Institution: Anglia Ruskin University

Unit of Assessment: Biological Sciences (UoA5)

a. Overview

This is the first submission by Anglia Ruskin University to the Biological Sciences UoA. The submitted Unit is the Biomedical Research Group (BRG), a multidisciplinary group set up in 2008. The Unit has a large proportion of early career researchers (ECRs), comprising five of the eight submitted members. The BRG carries out research under the over-arching theme of biomarkers, embracing a number of interconnected areas including molecular biology, microbiology, physiology, and standardisation in areas such as qPCR, physiological assessment, and research reporting guidelines. The primary rationale of the BRG is to improve our understanding of the mechanisms that underpin disease and injury, and so to contribute via research to improvements in human and animal health and welfare. Members of the Unit are drawn from the Department of Life Sciences, within the Faculty of Science and Technology (FST); from our Postgraduate Medical Institute (PMI), within the Faculty of Health, Social Care and Education (FHSCE), and from other departments and faculties where relevant research is being carried out in the broad area of biomedical science.

Members of the BRG work closely with clinical practitioners, notably from Addenbrooke's Hospital in Cambridge, and from the NHS trusts in Essex which are partners in our Postgraduate Medical Institute (PMI). We also collaborate with the Medical Research Council (MRC); the Division of Haemato-Oncology at Barts NHS Trust; the BBSRC Genome Analysis Centre (TGAC); The Animal Health Trust UK, and a number of industrial partners including Agilent, Biorad and Zoetis.

b. Research Strategy

A major strategic aim of Anglia Ruskin University over the past five years has been the expansion of medical and biomedical research. Although we did not submit under Biosciences in RAE 2008, we did submit some biological and biomedical research, to Geography and Environmental Studies (then UoA32) and to Allied Health Professions and Studies (then UoA12). This has provided the framework and direction for subsequent targeted investment in research.

Corporate strategy is set out in Anglia Ruskin's Corporate Plan and Research and Scholarship Strategy (both presently covering the 2012-2014 period) which inform strategic planning by faculties, departments, research institutes and research groups. The Unit has, from the outset, adopted a multidisciplinary approach. This strategy includes benefits to early career researchers (ECRs) who form a substantial part of the membership of our Unit by offering a range of experiences and approaches to research which can help them in determining their career path.

Our strategic research objectives over the REF 2014 assessment period have been to:

1. Recruit appropriately qualified staff;
2. Develop an appropriate research culture;
3. Increase the profile and reputation of our research Unit, through publication and dissemination of our research, and the development of significant collaborations
4. Recruit and support postgraduate research students as a first step towards achieving a sustainable and thriving postgraduate research culture.

We have made significant progress in achieving these objectives. In line with Anglia Ruskin's strategic decision that all newly-appointed staff should be qualified to doctoral level between 2008 and 2013, the number of research-active BRG staff with doctorates has risen from four to fourteen.

A key Unit objective is that every member of staff is engaged in research or current professional practice in their academic discipline. Staff benefit from, *inter alia*, writing retreats for preparing papers and bids, regular research seminars and engagement with Faculty and University research activities, the annual Faculty Research and Scholarship Conference and the annual University Research Conference. Further, researchers are expected to attend and present posters, papers,

invited keynotes and Plenary Lectures at National and International Conferences.

In order to increase the profile and reputation of our Unit we have ensured the wider dissemination of its research. Promotion of research to a wider audience is achieved through the Faculty and the Corporate Marketing Team and through them, in the a variety of media outlets. We have given traditional conference presentations (more than 100), and disseminated our research through websites and key textbooks (for example, the third edition of Bustin's book on PCR technology, and McNally's book on DNA fingerprinting). Additionally, colleagues are encouraged to deposit their research outputs in our University's central research repository – ARRO (Anglia Ruskin Research Online). We have developed more than 20 new collaborations with national and international partners (for example, work with the Genome Analysis Centre (McNally); research collaboration in the field of antibiotic resistance, with the King Faisal University, Saudi Arabia (Evans), and research into the structure and function of eye proteins with the University of Manchester (Jones)).

We recruited postgraduate students and developed a thriving postgraduate research culture. Over the submission period we have recruited nineteen research students; we have supported two of these to complete their PhDs during the assessment period. In addition, two have completed MPhil degrees, four have completed a PhD by Publication, and a further three students are on schedule for submission of their thesis in 2014.

