Institution: University of Westminster

Unit of Assessment: UoA 3; Allied Health Professions, Dentistry, Nursing and Pharmacy

a. Overview

Research described in this submission was based primarily in the **School of Life Sciences** and undertaken within and across the Departments of Molecular and Applied Biosciences, Human and Health Sciences, Biomedical Science and Complementary Medicine. There were four cross-Department Research Clusters that played a key role in fostering our supportive and productive research culture: the **Applied Biotechnology Cluster** (coordinator **Roy**); the **Cell Communication Cluster** (coordinator **Getting**); the **Diagnostics and Therapeutics** Cluster (coordinator **Barr**); and the **Perspectives in Health Cluster** (coordinators **Ridge** and **Scheid**).

During this period of assessment, the research strategy was defined within the University strategy, through the School's five year Research and Knowledge Transfer Strategy, and within the corresponding strategies of individual Research Clusters. The School of Life Sciences continued to develop its multidisciplinary and supportive research culture, as indicated by the volume and quality of research activities and outputs; the number and quality of research students with timely completions; the increasing volume of research applications; our substantial new successes in research funding; a sabbatical scheme that is producing results including new funding; and productive systems for research mentoring.

From the 1st of August 2013, the School of Life Sciences merged with the Department of Psychology and the School of Electronics and Computer Sciences to form the new Faculty of Science and Technology (FST). This strategic move to a Faculty structure will significantly enhance the research environment, our interdisciplinary work, and future research. In accordance with University policy we aimed – and will continue to strive – to produce world-leading research that contributes to new empirical knowledge, develops innovative theory and practice, influences policy, and addresses the important scientific and health issues of our time.

b. Research strategy

Strategy during the assessment period:

The University and Faculty are committed to high-quality, practice informed research with global impact. Following RAE2008, an analysis of strengths and weaknesses of the School of Life Sciences was undertaken, and a new five-year research strategy was developed. The primary aim was to grow the volume and quality of research, whilst securing sustainability through inclusive support structures. The research objectives were to: develop the number and proportion of 3* and 4* research active staff; increase external research income; expand PhD student numbers and improve completion rates; extend networking and knowledge transfer activities; and enhance impact and externally facing research related activities. A combination of strategies was employed that retained the best of what existed previously (and was commended in RAE2008 feedback) and introduced new schemes and resources to support people and infrastructure. Key policies and practices included:

- Schools were individually supported by Research Development Officers (RDOs), with primary responsibility for horizon scanning and bid preparation;
- Investment infrastructure and expanding facilities, including laboratory refurbishment;
- Career advancement of existing senior talent with support such as semester sabbaticals;
- Targeting promising early and mid-career researchers with enhanced support through teaching relief to enable more research to be conducted;
- Appointment of new research-active members of staff with a proven track record and providing £2,000 start-up funding and a further peer reviewed sum (£10-15,000) to generate pilot research and data;
- Increased training opportunities, including bespoke media training sessions every year;
- A research mentoring scheme;
- Encouragement of collaboration, both internally and externally to the University;
- Creation of a Research Business Officer to assist, support and promote School research

activities and exploitation of any commercial potential;
- Providing the training, support and incentives for timely doctoral student completions (including a bursary for thesis publication);
- Funding a minimum of two PhD scholarships per year specifically for new staff and encouraging interdisciplinary research projects; and
- Further developing the state of art research facilities.

We aimed to contribute to scholarly learning through high-quality publications, and to achieve impact through engagement and knowledge exchange with non-academic users. This has included development of Knowledge Transfer Partnerships (e.g. **Renshaw**). Through research mentoring and postgraduate training, we strive to develop the next generation of scholars in theoretical and practical aspects of science, health and technology.

Research activities are organised around research clusters, all engaged in interdisciplinary and collaborative activities across Westminster, nationally and with international partners. Clusters operate as hubs to foster research ideas, collaborations, learning and development of research proposals. Within these Clusters a critical mass of researchers collaborate to effectively execute and implement projects in a particular research area. Each Cluster develops a five-year research strategy which is debated in research workshops and reviewed periodically. All Research Clusters are required to sustain a demonstrable claim to excellence in their respective areas, as evidenced by grant applications and awards, high quality outputs, successful PhD supervisions, and distinct research culture. In addition to coordinating bids for funded research, Clusters liaise with other Faculties and institutions, and host open events, seminars, and conferences. Staff have shared expertise and published collaborative research from within the School. Many staff have formed extensive networks with other experts in their field of research, both nationally and internationally. This has led to sustained and fruitful collaborations with external centres of excellence as evidenced in this document.

