University of Birmingham
College of Life and Environmental Sciences

School of Biosciences: MRC Phenome Centre-Birmingham

Bioinformatics (Metabolomics-specific) Research Fellow 1

Salary from £28,695 to £37,394 a year
Fixed-term for 3 years in the first instance

As part of a £8m award from the MRC, industry and University of Birmingham, we are currently establishing a state-of-the-art metabolic phenotyping facility to conduct research in stratified medicine. Phenome Centre-Birmingham (PC-B) will apply eleven new liquid chromatography-mass spectrometers (LC-MS), two NMR spectrometers, liquid handling robots and high specification computational infrastructure to better understand metabolic perturbations in human health and disease. The facility is anticipated to conduct tens of thousands of analyses per year, creating genuinely 'Big Data'. The PC-B will interact closely with the MRC-NIHR National Phenome Centre in London to further enhance UK capacity and capabilities in metabolic phenotyping.

We seek a highly motivated bio-informatician to join the 10-person PC-B team and contribute to fulfilling the research objectives of this centre with a focus on the development, implementation and application of computational approaches for metabolic phenotyping. The position will primarily to develop and implement a data processing pipeline, include the experimental design, pre-processing, and statistical analysis of large scale LC-MS based metabolomics studies; collaboration with researchers within and external to the university (academic, industry, scientific instrument manufacturers); and providing training and support in bioinformatics.

Applicants should hold a PhD (awarded) in computational metabolomics, cheminformatics, bioinformatics or a closely related area, with experience and demonstrated success of working independently and as part of a large team in a bioanalytical or academic research facility in industry or academia as well as having a growing national reputation in metabolomics.

The University offers a variety of courses for personal development of its employees. The University of Birmingham is a family-friendly employer. The School of Biosciences welcomes flexible and part-time working to suit family or other commitments. The University has on-campus childcare facilities.

The post is available in the first instance for 3 years, with the expectation for significant extension subject to the success of the MRC Phenome Centre-Birmingham.

Informal enquiries can be addressed to Professor Mark Viant (tel: +44 (0)121 414 2219 or email: M.Viant@bham.ac.uk) or Dr Warwick Dunn (tel: +44 (0)121 414 5923 or email: W.Dunn@bham.ac.uk).

Closing date: 9th November 2015 Reference Number: 55192

For further information or to apply visit: www.hr.bham.ac.uk/jobs

Valuing excellence; sustaining investment

Job Description

Post title and post number	Bioinformatics (Metabolomics-specific) Research Fellow 1
Organisation advertising Description	School of Biosciences
Post number	**55192**
Full-time/Part-time	Full Time
Number of hours / weeks to be worked	100%
Duration of post	Initially for 3 years with expectation for significant extension subject to the MRC Regional Phenome Centre achieving its financial targets
Post is open to:	Internal/External candidates
Grade	7
Salary	**Salary from £28,695 to £37,394 a year**
Additional information	Informal enquiries can be directed to Professor Mark Viant m.viant@bham.ac.uk or 0121 414 2219 Dr Warwick Dunn (w.dunn@bham.ac.uk or 0121 414 5923)
Terms and conditions	Research and Analogous Staff (non-clinical)
Closing date	9th November 2015

Job Summary

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We seek a highly motivated bio-informatician to join the 10-person PC-B team and contribute to fulfilling the research objectives of this centre with a focus on the development, implementation and application of computational approaches for

metabolic phenotyping. The position will primarily to develop and implement a data processing pipeline, include the experimental design, pre-processing, and statistical analysis of large scale LC-MS based metabolomics studies; collaboration with researchers within and external to the university (academic, industry, scientific instrument manufacturers); and providing training and support in bioinformatics.

Main responsibilities

- Develop and implement computational workflows, to be applied in metabolomics and stratified medicine to enhance the capabilities and capacity of the PC-B
- Perform extensive pre-processing of data acquired on the mass spectrometry platforms in the PC-B
- Conduct an array of univariate and multivariate statistical analysis of data acquired on the mass spectrometry platforms
- Manage and ensure optimal operation of software and other bioinformatics resources so to meet research goals in a timely manner
- Perform curation of datasets both locally at Birmingham and at international data repositories
- Disseminate high quality research in project reports, articles in peer-reviewed journals, papers at scientific conferences and to the general public
- Contribute to the design of research projects in the PC-B including acting as a co-investigator on grant applications
- Work with the PC-B Directors to achieve the research objectives of the PC-B
- Carry out administrative tasks related directly to the delivery of the research.
- Provide bioinformatics and computational biology training to University staff, students and others

