

Impact template (REF3a)

Institution: University of Derby
Unit of assessment: UoA5 Biological Sciences
<p>Context The Biological Sciences Research group (BSRG), whilst small and highly diverse, has utilised previous QR funds efficiently to achieve impact locally, nationally and internationally. Our research themes can be broadly divided into conservation/behavioural ecology and human health, and impact can be demonstrated in the areas of insect behaviour, ecosystem diversity, plant conservation, improvements to cancer treatment, cancer drug stability and human exposure to toxic elements. Our work has reached a diverse array of non-academic beneficiaries within the areas of Health and Welfare, the Economy, Public Policy and Services and Public Engagement with Science. International beneficiaries include plant cryopreservation scientists in Malaysia.</p>
<p>b. Approach to impact Since the RAE 2008 we have targeted research active staff who produce high impact research (for example, Bulling, Knight, Ramsey and Sweet) and who can contribute to existing research themes (for example, Knight complements the cancer research of Sowter). Our new staff have also strengthened international collaborations, so increasing the worldwide impact of our research.</p>
<p>Public engagement with science (further details in case study 1) Mehra has impacted public knowledge on the fluoridation of drinking water when her research was aired nationally on ITV Central News, (04.03.09 at 6 pm) in a piece filmed in our laboratories. She also appeared on BBC East Midlands news on 25th July 2013 (at 13.30 and 18.30) together with Lynch and Chan to discuss her paper on human exposure to fluoride from tea. This story was reported by several newspapers nationally and internationally. Barnes has aired two live shows on Radio Derby (audience of 155,000 adults per week) based on her research in @July and August 2011; On July 30th 2013 Huck's comments on an article on primate monogamy (Opie et al. PNAS vol. 110 p.13328) appeared in The Guardian and CNN on-line (generating 1160 comments). The local public from Derbyshire attended Derby Bioblitz 5-6th June 2010, an event promoted as BBC Springwatch Wild Day out and hosted by Rowe. Twenty four hours of wildlife recording by the researchers and the public enabled the completion of a full list of animal and plant species for Markeaton Park (641 in total). Changes to Government policy Mehra was appointed as an advisor (2008-2011) to the Environment Agency's (EA) 'Regional Environment Protection Advisory Committee (REPAC), a statutory committee under the Environment Act 1995 which reports to the Secretary of State for the Environment and the Board of the EA. She advised on the regional and national strategy and policy of the EA including 'The Environment Agency Corporate Strategy 2010-2015, the Midlands' 'Regional Biodiversity Action Plan', and the 'Water Framework Directive'. As an invited 'Environmental Sustainability Advisor' to the Derby City Partnership Objective 2 Action Plan, Mehra advised on issues relating to environmental sustainability on project applications for funding from the European Regional Development Fund and European Social Fund in 2008. Mehra shared her research methods devised at Derby for the sampling of soils and plants to visiting academics from the University of Ioannina, Greece in 2003. This led to collaborative research projects (2004 onwards) which have impacted the Greek government policy-making on the reuse of wastewater and sludge in their agricultural practices given in the National Standards,</p>

2011. Mehra was invited to review a proposal on 'Apportionment of trace metals of pollution in outdoor and indoor PM-10, PM-2.5 and in selected flora of Kuwait arid ecosystem' from Kuwait Foundation for the Advancement of Sciences (KFAS) in 2006. KFAS programmes focus on the development of human resources, preservation of national heritage, and co-operation between Kuwaiti scientists, administrators and national organisations and the international scientific community in order to address national priority issues to ensure optimum benefits to the nation and region at large (report sent to KFAS in 2012). Rowe has been a key figure in the recent debate into *Chalara* (Ash tree) dieback, and has given interviews to The Guardian (06.11.12) and The Derby Telegraph (08.11.12). He was invited to take part in a Defra and BBSRC workshop on *Chalara* Science (London 13.12.12, hosted by Defra's Chief Scientific Adviser, Professor Ian Boyd) which aimed to define and prioritise current and future evidence needs for *Chalara*, and his comments were included in a House of Commons debate pack given to MPs on 12th Sept 2012. **International Development** Lynch's collaboration with the Research Institute of Crop Production in the Czech Republic has helped to establish the Czech Cryobank of Vegetatively Propagated Plants; this was assisted by the application of cryopreservation protocols developed at Derby and it now contains accessions of Czech germoplasm. Lynch, initially funded by the British Council, assisted University of Malaya (UM) and the University Putra Malaysia (UPM) to develop techniques for the cryopreservation of crop species. As a direct result of this the UM has received two contracts to develop suspension cultures for the banana and pineapple. Currently, the laboratory is developing transgenic bananas resistant to *Fusarium* wilt, using suspension cultures as target systems. This has been funded by a grant from the Malaysian Ministry of Science and Innovation amounting to c.RM 1 million. With Malaysian government funding, the UM laboratory is now using cryopreservation to pursue commercial exploitation of wild orchids. Lynch is currently assisting a cryopreservation group at UPM which is developing cryopreservation protocols for the conservation of oil palms to initiate a genebank.