Applied Biotechnology: Fourteen PhD students and ten academic staff including two Professors, two Readers, two Principal Lecturers, two Senior Lecturers and two Lecturers specialising in the application of biotechnology in a variety of different milieu including bio-products such as bio-polymers, biofuels, antimicrobials, enzymes; health and well-being with emphasis on tissue engineering, drug delivery, gene therapy; novel technologies for environmentally friendly bioremediation; molecular diagnostics and therapeutics in collaboration with the Diagnostics and Therapeutics cluster. This involves the use of advances in molecular biology such as in personalised human genome sequencing to accurately and sensitively diagnose disease and develop customised treatments and therapies. The Cluster also works on the exploitation of plant and algal resources. In the area of biopolymers and their application to regenerative medicine this group is internationally leading and recent success in attracting funding from the EU FP7 reflects this. Earlier success in the FP6 projects in biocatalysis (production of laccases for environmentally friendly and health supporting approaches in the dye, textile and leather industry) has been continued and in a multidisciplinary approach linked to biofuel and biohydrogen production, an area of priority for the RCUK.

Cell Communication: Fourteen PhD students and twenty seven academic staff including two Professors, three Readers, four Principal Lecturers, fourteen Senior Lecturers and four Lecturers exploring mechanisms of eukaryotic and prokaryotic cell communication. The group fosters a multidisciplinary approach to explore the basic bioscience underpinning health which includes research investigating cellular adaptations, survival and differentiation in response to both physiological and pathophysiological stimuli. Exploitation of microbial communication for improvement of microbial productivity has been world leading funded by the EU FP6 (Quorum) project. Investigation of the cross kingdom communication for health purposes (e.g. aspergillosis) is another area of activity. This Cluster includes the **Against Breast Cancer Research Group** which brings together two PhD students and seven academic staff including one Professor, one Reader, one Principal Lecturer, three Senior Lecturers and one Lecturer. This group led by **Dwek** works on identification of factors which influence the ability of breast cancer to spread to secondary organs – development of metastasis. In its Diet and Lifestyle survey (which is just coming to the end of a five year data collection period) the group has data from some 3,000 patients from 56 centres supported by the National Cancer Network. Work is carried out in collaboration with other centres at the University of Oxford, Queens University Belfast and Cambridge University.

Diagnostics and Therapeutics: brings together eleven PhD students and seventeen academic staff including three Readers, two Principal Lecturers, nine Senior Lecturers and three Lectures and two Research Fellows forming a multidisciplinary cluster centred on the detection of disease and development of novel treatments. The Cluster covers a broad range of diagnostic areas including: the use of biomarkers to guide drug development and target medicines toward specific populations; investigation of relationships between endocrine and anti-inflammatory mediators associated with obesity; studies of breast cancer patient samples to detect single nucleotide polymorphisms (SNPs) linked to responsiveness or resistance to treatment; and development of immunohistochemical and *in situ* hybridisation techniques for profiling disease biomarkers. Therapeutic research includes: development of small-molecule inhibitors of protein-tyrosine phosphatases by high-throughput screening and structure-based design (novel therapeutic strategy for breast cancer); development of *in silico* tools for high-throughput drug discovery; targeting of endothelial cell surface enzymes involved in fibrinolysis (novel anti-thrombotic strategy); identification and characterisation of endogenous amyloid-binding proteins (role in Alzheimer's disease); modulation of the host inflammatory response through melanocortin receptors (arthritis, cardiovascular and respiratory disease); insulin-dependent signalling pathways (type II diabetes); development of sugar analogues (anti-infective agents for *F.Necrophorum*) and development of oligonucleotide therapeutic drug delivery approaches for the lung and liver. The cluster works on the detection of disease and pathogens, genomics, epidemiology, studies of pathogenic viruses and development of novel antiviral drugs and vaccines, "Next generation sequencing" aimed at analysing lung bioburden in asthma and focused oncogene mutational analysis in lymphoma and breast cancer patients.