Person specification

Skills and experience

- First degree in area of specialism and a higher degree relevant to research area: PhD (awarded or soon to be awarded) in computational metabolomics, chemoinformatics, bioinformatics or closely related area.
- High level of analytical capability
- High level of accuracy, organisation and attention to detail is mandatory
- Ability to communicate complex information clearly
- Ability to assess resource requirements and use resources effectively
- Detailed knowledge of bioinformatics (both signal processing and statistical analysis), computational biology and metabolomics

- Competent in more than one programming language (e.g. Python, Matlab, R, etc)
- Sufficient breadth and depth of specialist knowledge in the discipline and research methods to work within established research programmes
- Good intellectual reasoning and innovative problem solving
- Dealing with large and multi batch data sets
- Able to assume responsibility
- Good team member

Scope of the Role

- Complete work to fulfil research objectives of the PC-B
- Operate within areas of bioinformatics, computational biology, metabolic phenotyping and stratified medicine
- Maintain operation of bioinformatics resources

Planning and Organising

- Plan for the efficient use of research resources in PC-B as appropriate
- Contribute to the planning of multiple and concurrent research projects in the PC-B in collaboration with PC-B staff and collaborators
- Contribute to the planning of their own projects and those of PhD students
- Co-ordinate own work with others to avoid conflict or duplication of effort
- Ability to work on own initiative, manage time effectively, progress tasks concurrently and work to deadlines

Decision Making

- Develop and prioritise tasks to fulfil PC-B objectives, in coordination with PC-B staff
- Choose appropriate methods for data pre-processing and statistical analysis
- Perform study design and methodological improvements, with PC-B staff
- Provide specialist training in bioinformatics and computational biology
- Perform alterations to working practices, following consultation with PC-B staff

Internal/External Relationships

- Liaise with research staff and collaborators to fulfil research objectives
- Liaise with external principal investigators of the research project to fulfil research objectives
- Disseminate research at conferences and through peer-reviewed journals
- Referee articles for peer-reviewed academic journals

- Maintain contact with (including membership of) appropriate professional bodies
- Liaise with the relevant external research community via seminars and conferences

The Environment

The University of Birmingham

The University of Birmingham has a distinguished academic reputation. It is a member of the Russell Group and belongs to the international network Universitas 21. The University was founded in 1900 at the initiative of local citizens and is now one of the largest in the UK offering degrees across a wide range of disciplines from Education to Medicine and from Engineering to Law. It is a major international centre of academic excellence and was ranked 10th in the UK by QS World University Rankings in 2013. Eight former members of the University have been Nobel Prize winners.

The University has a turnover of over £400 million per annum and is currently undergoing an extensive capital programme. This positive financial position is almost unique in the UK Higher Education sector and provides a firm foundation for further investment. One of the University's greatest assets is its Edgbaston campus. It offers its community of over 27,000 students and 6,000 staff an attractive environment in which to study and work. It is situated only two miles from the centre of a major European city and yet is set amongst green and leafy parkland which is largely pedestrianised, and provides a beautiful and pleasant backdrop for imposing Victorian redbrick buildings as well as some striking modern architecture.

The University of Birmingham is an Equal Opportunities employer. It aims to ensure that no job applicant or employee will receive less favourable treatment on the grounds of race, colour, nationality, ethnic or national origins, sex or marital status: this policy will include disabled persons who have the necessary attributes for the post. The University will operate selection and promotion criteria and procedures that are designed to ensure that individuals are selected, promoted and treated on the basis of their relevant aptitudes, skills and abilities.

The School of Biosciences

The School of Biosciences at the University of Birmingham is the largest biology school in the region, delivering internationally excellent teaching and research across the broad span of modern biology. There is currently an academic staff of approximately 60, conducting research and delivering teaching from the level of individual biological molecules to the study of whole ecosystems. We have a lively research

community, with over 70 postdoctoral research fellows and research assistants, and 120 doctoral research students.

Our ground-breaking research ranges from research into cancer and infectious diseases, such as tuberculosis, to studying the movement and behaviour of orangutans. We also offer major high-technology facilities for research in genomics, metabolomics, proteomics, structural biology and optical imaging (see below). Current research grant income is around £7 million per year, and comes from a variety of sources including research councils, the European Union and charities. The School has an excellent research profile with 90% assessed as international quality supporting an exciting range of teaching programmes.

