Institution: University of Portsmouth

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

a. Overview

The Institute of Biomedical and Biomolecular Sciences (IBBS) is the focus for biomedical and biomolecular research across the University of Portsmouth (UoP). IBBS draws its researchers primarily from the School of Biological Sciences and the School of Pharmacy & Biomedical Sciences. IBBS was established in 1998 and was recognised as a leading centre for biomedical and biomolecular research in RAE2001 (rated grade 5). In RAE2008, 85% of our research enjoyed international recognition, of which 55% was rated world class or internationally excellent, with world-leading research in our key areas of Biomolecular Structure and Cellular & Molecular Medicine.

IBBS is now structured into 4 synergistic research groups (group leaders in parentheses): Molecular Biophysics (*Prof. Kneale*); Cell Biology and Pharmacology (*Prof. Shute*); Epigenetics and Developmental Biology (*Prof. Guille);* Biomaterials and Drug Delivery (*Dr Tsibouklis)*. The groups are fully integrated, with extensive collaboration within IBBS, with health scientists across the University of Portsmouth, with local hospital trusts, with Industry, and with both national and international institutes. Our comprehensive collaboration network reflects our multidisciplinary approach to research in the biosciences, bringing together expertise in structural biology, biophysics, genetics, molecular and cell biology, medicinal chemistry and biomaterials, providing an environment in which our fundamental research may be translated to the clinical environment and to pharmaceutical, biotechnology and related industries.

b. Research strategy

Our 2008 research strategy was to promote our existing world-class research into molecular and cellular biology and to develop emerging areas of research excellence. Evidence of our success is that our RAE2008 submission included researchers from the School of Health Sciences and Social Work and the Department of Sports and Exercise Science. These emerging areas of research were nurtured and have expanded into new areas, to the extent that they are now self-standing and will be submitting to UoA2 and UoA26 in REF 2014.

Our core research strategy in 2008 was to take advantage of our world-class facilities and expertise to resolve molecular mechanisms that govern gene regulation and cellular mechanisms in health and disease. Our accomplishments include the deposition of 15 macromolecular structures in the Protein Structure Database since 2008, enabled by our newly acquired in-house X-ray diffraction facilities and outstanding access to synchrotron radiation sources.

Furthermore, we have invested significantly in infrastructure to take advantage of new methodologies and approaches. Important achievements include the establishment within IBBS of the European Xenopus Research Centre (EXRC: Director, Prof. Matt Guille) and the first UK Centre for Brain Tumour Research (Director, Prof. Geoff Pilkington). In addition, we have expanded and developed our world-class biophysics facilities, and procured new and upgraded facilities for confocal microscopy, live cell imaging, electron microscopy and electrophysiology from internal funding and external research grants.

The four research groups in IBBS reflect the strength of our research across a broad range of expertise. By working in an integrated way, with shared access to world-class facilities and a culture that both encourages and promotes cross disciplinary investigative approaches, IBBS has delivered distinctive interdisciplinary research into fundamental biomedical and biomolecular science (further details are available on http://www.port.ac.uk/ibbs)

1. Molecular Biophysics (*Kneale, McGeehan, Callaghan, Gowers, Kolstoe, Pickford).* The principal aim of this group is to understand biological processes in terms of the structure and function of biomolecules and their interactions. The applications of our research range from the development of novel antibiotic targets to structure-based drug design for amyloid diseases. Current projects include the structural and biochemical investigation of DNA methyltransferases and endonucleases (*Kneale, Gowers*), transcription factors and repressors (*Kneale, McGeehan*), ribonucleases and RNA chaperones (*Callaghan, Gowers*), metalloproteinases (*Pickford*), serum amyloid proteins (*Kolstoe*), mitochondrial proteins (*McGeehan*) and glycohydrolases (*McGeehan*).