Support of staff by the BSRG and central resources from the University of Derby (UoD)

The BSRG hold regular meetings focussing on funding opportunities and collaborations. We have secured £38,000 of internal research money from the UoD (teaching informed research fund). The BSRG has targeted the distribution of QR money since 2008 to research that has demonstrable impact, via a competitive bidding process (examples of funding use include the purchase of new research equipment, attendance for Cat A researchers at international collaborative meetings, pay for contracted research support staff and teaching cover to release staff writing journal articles and preparing grant applications). To improve our PG degree attainment (as recommended at the RAE 2008), departmental funding for two graduate teaching assistant (GTA) positions was made available (Archer and Shropshire), also competitively applied for. The University organised a Research Impact conference in Jan 2010 featuring presentations from assessors of the impact pilot study (for example, Judy Simmons) to which all research staff were encouraged to attend and internal research conferences yearly promote interdisciplinary working and sharing of good practice that increases project impact. In 2012 and 2013 BSRG staff set up several competitive internships whereby undergraduates gain research training above and beyond their degree. Student involvement in research projects provides additional support for staff projects, impacts on the training of future generations of scientists and helps maintain the "value for money" shown by the BSRG.

c. Strategy and plans The BSRG will continue to target any QR money to research with potential for demonstrable impact, as judged by a panel of experienced researchers during a competitive bidding process. The BSRG is growing in terms of academic expertise (new staff), PGR students (GTAs) and income generation (albeit through non-peer reviewed routes), and we are building on current research to achieve sustainable impact throughout the next 5 years. For example, our links with Royal Derby Hospital generate original research (Sowter has obtained funding from a patient group to run a clinical trial into inspiratory exercise for cancer patients in 2014), and an East Midlands-wide bid for a research for patient benefit grant is planned for 2014 to extend the Yoga trial. Our strengths lie in our inter-disciplinary collaboration, and Sowter (with Prof. White from the Art, Design and Technologies Faculty) has internal University funding to measure the effects of contemplative space in the museum and gallery (2014). We have put in place links with Derby County Council (Beverley Rhodes) and have obtained several local research projects via their "Wild Derby" team, which aim to contribute positively to biodiversity and wildlife habitats in the city of Derby and surrounding areas. Research staff effort will be focussed on tackling local environmental issues (for example audit and mapping of nature reserves in Mickleover and Swadlincote). Our international impact will increase, for example collaborations have been set up with research teams in the USA (University of Southern California), Indonesia (The Orangutan Foundation International organisation), Malaysia (Universiti Putya), Germany (Lynch acts in a knowledge transfer capacity with a German company, IPK, on garlic preservation protocols that have potential global importance) and the Netherlands (Institute of Ecology). Applications to other sources of funding (for example from Research Councils and charities) will be encouraged and supported via an internal peer assessment of all proposed grant applications before submission (already in place), and by continuing to hold regular external funding workshops. The commitment from the Faculty to funding GTA positions is being extended indefinitely (with a target of 3-4 PhD completions every three years). Current GTA positions (starting Jan 2013) are "The Role of Habitat Enrichment in Improving Welfare in Captive Primates" led by Bulling, and "Learning lessons from the past: understanding the classification, speciation, distribution and current status of the Natterjack toad in Great Britain" led by Rowe, which have national and international impact.

d. Relationship to case studies Since 2008 our group has obtained over £160,000 in external funding (see environment form), which has contributed to impact made in patient treatment (case study 1), Vahed's impact on public awareness and to our future impact strategy. To improve our PG degree attainment, departmental funding for two GTA students was competitively bid for by members of the research team, and awarded to projects most likely to achieve a high impact (in 2009 these were Sowter's Yoga trial and Wilkinson's and Sowter's Herceptin stability study). Sowter was released from other contractual duties to run oncology training days for NHS clinical trials staff throughout all UK networks (4-6 days per year between 2009 and 2014); her clinical trial leadership and basic research into gynaecological cancer informs this training, and income generated through this was used to improve the research infrastructure of the BSRG. This included the purchase of an inverted microscope, which was used extensively in the Herceptin study. Internal money from the University has also funded some of Sowter's work with the ovarian TMA (£2400 from the teaching informed research fund in 2008).