The Phenome Centre-Birmingham

The £8M Phenome Centre-Birmingham (PC-B) has been funded as part of the £7M Stratified Medicine Innovation and Technology Facility at the University of Birmingham and Birmingham Health Partners in collaboration with scientific instrument companies (Thermo Scientific, Waters Beckman Coulter) and the University of Birmingham. The Phenome Centre-Birmingham has the goal to enhance metabolic research for stratified medicine in Birmingham and the UK through the provision of increased capacity and increased capabilities. The PC-B will primarily focus on the investigation of metabolites to develop and translate new stratified medicine approaches in endocrinology, blood cancers and immune/inflammation-mediated diseases. The centre will operate with a range of instruments (eleven UPLC-MS systems and two NMR systems) applied to study human metabolism, primarily in human biofluids but also in mammalian cells and tissues. The RPC offers assays to study samples in a non-targeted approach (applying reversed phase UPLC-MS, HILIC UPLC-MS and NMR) and in a targeted approach (applying UPLC-triple quadrupole MS). These assays provide the capability to perform discovery studies and then to translate these for patient benefit (the bench-to-bedside approach). The Phenome Centre-Birmingham was funded in late 2014 and will be operational in early 2016.

The press release for the Regional Phenome Centre can be found at:
http://www.birmingham.ac.uk/schools/biosciences/news/2014/5m-MRC-Regional-Phenome-Centre-at-Birmingham-05-11-14.aspx

Metabolomics Research at the University of Birmingham

The Metabolomics Initiative at the University of Birmingham began in 2003 and now encompasses several Schools including Biosciences, Medicine, Mathematics and Computer Science. Our metabolomics research spans the development of analytical and informatic methods as well as their application to wide ranging and numerous projects in the Life Sciences to provide significant impact for change in human health and the environmental sciences. These include studies in mammals, fish, invertebrate organisms, microbes and plants, with a particular emphasis in both **clinical metabolomics** and environmental metabolomics. The research is driven by internationally-recognised academic staff (including Viant and Dunn) supported by our current and highly active research program which involves ca. 50 principal investigators, postdoctoral researchers and PhD students. Research and translation is performed in world-class bioanalytical facilities including the national NERC Biomolecular Analysis Facility (NBAF) for environmental metabolomics, Advanced Mass Spectrometry Facility, The Henry Wellcome Building for Biomolecular NMR

Spectroscopy and the Centre for Computational Biology (CCB) (further details below). To further strengthen our capacity and capabilities in clinical metabolomics, we have recently been funded £5m by the MRC to establish the Phenome Centre-Birmingham that will include eleven UPLC-MS instruments.

Further details on the **University's Metabolomics Research** can be found at:
http://www.birmingham.ac.uk/research/activity/metabolomics/index.aspx

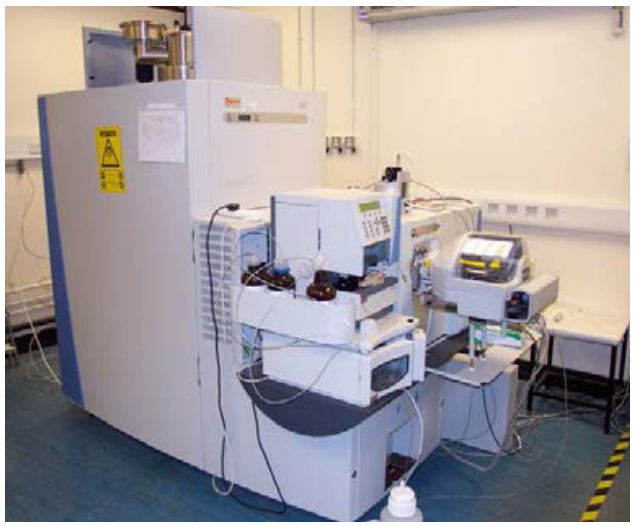
Clinical Metabolomics Research in Birmingham

Clinical metabolomics research in Birmingham integrates the University of Birmingham, the University Hospitals Birmingham NHS Foundation Trust and Birmingham Health Partners to provide cutting-edge research translatable to provide patient benefits. The importance of translation is highlighted by the soon-to-open Institute of Translational Medicine which will provide the bridge between primary research and translation in to healthcare systems. Research covers a broad area of disciplines including endocrinology, healthy ageing, inflammatory and immunological diseases, cancer, cardiology and liver diseases. Currently more than 30 principal investigators, postdoctoral researchers and PhD students apply metabolomics to clinical research. A significant focus of this research, and the focus of the Regional Phenome Centre, is stratified medicine.