2. Cell Biology and Pharmacology (*Shute, Butt, Pilkington, Lewis, Swinny, Hafizi, Young, Brown).* This group has broad biomedical and clinical interests, with particular emphasis on inflammation, neuro-oncology and neuroscience, with close interactions between the individual members. A major theme is lung inflammation in cystic fibrosis and developing novel strategies to improve inhaled drug delivery (*Shute*), together with mechanisms of disease progression and new therapeutic targets in inflammatory bowel disease (*Brown*), and over-active bladder and development of new drug targets for clinical applications (*Young*). There is a strong focus on neurobiology, with multidisciplinary research on glial cells, including oligodendrocytes and their precursors in MS, and the role of ion channels in potassium regulation and glial differentiation (*Butt, Lewis, Hafizi*). There is a close interaction between these 3 research groups and with researchers working on molecular and cellular aspects of primary brain tumours (*Pilkington*). Related research involves molecular dissection of brain circuitry (*Swinny*), the Gas6-Axl ligand-receptor system and its dysfunction in MS and gliomas and the roles of Tensins (*Hafizi*).

3. Epigenetics and Developmental Biology (*Guille, Thorne, Dietrich, An, Gorecki).* The focus of this group is to establish the role of genes that are important in developmental processes, e.g. the control of Gata2 and its role in blood formation, promoter structure in gene activation, and the genetic programming of muscle differentiation (*Guille, Dietrich*). Using the extensive facilities of EXRC, the *Xenopus* model is also used to assess the role (and possible side-effects) of novel drugs in development (*Guille*). Epigenetic themes encompass the role of chromatin modifying enzymes in gene regulation and the roles of histone modifications in cell differentiation, development and disease (*Thorne*). There is a strong research programme in Molecular and Genetic Medicine, including the molecular pathology of Duchenne muscular dystrophy (*Gorecki*) and gene mutations in mitochondrial diseases (*An*).

4. Biomaterials and Drug Delivery (*Tsibouklis, Barbu, Roldo, Smith, Clark, Lalatsa).* This group is concerned with the design, synthesis and medical applications of biomaterials, biosensors, drugs and drug delivery systems. Research methods include the use of Atomic Force Microscopy in biomaterials research (*Smith*) and molecular dynamics simulations in drug discovery (*Clark*), as well as underpinning synthetic chemistry (*Barbu*). Projects include the development of biomaterials with inherent resistance to bacterial colonization, bioadhesive materials for therapeutic use, polymeric vehicles for targeted drug delivery, and boron-containing materials for neutron-capture therapy (*Tsibouklis/Barbu/Roldo*). Our most recent appointment (*Lalatsa*) brings expertise in drug delivery across the blood-brain barrier, and her research is complementary to the Pilkington group.

Research plans

RAE 2008 recognised that there are many areas of excellence throughout IBBS, with a key strength being the breadth of our research and the range of levels at which we can address important questions. Our current research strategy identifies research themes that emphasise the areas of excellence in biomedical and biomolecular research in which IBBS has the greatest expertise, and that map onto current and future external research priorities. The research themes are principally IBBS-led (Neuro-oncology & Cancer Biology; Genomics and Molecular Medicine), or jointly with UoA2 (Allergy and Inflammation), together with a broader theme spanning research areas across the University and NHS partners (Ageing and Lifelong Health).

By identifying and promoting these research themes, we will provide a structure that facilitates our interdisciplinary engagement with the strategies of funding bodies, in a way that is adaptable to national priorities. Our aim is to increase our national and international competitiveness and broaden our portfolio of funding by addressing the priorities of multiple agencies, whilst also supporting our recognised excellence in fundamental biomedical and biomolecular research.

Over the next 5 years, we will expand our successful engagement in biomedical research to involve local NHS trusts, and both national and international institutes. Examples of engagement include research into: brain tumours (South of England Brain Tumour Alliance, SEBTA); prion diseases with the National Prion Disease Pathology Surveillance Center (Ohio, USA); Alzheimer's disease in collaboration with the Royal Free Hospital (UCL Medical School); novel theoretical approaches involving molecular dynamic simulations with the NREL (Colorado, USA). Our basic and translational research into the molecular biology and pharmacology of a range of pathologies (CF, COPD, MS, AD, DMD and a range of cancers) will be extended by further developing our

emerging links with clinicians specialising in conditions of the bladder (OABS) and bowel (IBD).

