

UNIVERSITY OF BIRMINGHAM

SCHOOL OF BIOSCIENCES

Research Fellow in Molecular Toxicology (post 47388)

Fixed term for 27 months with possibility of extension

Salary from £28,695 to £37,394 a year.

Funded by NERC and EU grants, we are expanding our research program to discover the molecular mechanisms of toxicity of chemicals and nanomaterials using 'omics approaches. The first project will focus on measuring the molecular responses of a sentinel organism, *Daphnia magna*, to priority environmental pollutants. The ultimate goal is to discover novel mechanistically-based molecular signatures that are both indicators of adverse organism health and diagnostic of pollutant class. The focus of the second, highly related project is to discover the mechanisms of toxicity of nanomaterials to *Daphnia*. The application of unbiased 'omics techniques will help to identify any novel potential hazards presented by the nanomaterials.

We seek to recruit an outstanding **postdoctoral researcher** to design and conduct a multi-omics approach, comprising of metabolomics and transcriptomics, to discover the molecular responses of *Daphnia* to chemicals, chemical mixtures and engineered nanomaterials. The appointee will conduct the exposure studies using *Daphnia*, and then use a combination of mass spectrometry metabolomics, transcriptomics and multivariate data analyses to reveal the molecular pathways disrupted. The candidate will work in a large and highly multi-disciplinary team at the international forefront of the development and application of 'omics approaches to environmental (nano)toxicology. Applicants should hold (or be near to completing) a PhD in molecular toxicology, with considerable interest in 'omics approaches.

World class research facilities exist at Birmingham for this research project as evidenced by the NERC Biomolecular Analysis Facility (NBAF) for Metabolomics (<http://www.biosciences-labs.bham.ac.uk/NBAF-Birmingham>) and the BGI-Birmingham Joint Centre for Environmental Omics. Further details are provided in the supporting information.

Informal enquiries about this post can be addressed to Professor Mark Viant (tel: +44 (0)121 414 2219, email: M.Viant@bham.ac.uk). Further details on the metabolomics research in his laboratory can be found at: <http://www.biosciences-labs.bham.ac.uk/viant>

Closing date: **Email Mark Viant**

Reference: 47388

To download the details and submit an electronic application online visit: <http://www.hr.bham.ac.uk/jobs> alternatively information can be obtained from 0121 415 9000

Valuing excellence; sustaining investment

Job Description

Post Title and Post Number	Research Fellow in Molecular Toxicology-47388
Organisation Advertising Description	School of Biosciences
Post Number	47388
Full Time/Part Time	Full Time
Number of hours / weeks to be worked	100%
Duration of post	27 months with possibility of extension
Post is open to:	Internal and External Candidates
Grade	7
Salary	Starting salary is normally in the range £28,695 to £37,394. With potential progression once in post to £39,685 a year.
Additional Information	<p>Informal enquiries to: Professor Mark Viant: m.viant@bham.ac.uk or tel: 0121 414 2219</p> <p>Estimated start date 1 January 2015 or soon thereafter</p>
Terms and Conditions	<u>Research and Analogous Staff (non-clinical)</u>
Closing Date	

Job Summary

To contribute to the achievement of the School's research strategy by undertaking specified research activities within an established research programme.

This post forms a component of the NERC funded grant "A Systems Biology platform for predictive ecotoxicology in *Daphnia magna*" and subsequently a component of the

EU funded grant “FutureNanoNeeds - Framework to respond to regulatory needs of future nanomaterials and markets”. As such the postholder will conduct “omics” studies (primarily metabolomics) into the effects of chemicals and nanomaterials on organism health in order to learn about the mechanisms of toxicity of these substances. Their role will be to conduct the *Daphnia* toxicity exposure studies, conduct “omics” experiments (primarily metabolomics and also transcriptomics) and undertake statistical analyses, ultimately generating new knowledge in both toxicology & nanotoxicology.

Main duties

- To collect research data via means of scientific experiments and literature reviews, where the techniques to be employed will include: *Daphnia* exposure studies, transcriptomics and mass spectrometry (direct infusion, LC-MS) metabolomics.
- Contribute to writing bids for research funding.
- To analyse data produced by the project, in particular including multivariate statistical analyses.
- To contribute to the development of research techniques, models and methods in collaboration with colleagues to support the activities discussed above.
- To disseminate research findings using appropriate and effective media such as publication, research seminars etc. In particular, dissemination of results through peer-reviewed publications, both as first author and as non-first author.
- To deal with problems that may affect the achievement of research objectives and deadlines.
- To carry out administrative tasks related directly to the delivery of the research.
- To provide training and supervision of other staff and students on own specialist area in metabolomics.