We have set ourselves six key strategic objectives for our research over the next five years:

1. Build upon research capacity and increase our research staff base by 50%
2. Increase the number of research outputs, in peer-reviewed journals, by 100%
3. Increase our external collaborations
4. Increase our postgraduate research student population by 50%
5. Increase our research income by 10% per annum over the next five years
6. Improve the dissemination of our research.

In increasing our external collaborations a strategic priority is to engage with hosting and delivering external international conferences. We also work with our International Office and are currently identifying potential research collaborators in Latin America, the Middle East and Australasia. In collaboration with our Research, Development and Commercial Services (RDCS) office and with our Faculty Commercial Manager we will increase the number of Low Carbon – Knowledge East of England (LC-KEEP) and Knowledge Transfer Partnerships (KTP) engagements with beneficiaries of research in the region and nationally and obtain two new LC-KEEP and KTP projects per year. Through engagement with the EU and other international funding programmes we will engage with at least 3 new international research projects per year for the next five years.

We are actively engaged with the development of the new commercial hubs, most notably "Anglia Biometrics" which will be launched within the Faculty of Science and Technology in early 2014. This will allow direct interaction with beneficiaries of research. The BRG has a diverse range of service users, from local practitioners in healthcare to commercial partners and performance athletes (see Section E for further details). We will approach service-user involvement in a more structured and systematic way, by including consultation with service user groups at the planning stage of all new research projects within the BRG.

In relation to increasing our research income, ECRs within the unit are currently engaged in a structured development programme including support for bidding for research funds specifically aimed at early career academics. The Faculty of Science and Technology is supporting this initiative with additional funding for a postdoctoral scientist to be located within the Unit. Through the Faculty Research income Manger opportunities for ECRs and more established colleagues will be identified to make funding bids to support research and development. The Unit will work with members of the RDCS team in making bids through the Marie Curie Sklodowska and RISE programmes of the EU Horizon 2020 funding programme. Colleagues in the Unit will be encouraged to make applications for funding from sources such as the EU Horizon 2020

programme; bids for EU and other funding will be supported by the Faculty Research Income Manager.

c. People, including:

i. Staffing strategy and staff development

Reflecting our strategy since 2008, the main priority for the Biomedical Research Group has been the recruitment and support of well qualified, research-active members of staff. University staffing strategy requires new academic staff to be qualified to doctoral level. The ten new members of staff, employed since 2008, are all qualified to doctoral level. Mentors are identified to support colleagues and all new staff have a mentor. The one-year probation period for new staff has a focus on research as well as learning and teaching. Staff in the submitting Unit are spread across all stages of the research career-span and include two established researchers, one mid-career researcher and five early career researchers.

All academics have a personal Research and Scholarship Plan which is developed and agreed annually through the staff appraisal system. This sets SMART targets around income generation, research and scholarship outputs, and impact, commensurate with the career stage of the appraisee. This ensures development requirements are resourced including identifying a mentor and other support needs. Mentoring by a 'critical friend' is built into the grant application process for junior staff, and funding applications are peer-reviewed by senior staff with a track record in winning research funding. Academics applying for readerships or professorships are also encouraged to have a mentor who provides advice in developing their application, for which clear guidelines are published.

In achieving the planned growth in the Unit's research strategy we take advantage of the many internal and external staff development opportunities. These include research seminars and attendance at University and external conferences and events. Staff development opportunities and research skills training are provided through Human Resource Services; and, Research, Development and Commercial Services (RDCS). Courses are offered on topics such as bid writing, project management and applying for promotion. Online research training courses, hosted by Epigeum, are also available to all staff and students. Both training and other research related activities such as conferences are factored in when assessing workloads. Staff also have the opportunity to engage with Faculty-organised half-day, one-day, two-day and week-long writing retreats to to complete research outputs and funding applications. Staff development is also informed by the *Concordat to support the Career Development of Researchers*, as evidenced by Anglia Ruskin being awarded (2013) the "*HR Excellence in Research*" badge. As part of that process, we undertook a gap analysis which we are now working to address, ahead of the review of the award in 2015.

Early career researchers at Anglia Ruskin have bespoke funding streams for conference travel and international collaboration offered by our RDCS. Feedback from staff who participated in the Careers in Research Online Survey (CROS) 2013 showed that Anglia Ruskin staff feel their contribution to a variety of research activities is more highly valued and recognised than the sector average, and that they were better integrated into their research community. Similarly, Anglia staff felt better informed about key research strategy and policy in the national environment, such as the REF, the RCUK's 'Pathways to Impact' expectations, the three Concordats on Research Integrity, Public Engagement and Research Careers, as well as the HR Excellence in Research Award.