By the use of internal investment and external funding streams, we will build upon our strategy of exploiting existing strengths and developing new research areas, for example by taking full advantage of the European Xenopus Resource Centre (*Guille*) and Centre for Neuro-oncology (*Pilkington*) to discover the functions of new genes and translational potential in brain tumours and other pathologies. We will exploit our new success in exploring the molecular basis of mitochondrial diseases (*Pilkington*, *McGeehan* and *An*), and exploit our expertise in the molecular mechanisms that underpin the control of gene expression at both the structural and functional levels, to expand into the new area of clinical genetics in collaboration with Southampton Medical School. These new projects will exploit the latest genetic techniques, which we have either in-house, such as new transcriptomics techniques (*Callaghan*) and gene editing technology (*Guille*), or by external collaborations, e.g. next generation sequencing in collaboration with the MRC Cambridge hub (*Butt*). Our expertise in structural biology (*Kneale*, *McGeehan*, *Callaghan*) and structure-based drug design (*Kolstoe*, *Pickford*, *Clark*) will enable us to gain a fundamental understanding of key biological and pathological processes, to underpin these activities and apply them in a biomedical context. Many of these new projects highlight the need for strong bioinformatics and this will be one of the main priorities in future recruitment.

Management of Research

The Institute is managed by the IBBS board, chaired by the Director of Research (originally Prof. Kneale, now Prof. Butt) that comprises the heads of the four research divisions, together with representation from the two constituent Schools, and attended by the Dean and the Associate Dean (Research) for the Faculty of Science. Additional staff have more recently been included who take responsibility for specific areas (e.g. the web site, the seminar program). The board is responsible for both strategic and operational matters, and for the disbursement of funding (e.g. for PhD bursaries and small grants).

There is an annual “away day” for PI’s, researchers and PGR students (~100 in total). On a separate occasion, IBBS PI’s meet at least once a year to discuss strategy and organisational issues. Both events are attended by a significant number of clinicians from Portsmouth Hospitals Trust to provide a bridge with clinical research; clinicians make short presentations on their research interests and engage in wide-ranging discussions with a view to potential collaborations. In addition, IBBS has a unified program of weekly research seminars with prestigious national and international seminar speakers (including one Nobel Prize winner) representing all areas of research across IBBS, in addition to internal speakers to promote interdisciplinary collaboration.

c. People, including:

i. Staffing strategy and staff development

Our staffing strategy is to develop expertise and forge strong teams and critical mass to strengthen areas of existing and potential international research excellence. To achieve this, we aim to attract, appoint and retain high-quality staff, and recruit excellent people who reinforce or complement existing research strengths or expand into new areas of biomedical research. For example, we appointed two Professors (*Butt* and *Pilkington*, both having held full Chairs at KCL) and these two areas are now major internationally recognised research themes in IBBS. Similarly, Shute was recruited from Southampton Medical School as a Reader and was promoted to Professor in 2013 in recognition of her high profile translational research. In addition, we have successfully developed staff through the Research Fellow route: Senior Research Fellows appointed to their first permanent post prior or during RAE2008 have since become Professors within this REF period and developed major trans-European research projects (*Guille*, *Gorecki*); McGeehan and Callaghan were recruited as research fellows and both have recently been promoted to Reader; others have been given permanent senior research posts within the REF period (*Smith*, *Barbu*), and we continue to attract high quality research fellows (e.g. *Kolstoe*, *An*) and provide a vibrant research community in which they can achieve their full potential and help fulfil our goals.

Currently, there are 7 Professors and 4 Readers within IBBS, with 8 new staff having been appointed since 2008, providing an appropriate balance between senior staff, mid-career and early career researchers. Our strategy is to recruit the best researchers at an early stage in their career,

and provide mentoring and support to enable them to establish their own successful research groups. Many of our emerging research leaders were appointed as lecturers or research fellows in the REF period to strategically target greater interaction between our main research platforms (*Kolstoe*, *Lalatsa*, *Dietrich*), and to expand into new areas of research that complement our existing strengths and map onto research priorities of the major funders, such as cell signalling (*Hafizi*), cancer genetics (*An*), neuroscience and ion channel biophysics (*Lewis*, *Swinny*, *Young*)

Academic Leadership. Senior staff within IBBS have taken on leadership roles in the University, including (since 2008): Faculty Research Degrees Chair (Gorecki), Associate Dean Research (Kneale, and subsequently Thorne) and senior academics in IBBS also serve on University Research Committee, University Research Degrees Committee and University Ethics Committee (Butt, Callaghan, Kolstoe, Shute).