Perspectives in Health brings together Patient Experience Research and EASTmedicine. The Cluster integrates social science and humanities' research within a health environment. This has created possibilities for innovative interdisciplinary collaborations. The **EASTmedicine** (East Asian Sciences and Traditions in Medicine) Research Unit, has established itself as a world-leading centre in the field of East Asian medicine. It focuses on understanding East Asian medicines and facilitating their evidence-based integration into contemporary healthcare. The new appointment of **Bligh**, a world leader in the identification of small molecules, is significant as she conducts research into the mechanisms of molecular activation in traditional Chinese Medicine, determining the active molecules with potential for the pharmaceutical industry. This appointment reflects the Faculty's strategy for underpinning the study of traditional Chinese Herbal Medicine with core science. **Patient Experience Research** brings together three PhD students and eight academic staff including two Professors and two research fellows. Researchers here focus on self-management approaches to health, how being a patient is meaningful and adds value to understanding illness and recovery, and how to promote health and wellbeing at the social level. This Cluster was highlighted in RAE2008 as an up-and-coming strength within the University. It has expanded considerably since then with areas of focus including health service evaluation of community diabetes prevention, musculoskeletal pain and complementary therapies, mental health, and chronic conditions (e.g. 'HIV in Later Life' with a consortium led by Keele University). This approach can identify innovative ways for better coping with, and recovery from, chronic health conditions (including mental health) to feed into practice. Other health-related research includes work by **Draper** for the UK Food Standards Agency on consumer comprehension and use of different food labelling formats. This has contributed directly to the Department of Health's recent policy changes regarding front-of-pack labels, namely to work towards a single labelling system with our research directly cited in support.

Evidence of the achievement of strategic aims during the assessment period:

The success of our strategy is evident in a number of key quantifiable measures. We have increased the FTE staff included in this return from 20 in the RAE2008 to 24.8 in the current submission. 87% of our doctoral students complete within the target four-year time scale in line with University and Research Council policies. The total number of peer reviewed publications during the REF period was 373 compared to 170 reported for RAE2008, a doubling of output. We have also increased our research income substantially. In the REF2014 period, we have spent around £3.8 million in UoA3, compared to around £1.4 million in RAE2008 (UoA12 Allied Health Professions and Studies). Here, we exceeded our own target of doubling income. The income awarded over the last two years exceeds £2.5 million, and includes some notable successes. For

instance, as part of a multi-million pound consortium, **Roy** has been awarded two EU FP7 grants bringing a total of £881,371 to Westminster for work on biodegradable coronary artery stents and biodegradable nerve conduits. **Scheid** was the recipient of nearly £1 million from the Wellcome Foundation for research entitled, *"Ways of Knowing and Styles of Practice in East Asian Medicines, 1000 to the Present."*

We have developed a strong research culture with regular research-related events and activities including the annual Postgraduate Fair (Oral and poster PhD presentations by all PhD students), which is popular with both PhD students and staff, weekly Friday lunchtime seminars with external speakers; as well as research Cluster discussion sessions and meetings and provision of visiting professors and scientists for enhancement of research ideas and collaborations leading to research proposals.

Future Strategy:

The Faculty and University strategies are to be a leading practice-based, research-engaged university, in the heart of London, through interdisciplinary and international partnerships. The new Faculty structure will provide the infrastructure to support these objectives. The integration of the School of Life Sciences with the former School of Electronics and Computer Science (UoA11) and the Department of Psychology (UoA4) provides us with many new opportunities. The newly appointed Faculty Research Director, **Buchanan** will ensure an enhanced interdisciplinary focus, and that RCUK priority areas are pursued. For example the theme of Lifelong Health and Wellbeing is already well developed across the Faculty and is expected to become a stronger focus in the next Research Excellence period. Additionally we have identified the development of tools and technologies to support the analysis of large biological datasets; the development of new medical technologies; and the evaluation and computational modelling of healthcare as potential multidisciplinary areas for expansion.

It is our aim to build a large and sustainable community of researchers including experienced and Early Career Researchers, Research Fellows and PhD students who can successfully build their careers from within the Faculty, generating a positive cycle of ambition and success. Our research strategy will be to consolidate the achievements made in the reporting period by continuing successful elements of our previous strategy, developing interdisciplinary foci and further investing in people and infrastructure. Over the next five years, the University will increase its review of and support for recognised research groups. Through inward investment they will help new and existing staff maintain and develop their research profiles, increasing the proportion of internationally excellent and world-leading outputs.