All members of staff, including part time staff, are eligible to apply for centrally funded sabbaticals. Within the BRG, Coussons was awarded a sabbatical in 2008/09, and Stoeber, McRobie and Northrop were successful in obtaining sabbatical funding in the 2012/13 round of applications. Through the 'Enterprising Academics' scheme, there is opportunity to develop relationships with business / research "end-users" in cognate subject areas**.** The Deputy Vice-Chancellor for Research's fund (over £1 million per annum) offers 'pump priming' funding for research development. Faculty and Department support for visiting scholars from the UK and overseas further strengthens our research profile, and provides opportunities for younger researchers in

particular to develop collaborations outside the Unit.

Clear guidance on expectations of supervisors is published for all staff supervising postgraduate researchers. Staff new to supervising must attend supervisor training and all supervisors are required to undertake continuing professional development. RDCS, working with Faculty Directors of Research, runs workshops and an annual conference for supervisors. Compulsory training is provided for all Chairs of Vivas and for Convenors of Student Monitoring meetings.

University-level meetings of Professors and Readers (twice annually) provide a discussion forum to share good practice and draw upon their expertise in implementing the research objectives of Anglia Ruskin University's Corporate Plan 2012-2014 and Research and Scholarship Strategy 2012-2014.

The Unit subscribes to the principles of the *Concordat to Support Research Integrity*. Our research is underpinned by the highest standards of rigour and integrity. Faculty Research Ethics Panels ensure that research, by staff and students, complies with ethical guidelines. All research bids are internally peer reviewed, and undergo central formal risk assessment and full economic costing before approval by the Dean and final submission. Critical peer review and feedback are a key part of our processes for maintaining research quality. The BRG drives academic rigour, and our institutional procedures reinforce these processes.

Our Corporate Plan emphasises the importance of the institutional equality and diversity policies, stating that these 'apply to our staff and students and are for everyone, whatever their backgrounds or personal beliefs. Everyone at Anglia Ruskin is expected to comply with them.' The institutional Equality Policy Framework was last updated and revalidated by our Board of Governors in 2010, in preparation for the passage of the Equality Act. All staff must undertake mandatory online equality and diversity training, and specific workshops are available to colleagues involved in, for example, recruitment and selection. Our University has a 'Women's Network' facilitated by a Deputy Vice Chancellor, and is also actively pursuing ATHENA SWAN recognition to ensure that the environment further supports gender and race equality.

ii. Research students

Within the submitting Unit, there are currently 13 research students, drawn from an international commUnity (seven countries). They are embedded within a wider doctoral community of 32 postgraduate research students within the Department of Life Sciences. Research students are recruited through a number of different processes, including via "pump priming" funds provided by, University, Faculty and Department bursaries. For example, full funding has been provided for two PhD students within the BRG, and partial funding for a third PhD student.

All doctoral students have a minimum of two supervisors. With support from their supervisors, students prepare a Personal Development Plan each year analysing their training needs using Vitae's Researcher Development Framework (RDF). In developing their research skills, all students attend compulsory training appropriate for the different stages of their PhD. This includes training on writing their research proposal, ethics, intellectual property, academic presentations and writing, and preparing for the viva. All students who teach must also take a three-day 'Learning and Teaching in Practice' course. A wide range of face-to-face and online training is available for research students. Students are expected to participate in departmental seminars and present their research at the annual Faculty Research Conference and the University's Research Student Conference. With departmental and faculty funding, students are encouraged to present their research at International Conferences.

Research student progress is carefully scrutinised. Annual monitoring is based on discussion of student progress in completing training as well as achieving the research and writing-up goals set previously for the year being monitored. These meetings are convened by an impartial experienced supervisor external to the supervisory team. All new PhD students have two monitoring meetings in their first year. Students are required to present their Personal Development Plan and a log of their supervisions at these meetings. These meetings also allow the student to discuss in confidence any issues without their supervisors being present. The outcomes of monitoring

meetings are reported to the Faculty Research Degrees Subcommittee and then at University level through the Research Degree Subcommittee. Doctoral candidates must also be successful at Confirmation of Candidature, in which the candidate shows they have the potential for a successful outcome at the doctoral level. Additionally, the Faculty Research Degrees Sub-Committee formally reviews the progress of every research student on an annual basis. Within the Faculty, the monitoring process has resulted in a 97% retention rate of PGR students in the academic year 2012/13. A new online vehicle, *Progress Platform*, launched in July 2013, will make monitoring acquisition of research skills from proposal stage to readiness to submit considerably easier for staff and students alike.