Equality and diversity. IBBS is proactive in developing inclusive working practices and is committed to actively promoting the role of women within IBBS. We have taken the lead in a number of UoP and national initiatives. The University joined the Athena SWAN charter in 2011, and the UoP Athena SWAN committee is chaired by a member of IBBS (Prof. Jan Shute). We strive to support the development of all our staff, and Jan Shute was promoted to Professor in 2013 and Anastasia Callaghan was recently appointed to Reader. We continue to attract top female scientists to IBBS, with the recruitment of Susanne Dietrich, Qian An and Katerina Lalatsa during this REF period (representing 60% of our staff appointments in the last 3 years).

Staff Development. All newly appointed staff are provided with a senior research mentor, with review meetings after 1, 3 and 6 months to support their induction and subsequent career development. Our policy is that newly appointed staff will be given priority for internally funded PhD studentships and start-up funds, and a second experienced supervisor is also appointed. They are given full assistance from senior members of IBBS in writing their first grant, through the University Peer Review College. All new staff are supported to submit their first grant as PI to research councils (e.g. BBSRC, MRC) and biomedical charities (e.g. CRUK, Wellcome Trust). In addition, we fully support established researchers in their applications for fellowships and sabbaticals, e.g. Gorecki has been awarded a Fulbright scholarship to spend a research sabbatical at Harvard.

Development of Research Staff and the Concordat. IBBS is committed to the Concordat to Support the Career Development of Researchers and to ensure effective development opportunities for contract research staff. Dr Anastasia Callaghan (IBBS) is the Research Staff representative on the UoP Research Committee (URC); she also coordinates the UoP research staff forum, and is the representative for the South East Universities on the Vitae-supported UK Research Staff Association. This has enabled awareness of and rapid engagement with the national agenda e.g. in trialling training sessions. Our success in obtaining external grant income has enabled us to recruit high quality PDRAs, and they are encouraged to attend bespoke internal training aligned with the Vitae researcher development framework (such as research techniques, project management, scientific writing, teaching and media training) and engage with external provision. PDRAs are mentored by permanent staff and monitored by annual reviews and are encouraged to present their research at national and international conferences. We have an excellent record of future employment of PDRA's, some continuing research nationally or internationally, with others entering non-research careers, such as management and teaching. We have successfully developed people through the Research Fellow route into permanent positions both in UoP and in other institutes (see above).

Research Ethics. All research projects undertaken in IBBS are subject to ethical review (http://www.port.ac.uk/research/ethics/) and staff are expected to have attended the 'Research Ethics Seminar' run annually as part of the University's Department for Curriculum and Quality Enhancement's programme of events for PhD Supervisors 'Ethical Research & Ethical Supervision'. IBBS aspires to play a central role in developing the ethics programme and our most recent strategic appointment, Dr Simon Kolstoe, is vice-chair of the Southampton NHS research ethics committee and has also recently been appointed to MOD research ethics committee and an HRA working group.

ii. Research students

The strength and breadth of research in IBBS has resulted in a high degree of success in attracting external PhD studentships from diverse sources, including the research councils, medical charities, industry and European funding. In addition, internal funds have been strategically directed to provide IBBS PhD stipends to support established research strengths and expand into new areas. This has proved a highly successful approach and IBBS has the largest number of successful PGR completions in the University (76 in the REF period; with over 3 completions per staff member, this represents an increase of 50% cf. 2008). We ensure that PhD students complete within 3-4 years, and the vast majority go on to further their careers in university and medical research labs, or in the biotechnology and pharmaceutical industries. IBBS aims to maintain this record by continued strategic internal support and diversifying our funding portfolio into ITN's, European funding streams, and international links.