Person specification

- First degree in area of specialism and a higher degree relevant to research area: PhD (awarded, or near completion) in molecular toxicology or equivalent, with considerable experience in ‘omics approaches.
- 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 laboratory safety.
- Sufficient breadth and depth of specialist knowledge in the discipline and research methods to work within established research programmes.

Scope of the Role

- Complete work within research grant
- Operate within area of specialism
- Analyse and interpret research results

Planning and Organising

- Plan for the use of research resources as appropriate. Planning will typically involve the postholder and supervisor. Meetings will be held on a weekly basis.
- Contribute to the planning of research projects, including their own projects, those of the 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

i) You take without reference to others (after appropriate training).

Sample preparation.

Data collection and analysis.

Prioritisation of tasks.

Implementation of School safety policy.

(ii) You take after consulting with supervisors.

Direction of project, including experimental design and development of improved methodologies.

Provision of specialist training.

Alterations to working practices.

Purchasing of equipment.

iii) You refer to your line manager.

Serious safety issues.

Internal/External Relationships

- Liaise with research staff and support staff on research-related matters
- Liaise with external principal investigators of the research project
- Give presentations and/or contribute to presentations at national and international conferences
- 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

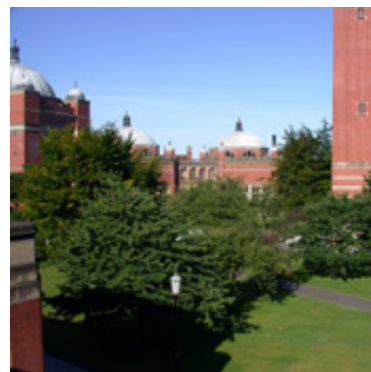
iii) You refer to your line manager.
Serious safety issues.

Internal/External Relationships

Liaise with research staff and support staff on routine matters.

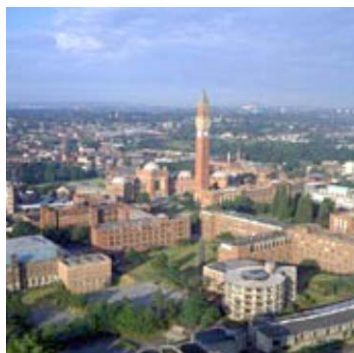
Molecular Toxicology Research at the University of Birmingham

The University has a long-standing research and academic focus on **Toxicology**. Some of the early groundbreaking work in drug metabolism initiated this profile, which evolved into studies of the molecular mechanisms of toxicity relevant to both humans and other organisms. A major current focus is around the development of Adverse Outcome Pathways derived from “Omic” analyses. This area is supported by over £2 million of recent University investment into associated environmental genomics. There are extensive collaborations with other Schools of the University in areas such as **nanotoxicology and environmental health**.



The School has hosted a highly successful Masters programme in Toxicology since 1979, which continues to attract high quality students and that enjoys strong industrial interactions. Toxicology research in the School currently attracts over £5 million from sources including the EU, NERC, Defra, Industry, NSF and US NIH. Members of the School’s Toxicology community have leadership roles within the British Toxicology Society, the International Union of Toxicology, EUROTOX, the international Metabolomics Society and Gordon Conferences. There is School representation on MRC and NERC panels and advisory committees such as the Advisory and Implementation Group NERC Mathematics and Informatics for Environmental ‘Omic Data Synthesis Programme. There are strong links with Industry via consultancies and with bodies involved in regulation and policy such as the European Commission’s Joint Research Centre (JRC) in Ispra, OECD, the UK Environment Agency, Defra, Department of Health and the Food Standards Agency having made contributions to the UK Committee on Toxicity and the former Committee on Safety of Medicines. The vision of the University of Birmingham’s research group is “to transform environment and health protection by the application of automated higher-throughput biology and omics technologies. This creates a comprehensive database of the effects of all chemicals, advanced materials and their mixtures on biological systems, thereby dramatically reducing uncertainty for industry, policy makers and regulators because of shared knowledge built upon strong scientific principles.”