Feedback from students participating in the Postgraduate Research Experience Survey (PRES) (2009, 2011, 2013) has shown that the student experience has improved significantly from 2008 - 2013. In both PRES 2011 and in 2013 our respondents rated their overall experience of their research programme at Anglia Ruskin more highly than the sector average.

d. Income, infrastructure and facilities

Income

Research, Development and Commercial Services develops and underpins Anglia Ruskin's research activity, training, infrastructure and culture. The UK Research Funding Manager and the European & International Funding Manager support applications for external income. A comprehensive website and blog give full details of current funding opportunities and guidance in bid writing. RDCS runs regular workshops to support those applying for funding, and also offers one-to-one assistance towards finding funding sources and writing applications. External income generation activity is also supported by the Faculty Research Income Manager, who was appointed a year ago, and the more recently appointed Faculty Commercial Manager. The roles of these posts are to increase research and commercial funding across the Faculty.

Since 2008 the BRG has won more than £175,000 in external grants. In addition, the BRG was the recipient, in 2012, of a number of items donated by the MRC in Cambridge, including a walk-in cabinet roller incubator, to an estimated total value of £60,000. Bustin, together with the global life sciences company, Life Technologies, has recently been awarded (November 2013) funding of $50,000 to investigate the use of proximity ligation assay for fungal diagnostics.

Investment in the research environment over the assessment period

The BRG has benefited from more than £16 million of investment by the University since 2008, notably the £12 million capital cost of the Postgraduate Medical Institute (PMI), opened in 2011. In addition to the PMI, which hosts the cell and molecular biology laboratory in which Greenwood and Bustin work, the Faculty of Science and Technology is now investing in a new £6 million Medical Business Innovation Centre (MedBIC) to allow direct contact with end users and beneficiaries of commissioned research. This is due to open in early 2014. The deliberate investment in research-active staff within the BRG since 2008 has been complemented by capital expenditure in excess of £1.2 million over the same period, for the development of two new tissue culture laboratories; the extension and refurbishment of our microbiology laboratories; the development of two dedicated molecular biology research laboratories and a dedicated platelet and haematology research laboratory. The Unit has purchased a number of major items of biomedical research equipment, including a Zeiss confocal microscope, all necessary equipment for a new Western blotting suite; an Intellipath immunohistology stainer; a platelet aggregometer; a Bioruptor, PCR and several qPCR machines; a Fluoroskan plate reader; a GelDoc imaging system, and Nanodrop spectrophotometer.

e. Collaboration and contribution to the discipline or research base

Indications of wider influence or contributions to the wider research base

Bustin has initiated and led the world-wide effort to standardize real-time PCR experimental analysis and reporting, with the MIQE guidelines cited more than 1,800 times in the peer-reviewed literature since 2009. The guidelines are having a major and increasing impact, with all major qPCR companies enthusiastic sponsors of the guidelines, organising world-wide MIQE seminar tours and advertising "MIQE Compliance". Bustin's work has been reported widely (for example, http://www.nature.com/nmeth/journal/v8/n3/full/nmeth0311-207.html). There is now a MIQE app available for both iOS and Android systems.

Northrop is an author of a White Paper recently endorsed by the FEI (Fédération Equestre Internationale). This provides a review of equestrian surfaces that was in initiated in preparation for the London 2012 Olympic Games (Northrop was part of the group which carried out the testing of the equestrian arena surface at Greenwich for the London 2012 Games), and is likely to provide the basis for future industry-wide standards in this area. Gordon has published a textbook which is now a core text at many universities across the UK (Coaching Science, Learning Matters, 2009); Bustin's textbook on PCR Technology is now in its third edition, and McNally's book on DNA fingerprinting (*Truth Machine*, University of Chicago Press, 2008) has been widely cited.

Participation in peer review processes (grants, editorial boards)

Members of the BRG have reviewed national and international grants from bodies including the BBSRC (Bustin), MRC (Evans), EPSRC (McNally), ESRC (McNally), USA National Science Foundation (McNally), World Cancer Research Fund (Bustin), Cancer Research UK (Bustin), Innovation and Technology Commission Government of the Hong Kong Special Administrative Region (Bustin), Research for Patient Benefit (National Institute Health Research) (Greenwood), British Council (Researcher Links Initiative) (Greenwood).