In the new Faculty, typically staff will focus on the mechanisms of cell function and survival for amelioration, treatment of medical conditions, health and wellbeing, ageing, developing innovative patient-centred research needed for the new NHS environment, understanding how to integrate East Medicine in the West, and potential uses of our knowledge in industry. Consolidating new interdisciplinary research Clusters in the Faculty (e.g. across health, psychology and the computer sciences) will be key here. Through the appointment of Readers (**Murphy, Moschos, Volpi)** and a new Professor (**Bligh**) the School has replaced senior retirees to continue to ensure the strength of research leadership. There will be further internal investment for research and scholarship support, consumables budgets, research technician time, Research Development Officer time, mentoring, and staff development in various forms (e.g. training, travel and networking) to support the breadth of research activities from data collection, external collaboration, generation of outputs and grant writing. Some specific Faculty initiatives to boost collaborative work include extending the School sabbatical scheme Faculty-wide; pump-priming funding for interdisciplinary projects and additional support for large bids for specific funding schemes. All aspiring and active researchers will agree yearly objectives with their Heads of Department (and have time allocated) for publications, grants, training, networking and research impact. The impact of research generated from within the Faculty will continue to be supported as described in the associated Impact Statement.

Successes will continue to be celebrated and suitable candidates supported to apply for Readerships and Professorships. By the next assessment exercise one of the major aims will be to increase the number of staff submitted by a further 20% to 30 colleagues in total. Another vital part of the strategy for success over the next five years will be investment in PhD students and their supervision. We plan to increase the number of PhD students funded from external sources and

finance PhD students from competitive University and Faculty-wide PhD scholarship schemes. The University's new Graduate School, established in June 2012, is already showing positive impact on the research culture across the institution. For example, doctoral students now meet regularly not only at Faculty but also at University level for training, seminars with external speakers, social events, and via social media (e.g. a very active Facebook page). The new Graduate School will continue to ensure excellence in delivery of research training across all years of the doctoral programme (closely modelled on the Vitae Researcher Development Framework), and contribute to the quality of the wider research community for both PhD and professional doctorate students, supervisors and post-doctoral researchers. With an active external advisory board of notable researchers, the Graduate School will act as a focal point providing networking and information sharing opportunities for all supervisors, current students, post-doctoral researchers, alumni and international researchers. The recently established Faculty Graduate Centre is a direct link between the supervisors and their PhD students and the University Graduate School. This Centre will support and strengthen the Faculty research culture, provide training and development programmes for the PhD supervisors and students and monitor the progress of the students to successful and timely conclusion of their studies.

Our strategic aims build on current areas of our international excellence, whilst at the same time extending them to tackle newly developing areas such as lifelong health and wellbeing and exploiting microbial/mammalian cell communication for understanding and battling diseases. These activities, matching national and international priorities, will ensure that our research remains cutting edge in both basic and applied science.

c. People, including:

i. Staffing strategy and staff development

The School's staff development and research strategies have worked synergistically to support staff research. The development budget has supported staff training, workshops, networking, media training, and attendance at research conferences. Key staff have also been supported through staff development by periods of extended research leave in the form of semester sabbaticals. These are available to staff within the School who have at least five years of service. In some cases these sabbaticals have been used to facilitate the development of new research links and new projects. For example **Roy** worked with the Eastman Dental Unit at UCL, facilitating the translation of biomaterial engineering into practical endodontic applications, and developed successful funding applications following her sabbatical which provided the opportunity for her to forge links at European level leading to two large EU FP7 projects. Staff have used sabbaticals to develop new techniques, to finalise scientific papers, books and successful grant applications. The School research budget, managed by the Director of Research advised by the Research Committee, has supplemented this support. The research strategy is fully inclusive and all staff can seek research support, e.g. in the form of Research Technician time, access to consumables and facilities, and mentoring. Allocation of research funds is transparent. This system both rewards excellence and broadens participation in research by creating an attainable '*ladder of excellence'*. This open support system is the primary means by which development and sustainability of research within the School has been achieved, and it will be a key enabler to grow the critical mass of research activity in the new Faculty, a key strategic aim for the next five years.