Metabolomics Research at the University of Birmingham



The Metabolomics Initiative at the University of Birmingham began in earnest in 2003 and now encompasses several Schools including Biosciences, Medicine, Mathematics and Computer Science. Our metabolomics research spans the development of analytical and bioinformatic methods as well as their application to wide ranging and numerous projects in the Life Sciences. These include studies in mammals, fish, invertebrates, microbes and plants, with a particular emphasis in both **environmental metabolomics** and clinical metabolomics. The bioanalytical facilities and

expertise in both NMR spectroscopy and mass spectrometry at Birmingham are

world class, and include the Henry Wellcome Building for Biomolecular NMR Spectroscopy with seven spectrometers ranging from 500 to 900 MHz, and the Advanced Mass Spectrometry facility with Thermo Fisher Scientific Fourier transform ion cyclotron resonance, Orbitrap Velos, triple quadrupole and a newly installed Q Exactive mass spectrometer (further details below). The bioinformatic facilities and expertise at Birmingham include the new Centre for Computational Biology and several high performance computing clusters (details below). Our current and highly active research program involves ca. 50 principal investigators, postdoctoral researchers and PhD students.

Further details on the **national NERC Biomolecular Analysis Facility (NBAF) for environmental metabolomics** research can be found at:

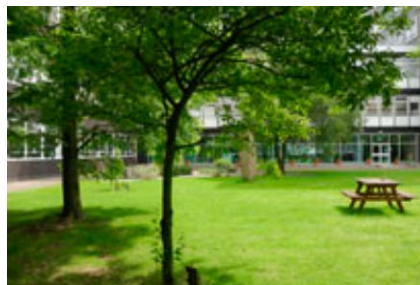
<http://www.birmingham.ac.uk/facilities/metabolomics/index.aspx>

Further details on the **University's Metabolomics Research** can be found at:

<http://www.birmingham.ac.uk/research/activity/metabolomics/index.aspx>

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 50, 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). The **national NERC Biomolecular Analysis Facility (NBAF) for environmental metabolomics** is based in the School of Biosciences.

Research in the School centres around four interlinked themes:

- **BioSystems and Environmental Change**
- Microbiology and Infection
- Molecular Cell Biology and Signalling
- Plant Genetics and Cell Biology

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 Primary Supervisor

Prof. Mark R. Viant holds a Chair in Metabolomics, is Director of the NERC Biomolecular Analysis Facility for Metabolomics, and is the 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 has developed new metabolomics methods in both 2-D NMR and mass spectrometry, and confirmed the high reproducibility of NMR environmental metabolomics in an international intercomparison study. He 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. This work has received “Honourable Mention” from the Society of Toxicology as one of the top 5 papers published in *Toxicological Sciences* in 2010. He serves on the editorial boards of *Scientific Data* and *Metabolomics*. Viant has published ca. 120 peer reviewed publications.

Relevant facilities at the University of Birmingham

Metabolomics facilities

The **Advanced Mass Spectrometry Facility** in the School of Biosciences houses a hybrid 7T Fourier transform ion cyclotron resonance (FT-ICR) mass spectrometer (Thermo LTQ FT Ultra) equipped with a nano/capillary/HPLC (Dionex Ultimate 3000) and a Triversa chip-based nanoelectrospray system (Advion Biosciences). In addition there is a Thermo Orbitrap Velos that is equipped with a dedicated nanoLC (Dionex Ultimate 3000) and a Triversa chip-based nanoelectrospray system, and a newly installed Q Exactive LC-MS.



For targeted metabolite analyses, the University has recently purchased a triple quadrupole mass spectrometer (Thermo TSQ Vantage), which is also equipped with a Dionex LC (capable of UHPLC) and ion sources including a third Triversa system. All of these instruments are used solely for proteomics and metabolomics 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 seven NMR spectrometers (two 500 MHz, three 600 MHz, 800 MHz and 900 MHz) that are

equipped with cryoprobes, autosamplers, and a high resolution magic angle spinning probe. The facility also houses a Bruker maXis high resolution mass spectrometer with a Dionex LC. The facility is supported by three staff, under the leadership of Professors Michael Overduin and Ulrich Günther. Further details at: www.nmr.bham.ac.uk

These instruments form the core of the NERC Biomolecular Analysis Facility (NBAF) for Metabolomics, further details of which can be found at: <http://www.birmingham.ac.uk/facilities/metabolomics/index.aspx>

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 which 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 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.