maintain a supply of trained individuals, rather than seek to recruit from abroad.

i) The UK's ability to continue to receive the wealth and health benefits of biomedical research depends on the UK remaining a competitive and attractive location for such research. Increased global competition for biomedical investment is causing those responsible for research and development to look much more closely at what other locations offer in terms of access to skills, proximity to technical partners, attractiveness of local market conditions, operational costs and taxation rates. Globalisation is giving scientists and business a real choice as to where they are located. The UK can no longer count on remaining a choice location because of its past strengths. Skills in whole animal research are key for regulatory compliance under the Animals (Scientific Procedures) Act 1986 and are also important for future advances in developing alternatives to the use of animals.

ii) and iii) Although it is always possible to recruit some experts from other countries it is essential that the UK retains sufficient expertise to act as the “intelligent customer” in the context of employer. Further, without a good base from which to recruit it may become quite difficult to attract leaders in their fields to the UK.

Q5) For the area(s) listed, please provide evidence of the impacts that could result from losing UK expertise, including the ultimate economic or social impacts resulting from the loss of active research and/or training in the area concerned.

Please be as specific as possible and provide quantitative information if available.

i) Without high quality scientists with in vivo skills, the UK will be unable to either attract new pharmaceutical or biopharmaceutical R&D investment, or to sustain the higher education capability that will expand basic knowledge and train the next generation of scientists. Without these skills to design, carry out and interpret pre-clinical research on animals (particularly safety research), the entire drug development process, from academic biomedical bench research through to the discovery of new effective medicines, cannot proceed. The supply of a relatively small cadre of individuals with these skills therefore has a potentially large impact on UK productivity, biomedical science, competitiveness and health.

ii) A decline in taxonomy and systematics in the UK would directly and indirectly impact on the Government’s ability to deliver across a wide range of policy goals (see under Qu 3). For example the ability to monitor climate change or the wellbeing of an ecosystem requires that the geographical range of any organism can be monitored correctly. Currently the UK has few working scientists with a sufficient knowledge of lichens or marine algae to undertake this important role.

iii) Whilst the UK retains some strong foci in plant sciences at BBSRC Institutes and elsewhere, the reduction in teaching in this area may create serious loss of interest/exposure in the subject and reduced supply of good technicians and research leaders. A skills shortage in the UK will not only affect our ability to respond to the need for elevated food production at home but globally as well.

Vulnerability

Q6) For the area(s) listed, please provide evidence of their vulnerability.

Hard evidence is crucial to help with the prioritisation of BBSRC action, and to indicate the scale of the problems. For example, evidence of vulnerability may relate to the age profile and numbers of existing specialists; trends in the numbers of research students being trained; numbers of unfilled vacancies for skilled individuals; etc.

i) About 75% of relevant employers (industry, universities, public sector and charity research organisations) report finding it "difficult" or "very difficult" to hire staff with appropriate in vivo skills. Most are managing the difficulties by recruiting people with higher degrees or investing heavily in training, with about 70% of employers believing the difficulties have had a negative impact on their productivity.

ii) There has been no comprehensive assessment of the numbers of taxonomists in the UK for more than 10 years. However NERC will launch a review of the research needs and capacity for taxonomy and systematics research in the UK in September. Precise data exists for algal taxonomists (see submitted data from the British Phycological Society) and makes depressing reading. The majority of submissions to the HoL Systematics and Taxonomy inquiry testified to a general picture of decline in taxonomist numbers, particularly in UK universities.

iii) Considerable quantitative evidence of vulnerability is provided in the Gatsby Charitable Foundation/Centre for Education and Industry report on trends in the uptake of plant sciences in the UK (http://www2.warwick.ac.uk/fac/soc/cei/news/).

Q7) For the area(s) listed, please provide details of what the ultimate causes of the problem seem to be.

Please provide as much information about underlying causes, rather than 'symptoms' of the problem. For example, if postgraduate numbers in an area are declining, is this due to a lack of career opportunities within or outside academia?

i) Employer demand for in vivo skills has been stable over the past 10 years, but supply has declined. Fewer students now study the practical aspects of whole animal physiology and pharmacology, and those who do, spend a much smaller proportion of time on in vivo work than was the case historically. Shifts within curricula, regulatory bureaucracy, changes in societal values on using animals, high costs and the doubling in student:staff ratios within universities have driven the decline. The high cost associated with supporting vivarium in academic institutes makes provision of both undergraduate and postgraduate training economically difficult.

ii) One of the key drivers of the decline in taxonomy at UK universities has been the Research Assessment Exercise. The RAE's emphasis on high impact journals and the low weighting given to measures of esteem in which contributions to informatics initiatives and expertise might be recognised, discourages universities from recruiting systematists. Funding is also a barrier with taxonomy falling into a gap between research councils' funding. Consequently the paucity of university systematists impacts negatively on training and education in systematics and taxonomy.

iii) Decreased student demand for plant science courses, reduced public investment in agricultural research, and the restructuring and closures of specialist research centres has reduced capacity in essential skills in the plant sciences.

Actions

Q8) Please provide information on any actions of which you are aware *by institutions,*

companies, or professional societies to address the vulnerabilities in supply of expertise in the areas listed.

i) We (the BSF) have developed an 'ideal curriculum' for a Masters course in safety pharmacology and are actively seeking support from funding bodies. The Physiological Society and the British Pharmacological Society have developed in vivo summer schools for students without access to the learning in their own institutions and the Institute of Animal Technology has revamped the training for animal technologists. Several employers have developed bespoke training programmes for employees which include in vivo techniques.

ii) The Linnean Society hosts an annual systematics debate series to stimulate interest in the field and distributes a small number of grants such as the Linnean Society/Systematics Association/ BBSRC Collaborative Scheme for Systematics Research (CoSyst). The NHM supports a Masters course at Imperial College.

iii) The Gatsby Charitable Foundation's Plant Science programme provides grants for young researchers and also supports the Science & Plants for Schools scheme which works to strengthen plant science education in schools. The British Society for Plant Pathology distributes student vacation and MSc bursaries and provides a fund for the promotion of plant pathology.

Q9) Please describe what actions could be taken forward *by BBSRC* (in partnership with others, where appropriate) to support the efforts identified in Q8.

i) Providing funding for targeted Masters courses; increasing priority support for PhD level training, ideally through CASE style programmes. Linking a CASE PhD to every three MSc places would improve the attractiveness of the MScs both to potential UK applicants and to the academics whose time is required to train and supervise the MSc students.

ii) Increasing funding to allow expansion of CoSyst Scheme; work with NERC to close gap in funding.

iii) Providing funding for summer studentships, targeted Masters courses and support for teaching staff.

Thank you for providing your views.