PGR students are recruited by rigorous selection involving presentations and interviews of short-listed candidates with the supervisor(s) plus a member of the IBBS board, following advertising in international journals and web sites. There are obligatory induction courses for all research students, at University, Faculty and Department levels. The latter covers health and safety, record keeping and specific lab induction and technical training together with details of monitoring of progression throughout the program (annual reviews). Supervisor induction covers issues and training specific for each project. Supervisors are expected to have informal daily contact with their students and to hold weekly meetings for their research group, where the students discuss their work in detail. Attendance at 1-2 national conferences a year is supported and encouraged, and usually one international conference in the 3 year period. Progression is formally monitored annually by presentations to a panel that includes independent assessors followed by oral examination; in the first year, an additional substantive progression report (Major review) is also required. Students are required to attend weekly IBBS seminars and present their own work annually at the IBBS postgraduate "away-day" in the form of posters (yr 2) or short talks (yr 3).

Graduate School. IBBS PGR students also receive coordinated support via the University of Portsmouth Graduate School. The Graduate School Development Programme (GSDP) provides the key elements of generic research skills and transferable career development skills training as outlined by Vitae and the RCUK. Our supervisors are required to attend The Graduate School's induction course for new supervisors, and are actively encouraged to attend the wider Research Supervision Events programme (approximately 10 events a year). We operate a Research Degrees Committee (which includes student participation) to support student progression, and facilitate information exchange between the local-level and Faculty- and University-Research Degrees Committee and the Graduate School Management Board.

d. Income, infrastructure and facilities

Funding Streams

With research income for the REF2014 period approaching £9 million, IBBS is the largest of the UoA's submitting from UoP and a major flagship of the University. We have seen a 35% increase in per capita funding (£380K, compared to £280K in 2008), despite intense competition for external funding. Our continued growth reflects the success of our strategy and the diversity of our funding streams, which have been mainly RCUK, Wellcome Trust, and Medical Charities, but during this REF period we have made a significant advance into new areas of Industry and European networks, e.g. the trans-channel neuroscience network (TCN2), the Peptide Research Network of Excellence (PeReNe), and European School for Glial Cell Biology (EduGlia). We will continue to ensure our research themes align well with the research priorities of a wide range of funders (*BBSRC*: Basic Bioscience Underpinning Health; *MRC*: Lifelong Health & Wellbeing; *Wellcome Trust*: Fundamental Basis of Health and Disease), and we are well-positioned to influence the agendas of specialist biomedical charities such as those supporting research into brain tumours, respiratory diseases and inflammation.

All members of IBBS contribute fully to undergraduate and postgraduate teaching in the Schools of Pharmacy & Biomedical Sciences and Biological Sciences, including Pharmacy, Pharmacology, Biomedical Sciences, Biochemistry and Biology programmes, together with a highly successful Professional Doctorate programme and a new MRes course. Hence, staffing costs and the research infrastructure are sustainable through a combination of HEFCE (T and R) income

streams, competitive external research grants and externally funded fellowships.

We have used internal investment to appoint a number of senior research fellows (SRF), who typically are given permanent contracts at the end of the fellowship period. Such Fellows in the current submission include Callaghan (now a Reader), Kolstoe, Smith and Barbu (*see also* Section (c)). An SRF appointed in a previous RAE period (*McGeehan*) left for a post at the European Molecular Biology Laboratory (EMBL, Grenoble); he was subsequently attracted back to UoP by a prestigious 5 year RCUK Academic Fellowship, at the end of which he was promoted to a Readership. Internal funds have also been deployed to fund PhD Studentships, start-up funds and small grants, following internal peer review.

Infrastructure and Facilities

IBBS has world-class research facilities and techniques, acquired both from external research grants and from substantial internal investment.

The *University of Portsmouth Imaging Centre* (UPIC) was created as a facility to bring together the wide variety of advanced microscopy techniques available in IBBS. A purpose-built Microscopy Imaging Suite houses the atomic force microscope, live cell imaging microscope, a TIR microscope and laser capture micro-dissection apparatus. Three confocal instruments plus calcium imaging and a variety of Fluorescence Microscopes are located close by, and excellent facilities for Electron microscopy (SEM and TM) are located in a dedicated laboratory within the Faculty.

The *Biophysics Laboratories* have invested in state-of-the-art facilities for investigation of both structural and functional aspects of macromolecular interactions include an X-ray Diffractometer with Cryojet (Oxford Diffraction) a crystallisation robot, a 600MHz NMR spectrometer with cryo-probe (Varian), Analytical Ultracentrifugation (Beckman XL-A), Surface Plasmon Resonance (BiaCoreT200), Circular Dichroism and Fluorescence Spectroscopy, Laser Light Scattering (DLS and MALLS) and Calorimetry (ITC and DSC). These facilities are complemented by extensive facilities for bacterial fermentation and protein purification (including ~10 Akta Purifiers).

