Institution:
Oxford Brookes University

Unit of Assessment:
5: Biological Sciences

a. Context

The Biological Sciences UoA primarily comprises research groups and staff within the Department of Biological & Medical Sciences (BMS) within the Faculty of Health & Life Sciences together with the biological anthropologists from the Department of Social Sciences (SS); both of which are new departments following a major University reorganisation from eight schools to four faculties in 2011/12. The main non-academic beneficiaries of the unit's research range from the Pharmaceutical & Biotechnology Industries (**Fell** & **King** case studies), healthcare practitioners and ultimately the general public and patients (**Groome** case study), to informing the policy of Governments and International bodies (**Kadhim** case study). Oxford Brookes sits within the top ten universities in the UK for income generated through its IP and this success is entirely derived from IP that has arisen from research in the Biological Sciences (largely **Groome** case study and more recently **King** case study).

b. Approach to impact

Central to our approach to supporting staff and research groups in realising the impact of their research has been the commitment and involvement of the Head of Department (and former Head of the School of Life Sciences 2008-2011) working in partnership with the appropriate research group PI, the University's Research & Business Development Office (RBDO) and the Faculty Associate Dean for Research & Knowledge Exchange (ADRKE).

At the research grant application stage, PIs are supported by a mentor and members of the Faculty research office (RO), who read, comment on and help refine pathways to impact statements. One member of the RO team has expertise in supporting impact statements. All PIs and research fellows produce a rolling five year research plan, which is updated and discussed annually with the Department Research Lead and as necessary the ADRKE. The plan prompts staff to consider the impact of their research and what support might be required to enable the impact to be achieved, particularly as a funded project draws to a close. As a result of these meetings, staff may be advised to contact the Business Development Officer for the Biological Sciences in RBDO, who will review and assess the various opportunities open to the PI, including obtaining external expert advice (including ISIS Innovation Ltd) on patents, licensing opportunities or spin outs. PIs also have access to two members of RBDO staff with expertise in Knowledge Transfer Partnerships as a channel to exchange and to strengthen research links with external partners.

In many cases, follow-on funding is required to bridge the gap between research outputs and realising their potential for impact. The University Commercial Steering Group, of which the ADRKE is a member, oversees the distribution of funds to support such follow-on projects and awards are made typically varying between £2000 and £60,000 to support market research or market intelligence reports, proof-of-concept projects, patent applications or bringing in expert advice to secure licence opportunities or spin-outs. Several members of staff within Biological Sciences UoA have successfully accessed such follow-on funding, particularly for proof-of-concept projects, of which only a few are represented by the case studies presented in this return: Bermudez, Carter, Graumann, Hawes, Kadhim, King and Meredith. The proof-of-concept projects have varied from novel plant and insect virus expression systems to radiation biology, to applications of microRNAs and novel transporter and receptor proteins.

Where projects move from research output to potential application, academic staff are actively engaged and supported through regular team meetings between the PI, RBDO, ADRKE and if required, University Legal Services. This is best illustrated through the **Groome** case study, where quarterly or monthly meetings were held to review and make joint decisions on the various patents, licence arrangements and on-going research projects that have ultimately led to the significant royalty income for the University and Biological Sciences UoA. In other instances, UoA staff can call upon the external expert advice of ISIS Innovation Ltd, who are engaged as consultants to the University, to provide advice on spin-out, for example in the **King** case study. Staff are encouraged

to facilitate the transfer of knowledge into companies through acting as consultants, working under the guidance of the University Consultancy Policy, as exemplified in the **Fell** case study.

In some instances impact is best achieved through the establishment of a multidisciplinary Centre that provides an umbrella for activities related to research, teaching, enterprise and external engagement. The University has recently drawn up guidelines for the establishment of such centres and staff within the Biological Sciences have just successfully launched the Centre for Environment, Ecology & Conservation (CEEC) in 2012 using investment from the University and Faculty in the form of pump priming for a centre manager, research fellow, business development officer and PhD studentships. In other instances, staff are given time through work load planning and supported with funds for travel to engage with a wide range of external bodies, as exemplified by the **Kadhim** case study.

Almost all academic staff, research fellows and research students within the Biological Sciences are also engaged and enthusiastic about outreach and public understanding of science activities. The University and Faculty have jointly invested in a Science Communication & Research Fellow (Osterrieder), who coordinates activities such as an Outreach Seminar programme, annual Brookes Science Bazaar, Pegasus Theatre events, the Biotechnology Equipment loan scheme for local schools and various events and visits for local sixth formers. Osterrieder was awarded the President's medal from the Society for Experimental Biology for her outreach and public understanding of science activities in 2012 and was invited to the Women of the Year Lunch, London in summer 2013. She also manages a small budget to support individual staff outreach initiatives. All research students in the Biology Doctoral Training Programme (DTP) train as Science Ambassadors in a partnership with Science Oxford. The DTP also includes seminars on maximising the impact of research and the various ways in which this can be achieved including use of social media.

c. Strategy and plans

The Department produces a rolling five year Research & Knowledge Exchange strategy, which is discussed and reviewed with academic staff, research fellows, contract research staff and research students, and incorporated in the Faculty strategy and approved through Faculty and University Research & Knowledge Exchange Committees. This in turn feeds into and supports the University 2020 Strategy. Staff also produce rolling five year research plans, which are reviewed each year in discussions with the Research Lead and ADRKE. Integral to these discussions are plans to ensure maximum impact from the research and where necessary to ensure staff access expert advice and support in preparing bids for internal or external follow on funds. Specifically our strategy is to continue to support staff through a series of impact team meetings with senior staff in the Faculty (HoD and ADRKE) and appropriate staff from RBDO who will advise and, where necessary, assist staff in preparing applications to access either internal follow on funds (proof-of-concept, marketing reports, enterprise funds) or external funding and/or advice (for example, KTP, industry, IP and patents, technology transfer).