During the assessment period there have been three promotions to Reader (**Dwek, Roy, Scheid**) and two promotions to Professor (**Scheid, Ridge**) demonstrating the excellent career progression that is available within the Faculty. There is a good balance within Departments between early, mid-career and established researchers. There has been some maternity leave (supported by temporary staff appointments) during the assessment period for staff included within this return. In conclusion the staff development and research strategies deployed have ensured equality of opportunity and diversity amongst the staff by implementation of a range transparent and inclusive policies as described. All staff are equally encouraged and supported in their research aspirations with opportunities for peer mentoring and advancement in career progression, which lies at the heart of our strategy for a sustainable research future.

ii. Research students

The School has a long history of successful PhD supervision; on average there are 10 successful defences of doctoral theses per year, with 52 fulltime and two part-time doctoral completions in the REF2014 period. An 87% success rate was achieved for completion of studies

within the four year time period. Proactive and responsive support of the research degree program is orchestrated by the Graduate Research Centre Coordinator (**Keshavarz**) who also holds responsibility at University level as Deputy Director of the Graduate School. Internal investment is used for a range of targeted policies that support both the research students (e.g. conference attendance, training and specialist equipment) and their supervisors (e.g. supporting bids for external studentships). PhD tutors at School level provide additional individual pastoral support and guidance for research students and supervisors, and hold four lunches a year with research students to ensure they have in strong say in policy and practice. Successful defence of a PhD thesis during the Viva has always been celebrated by School-wide celebrations (organised by doctoral students), and attended by many of the staff and students.

The Doctoral Researcher Development Programme (DRDP, modelled on the Vitae Researcher Development Framework) is coordinated by the University Graduate School and implemented locally by "DRDP Champions". Champions provide induction sessions for the new PhD students and training sessions for all PhD students during their PhD life-cycle. While **Ridge** was the DRDP Champion in the School, two Champions will be appointed in the Faculty to support the larger body of doctoral students.

The DRDP provides skills training in areas identified by the UK Research Councils. The programme promotes academic, research and transferable skills (e.g. networking, collaboration, problem-solving, project management) through University-wide and discipline specific sessions. These are specifically geared towards the student's needs at each stage of their PhD. Research students are also able to enrol on relevant modules from the MSc degree programmes if deemed suitable to make good any shortfall in pre-requisite knowledge requirements. Our Faculty Research Student Forum meets once per term to give students an active voice and to allow them to contribute to the development of the School's research culture. PhD students also participate in the School's student executive committee. Doctoral students are further supported through a Blackboard site, where information is disseminated and issues discussed online. Student progress with the training programme and key stages of the research degree programme i.e. registration, transfer, and most importantly, completion is monitored annually by the Faculty Graduate Centre.

d. Income, infrastructure and facilities

Since 2008 there have been numerous awards giving a total income to the School in excess of £3.8 million. New awards (as above) indicate that at least this level of income can be projected in the early part of the coming period. This funding has been for a diverse range of projects including cancer, cell biology, Traditional Chinese Medicine, chronic health conditions, wellbeing and biofuels, demonstrating depth and breadth of the research activities being pursued within the Faculty. Funding has come from a variety of sources (e.g. the MRC, NHS, Wellcome, European Commission, a wide variety of Charities, the Food Standards Agency and the Royal Society).

The School is well resourced in terms of technical support with Laboratory Managers, 20 technicians, and a procurement and stores unit. Refurbishment of all laboratories has focused on purchase of new equipment to improve research capacity and to further enhance the capabilities of exciting facilities. A Central Analytical Instrumentation Suite is a state-of-the-art, well-equipped laboratory that supports research across many different disciplines such as chemical, biological, biomedical and environmental sciences. The laboratory includes a gas chromatograph with flame ionisation detector, high performance liquid chromatography (equipped with UV, PDA, MSQ, fluorescence, evaporative light scattering and electrochemical detectors), spectrometer (absorbance and luminescence), multi-detection microplate reader, bio-imaging system, gamma and scintillation counters.

The Fermentation Laboratory is one of our flagship laboratories. It is used for research activities in the areas of biochemical engineering and applied bioprocessing. The laboratory is equipped with three 600 mL mini-bioreactors designed in-house, two 1L, four 2L, 3 6L, four 20L laboratory scale bioreactors and a 72L pilot plant in addition to specialist chromatography and filtration units. There is a bead mill cell disruptor, and a tubular bowl centrifuge for downstream processing. A state-of-the-art supervisory computer system allows monitoring and control of fermentation parameters. The facility has a dedicated technician to provide fermentation advice and expertise and training.

The School has a Tissue Culture Facility with specialist technicians, other specialist

equipment include the CYAN ADP flow cytometer, the Leica confocal microscope system and an AKTA protein purification system in a dedicated working cold room. Expertise in areas such as cell biology, confocal microscopy, flow cytometry and next generation sequencing are nationally and internationally recognized through collaborative work and commercial use of facilities.