*Access to International facilities***.** Structural biologists in IBBS are members of block allocation groups (BAGs) that receive highly competitive peer-reviewed synchrotron beam time at both ESRF and Diamond for crystallographic analysis of proteins and nucleic acids. IBBS PI's have also been awarded synchrotron beam time for small angle x-ray scattering (SAXS) and circular dichroism (SRCD) studies, as well as substantial neutron beam time at Institute Laue-Langevin (ILL, Grenoble) for the structural analysis of protein-DNA and protein-RNA complexes by SANS. In addition to our involvement in BAGs, Kneale, McGeehan, Callaghan and Pickford have each submitted beam time applications for SAXS and SRCD, and have obtained beam time equivalent in value to over £440K in the REF period.

In addition to excellent facilities for biochemistry, molecular/cell biology and physical/organic chemistry, we have invested in state-of-the art facilities that are used primarily by IBBS staff but also an increasing number of visitors from universities and institutes in the UK and elsewhere (e.g. Southampton, Sussex and Cambridge universities). General physico-chemical, molecular and cell biology facilities include a 400 MHz NMR Spectrometer, FTIR and UV Spectrometers, Contact Angle Goniometer, GC/MS, HPLC, Atomic Absorption Spectrometer (AAS) / Atomic Emission Spectrometer (AES), particle sizer, Tissue Culture rooms, Flow Cytometer, Dynamic Vapour Sorption (DVS) apparatus, qPCR, scintillation counters and a phosphorimager.

IBBS also hosts the *European Xenopus Resource Centre (*EXRC*),* which was set up in 2006 principally by Wellcome Trust, with a total of £3.3m funding, together with a major investment of funding from UoP. BBSRC has awarded an additional £1m to provide molecular resources and bioinformatics support. Wellcome Trust funding (£1.3m) for EXRC was renewed in 2013 for a further 5 years, to maintain the centre as a major resource for scientists studying frog genetics, and facilitating collaborative research with laboratories across Europe and the USA.

e. Collaboration and contribution to the discipline or research base

IBBS is a multi-disciplinary research Institute, enabling numerous collaborations between researchers, both within and between groups. A major success of the IBBS research strategy has been to promote new collaborations with the NHS and national and international institutes, which is evidenced by new funding streams, increased quality and quantity of publications and the

enhanced international profile of our researchers. Indeed 52% of our submitted publications are international collaborations (and a further 24% are with collaborators within the UK).

International Collaborations have been essential for providing new funding streams and increasing our international profile, as well as improving access to world-class research facilities, and include: EXRC partnerships with 96 labs worldwide (**Guille**); TC2N partnerships with 17 EU labs (**Gorecki/Swinny**); EduGlia partnerships with 12 EU labs (**Butt**); University of the Saar, Germany (**Butt**/Kirchhoff); University of Groningen, The Netherlands (**Swinny**/ van der Want); Harvard, USA(**Swinny**/ Rudolph); University of Vienna, Austria (**Swinny**/ Klausberger/ Sieghart Vienna); Milan, Italy (**Shute**); Rome, Italy (**Shute/**Cazzola); Central Leather Research Institute in Chennai (**Tsibouklis/** Reddy); 'Gr.T.Popa' University, Romania (**Tsibouklis/**Verestiuc); Aristotle University of Thessaloniki (**Tsibouklis/**Fatouros); University of Padua, Italy (**Tsibouklis/**Calliceti); Florida Atlantic University, USA (**Pickford**/Fields); Salzberg, Austria (**Pilkington**/Vlasak); Institut Cochin, Paris, France (**Pilkington**/Couraud); Weill Medical College, New York, USA (**Pilkington**/Weksler); Yunnan University, China (**Pilkington**/Huang); Kunming Medical College, Yunnan, China (**Pilkington**/Zhao); Institut Laue-Langevin, Grenoble **(Kneale/**Callow); Institute of Molecular and Cell Biology, Warsaw (**Kneale**/ Bujnicki); Waksman Institute, Rutgers University, New jersey, USA (**Kneale**/Severinov); National Prion Disease Pathology Surveillance Center, Case Western Reserve University School of Medicine, Ohio, USA (**Kneale**/Zou), Leiden University Medical Centre, The Netherlands (**McGeehan**/Ravelli); NREL, Colorado, USA (**McGeehan**/Beckham); Institut Cochin, Univ. Paris Descartes, Paris, France (**Dietrich**/ Maire); University of Utah, USA (**Dietrich**/ Kardon); University of Campinas, São Paulo, Brazil (**Dietrich**/ Alvares); Institute of Molecular & Cell Biology, National University of Singapore (**Dietrich**/Ingham).