Further details of examples of specific centres can be found at:
http://www.birminghamhealthpartners.co.uk/
http://www.birmingham.ac.uk/research/activity/mds/centres/cedam/index.aspx
http://www.srmrc.nihr.ac.uk/
http://www.birmingham.ac.uk/generic/mrc-aruk/home.aspx

Relevant facilities at the University of Birmingham

Metabolomics facilities



The **Advanced Mass Spectrometry Facility** in the School of Biosciences houses a Fourier transform ion cyclotron resonance (FT-ICR) mass spectrometer equipped with a Thermo Dionex Ultimate 3000 LC and a Triversa chip-based nanoelectrospray system. In addition there is a Thermo Orbitrap Elite that is equipped with a dedicated nanoLC (Thermo Dionex Ultimate 3000) and a Triversa chip-based nanoelectrospray system, and a Q-Exactive LC-MS. For targeted metabolite analyses, the facility has a triple quadrupole mass spectrometer (Thermo TSQ Vantage) equipped with a Thermo Dionex LC. All of these instruments are used solely for 'omics research. Several PhD students and postdoctoral researchers use these mass spectrometers, supported by a Scientific Officer for Proteomics and two Experimental Officers for Metabolomics/Lipidomics. Further details at:
http://www.birmingham.ac.uk/facilities/advanced-mass-spectrometry/index.aspx

The **Henry Wellcome Building for Biomolecular NMR Spectroscopy** (HWB•NMR) houses extensive instrumentation for high throughput metabolomics and protein structure determination. This state-of-the-art facility currently has four 600 MHz, one 800 MHz and one 900 MHz NMR spectrometers that are equipped with an assortment of cryoprobes, autosamplers and a high resolution magic angle spinning probe. Further details at: www.nmr.bham.ac.uk

Bioinformatics facilities

The newly forming **Centre for Computational Biology (CCB)** builds on the success of the former Centre for Systems Biology. The CCB is an interdisciplinary Research Centre that provides dedicated space for bioinformatics activities including a local high performance computing cluster. Researchers use this high performance cluster in the analysis of large amounts of data generated from biological experiments on gene expression and metabolomics, as well as the BlueBEAR supercomputer with includes dedicated servers for jobs run by the NBAF metabolomics facility staff. Further research collaborations across Schools (e.g. Computer Science, Engineering, Mathematics, Medicine and others) are also facilitated by the Centre.

The People

Key metabolomics investigators at the Regional Phenome Centre

Prof. Mark R. Viant holds a Chair in Metabolomics, is Director of the NERC Biomolecular Analysis Facility for Metabolomics, Director of the Regional Phenome Centre, and Immediate Past President of the international Metabolomics Society. As a postdoctoral fellow at the University of California, Davis, he pioneered the application of metabolomics to environmental health issues in aquatic organisms. In 2003 he relocated to Birmingham as a NERC Advanced Fellow with the remit to further develop metabolomics in environmental toxicology. With funding from the NERC, BBSRC, MRC, Wellcome Trust, Wolfson Foundation, EU, Environment Agency and several US agencies, he and his group have developed new metabolomics methods in both 2-D NMR and mass spectrometry. His team has applied these techniques to probe toxicant-induced metabolic changes in a range of organisms. He has demonstrated the need for “phenotypic anchoring” in metabolomics and most notably discovered biomarkers of toxic stress that are predictive of whole organism physiological perturbation. He serves on the editorial boards of *Metabolomics* and *Scientific Data*. Viant has published ca. 120 peer reviewed papers. See http://www.birmingham.ac.uk/staff/profiles/biosciences/viant-mark.aspx

Dr Warwick B. Dunn is Lecturer in Metabolomics, Mass Spectrometry Director of the Regional Phenome Centre, Theme Lead for the MRC-ARUK Centre for Musculoskeletal Ageing and a Director of the Metabolomics Society. He has applied bioanalytical and metabolomics approaches to the study of biological systems for the last 15 years, with the last seven years focused on clinical applications. His research focuses on the development of experimental and computational workflows to study biological systems in close collaboration with Prof. Viant. These tools are then applied in the study of human, health, diseases and ageing to develop new treatments for human diseases, to increase patient benefit and to improve patient

outcome and longer-term health. An integral part of this initiative is to apply ‘omics technologies including metabolomics. These studies provide data which are applied to understand molecular pathophysiological mechanisms associated with human health and disease, to act as prognostic or diagnostic biomarkers of disease or to act as biomarkers to define efficacy and toxicity of disease interventions (for example, therapeutics) or to apply as biomarkers in stratified medicine. My group collaborates with clinicians and biomedical researchers in areas of endocrinology, inflammation and Immunology, musculoskeletal health and exercise and complications of reproduction and pregnancy. See http://www.birmingham.ac.uk/schools/biosciences/staff/profile.aspx?ReferenceId=53168