In 2012, £168k was invested in the establishment of a top-class Next Generation Sequencing (NGS) facility and set up Westminster Genomic Services (WGS; www.fast-seq.com). Conceived and set up by **Moschos** a new member of staff with industrial and world-class expertise in nucleic acid biomarkers and therapeutics, the facility is based on a cutting edge 3rd generation sequencer (IonTorrent Personal Genome Machine, Life Technologies) and associated instrumentation (Covaris S, Covaris Inc.; LabChip XT, Caliper Life Sciences; 2100 Bioanalyzer, Agilent Corp.) for performing a variety of NGS assays at the highest level of quality. WGS was the first in the UK to receive Certified Service Provider accreditation for the Life Technologies Ion Torrent platform and is the UK reference laboratory for Life Technologies. The primary purpose of this facility is to support internal research and to offer bespoke and fast-turnaround sequencing services externally to the London biotechnology, clinical research and academic community. Thus, work is currently underway on metagenomic environmental studies, breast cancer biomarker discovery studies, and novel NGS method development. The service has completed over £28K of contractual work in 12 months of operation and has established collaborations with UK Biotech companies. WGS is involved with an EU-wide collaboration on biomarker discovery in lymphoma and breast cancer as part of the Breast Cancer Association Consortium. Aligning with the strategic plan of the Faculty to develop capacity in Diagnostics and Therapeutics, WGS is also interfacing with Departments of Electronics and Computing Sciences to utilize computational infrastructure (cloud and internal clusters) towards establishment of comprehensive and state-of-the-art bioinformatics platforms for novel cancer biomarker discovery. Work is underway to expand the analytical capacity for diverse sequencing and post-sequencing applications; to cater for the national and international community engaged in sequencing research.

Biosensor Services (http://bit.ly/SVKQIm), a part of the Against Breast Cancer (ABC) research Unit, is the first UK label-free, cell based biosensor facility. It services the proteomic and glycomic aspects of the Faculty biomarker strategy and provides the first-ever method for measuring small molecule and biological compound molecular interactions on living cells as opposed to cell-free systems such as surface plasmon resonance. Expertise was acquired through direct engagement between the ABC group leader (**Dwek**) and the technology developer, Attana AB (Sweden), who now use Westminster Biosensor Services as their UK-based service laboratory. This has led to national collaborations (UCL; http://dx.doi.org/10.2147/IJN.S25035).

The School also contains Human Performance Laboratories and ancillary support for research in physiology, nutrition, exercise, and bodywork activities. These laboratories are well equipped for taking anthropometric measurements and for investigating the interactions of nutrition with exercise. The lab has a state of the art treadmill, cycle and rowing ergometers, gas analysis systems, as well as equipment to test strength and power, flexibility, lung function and speed/acceleration. Specialist equipment is used for measuring the percentage of body fat (Bodpod) and metabolic rate (Deltatrac). Other research related equipment include a large freeze dryer and four dedicated fume cupboards, a PCR gel imaging system, cytospin, ELISA, plate readers and a fluorescence microscope. There is extensive provision of microscopes, tissue/cell culture and histology equipment for cutting and processing tissue sections.

e. Collaboration and contribution to the discipline or research base

Staff from across the School have participated in national and international networks, workshops and conferences over the assessment period, have undertaken PhD external examining in the UK and overseas as well as contributing to public communication of Science.

Contributions to the discipline include committee work for learned societies and other organisations e.g. Chair of the Biotechnology Group of the Society of Chemical Industry (**Keshavarz**); Science committee for Society of Endocrinology (**Renshaw**); Hon. Secretary of the Association of Nutrition (**Robertson**); Member of Breast Cancer Association Consortium (**Dwek**); President of the International Association for the Study of Traditional Asian Medicines (**Scheid**); Member of the Executive committee for Heads of University Biosciences (**Lewis**); Member of Council of the Italian Medical Society of Great Britain (**Volpi**); Member of Bioinformatics and Biotechnology Panel of the Biochemical Society (**Dalby**); Chair of the Royal Society of Chemistry

Chilterns and Middlesex branch (**Bligh**), Founding member of the International Association for the Advancement of High Performance Thin Layer Chromatography (**Bligh**), Member of the Scientific Subcommittee of the Association of Clinical Genetic Science (**Volpi**). Staff also contribute to various working groups e.g. membership of the NHS Inner North West Suicide Prevention Working Group (**Ridge)*;*** national representative to two EU COST Actions (**Keshavarz**).