National Collaborations between IBBS and over 30 national research institutes have been a major mechanism for promoting interdisciplinary research, and include: the Defence Science and Technology Laboratory **(Tsibouklis /** Willis); Reading University (**Butt** / Rattray); Warwick (**Butt** / Pankratov); Manchester University (**Butt**/Verkhratsky); King's College London (**Butt**/Bradbury); Glasgow University (**Butt**/**Hafizi**/Barnett); Dundee University (**Swinny**/ Lambert); Sussex (**Swinny**/ Stephen); Oxford University (**Swinny**/Magill/ Lamsa); Liverpool University (**Shute**); DSTL Porton Down (**Shute**); Oxford (**Pickford**/Campell); St Andrews University (**Pickford**/Schwarz-Linek); King's College Hospital (**Pilkington**/Ashkan); Wolverhampton University (**Pilkington**/Warr); Oxford Brookes (**Pilkington**/King); Milton Keynes (**Pilkington**/Romero); Warwick University (**Pilkington**/Cree); Edinburgh University (**Kneale**/ Dryden); Leeds University (**Kneale**/ Trinnick); National Institute for Medical Research (NIMR), Mill Hill, London (**Kneale**/ Taylor); Sussex University (**Kneale**/ Caldecott); Cambridge University (**Callaghan**/ Luisi); Oxford (**Callaghan**/ Sobott), National Institute for Medical Research, Mill Hill, London (**Callaghan**/ Driscoll); Diamond Light Source (**Callaghan**/Malfois); Royal Free / UCL, London (**Kolstoe**/ Wood/ Pepys); Research Complex at Harwell, RAL (**Kolstoe**/ Owens); Manchester University (**Guille**/ Amaya); Kent (**Guille**/Spencer); ZSL (**Guille**/Holt/Gardner); NIMR, London (**Guille**/Smith); Cambridge University (**Dietrich**/Lewis); East Anglia (**Dietrich**/Munsterberg); University College London (**Dietrich**/Tada); King's College London (**Dietrich**/Basson).

NHS Collaborations *(IBBS members in bold)* are a key part of our strategy for increasing translation of our fundamental research, and major new collaborations include South East Brain Tumour Association/*SEBTA* (**Pilkington** - Kings College Hospital, Frenchay Hospital, Bristol, Peninsula College of Medicine & Dentistry & Derriford Hospital, Charing Cross Hospital & Imperial College, Southampton General Hospital and Hurstwood Park Clinical Neurosciences Centre, Sussex), and translational research in respiratory diseases (**Shute -** *Anoop Chauhan,* Respiratory Consultant, QAH, and Director of R&D for the Portsmouth University Hospitals Trust; *Peter Howarth*, Respiratory Consultant, Southampton General Hospital; *Alan James*, Consultant at Sir Charles Gairdner Hospital, Perth; *Gary Connett*, Paediatric Respiratory Consultant, Southampton General Hospital) and inflammatory bowel disease (**Brown** - *Pradeep Bhandari,* Consultant Gastroenterologist*, QAH),* and mitochondrial diseases (**McGeehan/ An** - Keyoumars Ashkan, Consultant Neurosurgeon, King's College Hospital, London; Prof. Diana Eccles, Director, University of Southampton Clinical Trials Unit).

Industrial Collaborations are seen as essential for ensuring the relevance of our world-class fundamental research to potential end-users, and include: Pfizer (Shute/Pickford); Hoffmann La Roche, Switzerland (Swinny); Synova, Tubingen (Pilkington); Healthcare Products, Sussex (Pilkington); Novartis (Tsibouklis); GlaxoSmithKline (Tsibouklis); Novozymes (McGeehan).