The Faculty receives a fair share of income received from the exploitation of its research activities through the University IP Strategy, which also includes a generous 'rewards to inventors' scheme. The Faculty Research and KE strategy outlines (1) how it plans to (continue to) use this income (currently just under £600K and rising annually) to directly support its research activities including funding research studentships (16 in 2013/14 for UoA5), Research Fellowships (6 in the period 2008-2013 for UoA5), bridging funds to support contract staff between grants, start-up funding for new staff, equipment, faculty research events and outreach activities, and (2) how it plans to support current researchers to best exploit the outcomes of their research and engage with external partners, as has been described above.

d. Relationship to case studies

Clinical applications of inhibin assays and their impact on human medicine (Groome)

The **Groome** case study exemplifies the way in which the impact of research has been exploited to benefit the biosciences industry (through revenue from selling kits and high throughput diagnostic

assays) and the general public (for example, through clinical assays to more accurately detect Down's Syndrome using the Quad test, male and female infertility and monitoring ovarian cancer). It is also a good illustration of how staff in the biological sciences have been supported to exploit their research through a partnership between the academic PI, Head of School (now Faculty ADRKE), University staff within RBDO, Legal Services and external consultants. Regular team meetings, at times monthly, oversaw first the spin-out of Oxford Bio-innovation Ltd, a joint venture company between the University and a local immunoassay company Serotec together with a number of patents to protect the IP, and subsequently the sale of OBI to an American Diagnostics Company and then the transfer of IP from this company to a Beckman Coulter Inc. who adapted the tests for their high throughput robotic platform for clinical assays. The Case Study details the rest of the inhibin story, which has led to increasing royalty income streams of around £1M per annum. However, exploitation of the antibodies to inhibin is only one of a large number of commercial projects that have arisen from Groome's research and a number of other monoclonal antibodies are licenced worldwide for inclusion in a range of immuno-diagnostic assays or stand-alone antisera, bringing in a total royalty income close to £2M per annum. Team meetings continue to review the status of licences, revenue from royalties and patent protection.

Oxford Expression Technologies (OET) Ltd: supplying insect virus expression systems to the pharma and biotech industry (King)

The **King** case study is an example of where academic staff (King and members of the insect virus research group -IVRG) and staff within RBDO and Legal Services were supported by external consultants, ISIS Innovations Ltd and Business Boffins Ltd, to spin out OET Ltd. Prior to spin-out, the IVRG (headed by King) had been operating a formal University consultancy 'OET' through Oxford Brookes Enterprises Ltd for almost eight years, providing bespoke insect virus expression system services to produce recombinant proteins for pharma and biotech companies. It was decided to spin-out OET Ltd after securing patent protection for a novel expression system that could also be sold in kit format to a wider audience. Four members of the IVRG transferred into the newly established company, two as share-holders. King became a founding director and consultant to the new company. The company continues to employ OBU graduates and post-docs, to provide placements, projects and internships for OBU undergraduate students and invests in OBU research by funding or co-funding PhD students, most recently jointly with the BBSRC Pirbright Laboratory.

Physiomics plc: systems biology consultancy for the Pharmaceutical Industry (Fell)

The University Consultancy policy encourages and supports staff to spend time as consultants transferring knowledge from their research into industry. A good example is the **Fell** case study in which Fell, who is an internationally recognised expert in metabolic modelling, helped to found Physiomics Ltd, a small biotechnology company that offers computer modelling of drug action to the pharmaceutical industry, building directly on his research expertise. The company later floated on AIM to become plc and includes a number of graduates from the Fell laboratory amongst its staff

Low dose radiation exposure and its implications on health risk assessment policy in the UK and globally (Kadhim)

The University and Faculty RKE policy encourages and supports staff to engage with external partners and organisations through generous workload planning allowances, staff development travel funds, pump prime and follow-on funding, which collectively have allowed Kadhim time and funds to engage with European collaborators, which has in turn led to organisations such as the United Nations Scientific Committee on the effects of Atomic Radiation citing Kadhim's work in a White Paper to guide future policy. She has been appointed to the UK Government Committee on Medical Aspects of Radiation in the Environment (COMARE) and also sits on its sub-panel which is providing advice on risks associated with the increasing use of CT scanners in medical diagnosis. Kadhim's research group have also benefitted from significant Faculty and University bridging funding to retain key research assistants between externally funded grants, which has been crucial to deliver the research outputs that underpin this case study.