Staff undertake a wide range of reviewing and related activity including reviewing funding applications for UK and international research councils and charities. Work for UK bodies includes the MRC (**Dwek, Greenwell, Murray, Volpi**); BBSRC (**Dalby, Keshavarz, Moscos, Murray, Roy**, **Volpi**,); EPSRC (**Bligh, Dalby, Roy**); ESRC (**Ridge**), Wellcome Trust (**Murray**, **Volpi**), NIHR (**Greenwell**, **Ridge**). International bodies drawing on us for reviews include NSERC Canada (**Roy**); FWF Austria (**Roy**); NSFC China (**Roy**); ESF (**Roy**); MUIR Italy (**Roy**); Swiss National Science Foundation (**Roy**), Research Grants Council of Hong Kong (**Bligh**), German-Israeli Foundation for Scientific Research and Development **(Moschos)**.

Staff contribute extensively to peer reviewing and a number are members of journal editorial boards. These include Journal of Chemical Technology and Biotechnology (**Keshavarz, Roy**); ISRN Tissue Engineering (**Roy**); Journal of Chromatography and Separation Techniques (**Roy**); Endocrine Connections (**Mckenzie**); Reproduction (**Murray**); British Journal of Biomedical Science (**Warford**); Journal of Holistic Healthcare (**Peters**); Cell Proliferation (**Eastwood**); PLoS One (**Dalby**); Complementary Therapies in Clinical Practice (**Polley, Ridge**); BMC Complementary & Alternative Medicine (**Ridge**); Biotechnology and Applied Biochemistry, Industrial Microbiology, International Journal of Microbiology and Biotechnology, Annals of Microbiology (**Keshavarz**); Journal of Chromatography A and B; Rapid Communication of Mass Spectrometry; Journal of Pharmaceutical and Biomedical Analysis; Phytotherapy Research (**Bligh**). **Getting** has been a guest editor for Scientific World Journal; (**Dwek**, **Volpi)** invited editors for Methods in Molecular Biology Series; and **Patel** a regular editor for Human Health Handbooks.

Staff expertise is also recognised more widely e.g. **Renshaw** is on the Corporate Liaison Board of the Clinical Committee of the Society for Endocrinology; **Murphy** has been a Scientific Advisor to the Supreme and Appeal Court in England; **Peters** gave evidence to the House of Commons Health Committee on education training and workforce planning; **Pilkington** was an invited expert and moderator of the European Directorate for the Quality of Medicines and Healthcare (Council of Europe); **Bligh** was a visiting researcher to the Royal Society of Chemistry and State Administration for Foreign Experts Affairs China Visiting Fellow program to advise Chinese research groups on all aspects of presenting their research to an international audience; **Greenwell** was one of seven Community Champions funded by the EPSRC through SelUCCR (Supporting e-Infrastructure Uptake through Community Champions for Research).

Public engagement work includes STEM Ambassador (**Eastwood**); trustee for CALM anti-male suicide charity (**Ridge**); Royal Society partnership grant with Coloma Convent Girls' School, Croydon (**Clements**); Huffington Post blog (**Ridge**); attendance at parliamentary meetings with ministers discussing the impact of new technologies for the NHS (**Greenwell**) and regular public-facing lectures and other events.

Visiting professorships are held at Zhejiang University of Traditional Chinese Medicine (**Scheid**) and Shanghai University of Traditional Chinese Medicine (**Bligh**)

The School has supported and promoted internal collaborative research between members of staff from across Departments and with other Schools from within the University. A notable example is the Against Breast Cancer unit's work with our School of Media Art and Design (UoA36) on the Patients as Authors project, which makes cancer patients' voices heard through documentary film. Collaborations with external centres of excellence are supported by the Research Development Officer, who actively promotes research opportunities with other organisations and universities. The Business Development Officer investigates and nurtures research opportunities with industry and health services. Collaborations around doctoral research are encouraged and monitored through the Graduate Centre link with the University Graduate School's Collaborative Provisions Committee. Examples of significant external collaborations include the British Heart Foundation Cardiovascular Regenerative Medicine Centre consortium with Imperial College (**Roy**) and the international Traditional East Asian Medicines Research Network (**TEAMs•RN**) established through the EASTmedicine group (**Scheid**), linking researchers in the field of medical humanities with clinicians and clinical researchers.