Fellowships and membership of professional bodies

Bustin is a Fellow of the Society of Biology; Warburton and Walker are members of the Society of General Microbiology, and Northrop is a Professional Member of the British Association of Sport and Exercise Sciences, and of the UK Equine Forum. McNally is an Associate Member of the ESRC Centre for Economic and Social Aspects of Genomics; the Society for the Social Studies of Science and of the European Association for the Study of Science and Technology. Gordon is a member of the American College of Sports Medicine, the European College of Sports Sciences and the British Association of Sport and Exercise Sciences.

Journal editorships

Staff in the Unit have served as editorial board members *for BioMed Central Molecular Biology* (Bustin, section editor), *Nature Scientific Reports* (Bustin), *International Journal of Molecular Science* (Bustin, Editor-in-Chief), *Materials Science in Semiconductor Processing* (Jones) (which has an international profile and a broad scope including therapeutics, biomedical devices, biotechnology, green energy, photoconductors, and sensors), *New Genetics and Society* (McNally), *Genomics, Society and Policy* (McNally) and *Life Sciences, Society and Policy* (McNally). We have participated in peer-review for 28 national and international publications, including *Nature Scientific Reports* (Bustin); *Thrombosis and Haemostasis* (Pugh); *Bioethics* (McNally); the *Journal of Antimicrobial Therapy* (Evans), and the *Journal of Cellular and Molecular Medicine* (Jones).

Effective academic collaboration

More than three quarters of our staff have authored at least one research output in collaboration with an international researcher. The work of the BRG includes collaborations with groups from Australia (Evans, Greenwood), Austria (Bustin), Belgium (Bustin), Canada (Bustin), the Czech

Republic (Bustin), Denmark (Bustin), Finland (McNally), France (Gordon), Germany (Bustin), Ireland (Bustin), Italy (Bustin), Japan (Pugh), Netherlands (Pugh), New Zealand (Claydon), Norway (Bustin), Poland (Cole), Portugal (Jones), Republic of Korea (Pugh), Spain (Bustin), Sweden (Greenwood) and the USA (Greenwood, McNally).

We have established numerous on-going national and international research collaborations demonstrating our growing global reach. These include collaborations with groups in Argentina, Australia (e.g. Greenwood, 2012), France, New Zealand, Netherlands, Saudi Arabia, Sweden (e.g. Bustin, 2013) and the USA. National collaborations include the Universities of Cambridge, Keele, Manchester (e.g. Evans, 2013), Central Lancashire, Glasgow (e.g. Walker, 2011), Warwick, East Anglia, Imperial College, Goldsmiths, University of London, the University of Essex, Lancaster University, Cancer Research UK and the Wellcome Trust Sanger Institute.

Current collaborative grants include: i) 'Socialising 'big data': identifying the risks and vulnerabilities of data-objects'. This project is ESRC-funded (£230,000) until 2014, in collaboration with Goldsmiths, University of London and the Universities of Warwick, Manchester and Lancaster (McNally), and ii) 'CaTalyST: Citizens Transforming Society (Tools for Change)'. EPSRC Cross-Disciplinary Interfaces Programme. The latter is funded (£1.9 million) until 2014, in collaboration with Lancaster University (McNally).

Extent of collaboration or integration with external bodies

Bustin has established collaborations with a number of commercial partners including Agilent (2002-present), Life Technologies (2012-present), BJS Biotechnologies (2013-present) and Illumina (2012-December 2013). As part of collaborative agreements, Agilent and Biorad have supplied equipment and reagents for use in Bustin's research in the PMI. Bustin and BJS Biotechnologies have a joint PhD project aimed at developing an ultrafast intraoperative diagnostic qPCR test. McNally has recently established a collaboration with Kent County Council, Business Support Kent, West Flanders Development Agency (Belgium), Economic Development Impuls Zeeland, and University College VIVES Bruges; research funding of €480,000 has now been won by this group. Collaborations have also been established with the Animal Health Trust, Newmarket, UK (Northrop), the French National Institute for Agricultural Research (Walker), Zoetis (formerly Pfizer Animal Health) (Walker), and the East of England Ambulance Trust (Gordon). McNally was, until 2012, a member of the Scientific Advisory Board for the BBSRC Genome Analysis Centre (TGAC), chaired by Professor Sir John Sulston FRS Nobel Laureate (leader of the Human Genome Project at the Wellcome Trust Genome Centre, Hinxton, Cambridgeshire).