Engagement with external professional, scientific and funding bodies: IBBS PIs are on review panels for a wide range of national and international grant bodies, as well as local, national, and international professional bodies. Key examples include:

- Prof. Geoff Pilkington, Executive Board of European Association of Neuro-oncology, Co-ordinator of South of England Brain Tumour Association, Norwegian Research Council, Children with Cancer UK, President of the British Neuro-oncology Society
- Prof. Matt Guille, Advisory Panel for the NXR at the Marine Biology Laboratory at Wood's Hole, USA, RSPCA and DEFRA advisory groups.
- Prof. Arthur Butt, REF2014 panel member (REF panel 4), BBSRC Committee Panel Member (Committee D), Finnish Academy of Sciences (Strategic Research Roadmap Committee Member), Agence Nationale de Recherche (France, Panel Member); Panel of experts on National Science Foundation USA, Alzheimer's Association USA, Italian Multiple Sclerosis Society, Irish Epilepsy Society, Fons National de la Recherche Luxembourg, Fondation pour la Recherche Médicale, France, Deutschen Forschungsgemeinschaft, Germany
- Prof. Jan Shute, Scientific Advisor to the Cystic Fibrosis Trust, Chair of the University of Portsmouth Athena Swan Group, and Consultant for DSTL Porton Down.
- Prof. Geoff Kneale, Portsmouth representative for the South West Structural Biology Consortium (SWSBC); invited to participate in the MRC/BBSRC Structural Biology Large Facilities planning group; member of the Peer Review Panel for the allocation of neutron beam time in the biosciences (Institute Laue-Langevin, Grenoble).
- Dr Andy Pickford, member of the Peer Review panel for the allocation of synchrotron beam time (Diamond Light Source, Harwell)
- Dr John McGeehan, member of Diamond User Committee, Secretary of the Committee of the Biological Structures Group of the British Crystallographic Association (BCA)
- Dr Anastasia Callaghan, UK-Research Staff Association South East Representative.
- Dr John Tsibouklis, Expert Panel Member and Rapporteur for: (i) RTD Programme Monitoring (European Union), (ii) Research Financing Directorate (Romania)
- Dr Simon Kolstoe, vice-chair of the Southampton NHS research ethics committee

External Profile: *International and national meetings:* Our members are regularly invited to give presentations (including keynote addresses) at other institutions, conferences and workshops.
Organisation of national and international meetings:

- 16th LARC Neuroscience Network meeting (Portsmouth, Nov 9, 2012)
- Progress in Cellular Imaging for Neuroscience Research workshop, July 9-10, 2010, Rouen
- Anatomical Society Summer Meeting (Portsmouth, July 2010)
- British Neuro-oncology Society meetings (2010 – Portsmouth, 2011, 2012)
- BCA Biological Structures Group Meeting, 'Structures of Supramolecular Assemblies' Diamond Light Source (Harwell), 14th Dec 2011
- Seventh International Workshop on X-ray Radiation Damage to Biological Crystalline Samples', Diamond Light Source (Harwell), 14th March 2012
- South Coast RNA Group Meeting (Portsmouth Nov 2011)
- SEBTA Meetings (Portsmouth 2011, 2013)

Press: Our primary research has received press attention at a local and national level, including *BBC, ITV, Channel 4, Daily Mail,* and others.
Engagement with potential end-users, some examples include:

- All Party Parliamentary Group on Brain Tumours (Pilkington)
- Articles in magazines for patients and support groups, such as Epilpesy Today (Butt), Oncology Today (Pilkington), Chemistry World (Tsibouklis)
- Public lecture series at the UoP, e.g. Asthma and allergy in your family (Shute), Brain Week (Butt, Pilkington, Gorecki)
- Talks to Schools and Colleges (from most members of IBBS), including Queen Mary College Basingstoke, Portsmouth Grammar School, St Johns College Portsmouth, Bay House School Gosport, Portsmouth sixth form college, Bedales School, Petersfield.
- Scientific Advisor to charity trusts (Shute, Pilkington, Guille).