Postdoctoral Research Associate
Department of Chemistry

Closing date: 2 August 2018
Interview date: 14 August 2018
Vacancy reference: 6822
INTRODUCTION

A postdoctoral position (funded until July 2022) is available to study the structure and mechanism of viral DNA-packaging motors. The project is funded by a Wellcome Trust grant ‘Structure and mechanism of nucleic acid-processing machines in viral biogenesis’ awarded to Professor Fred Antson. You will work principally with Fred Antson but also with other members of his group, in particular Maria Chechik, Huw Jenkins and Sandra Greive. You will be based in the internationally renowned York Structural Biology Laboratory (YSBL) in the Department of Chemistry; the laboratory has all the equipment that is necessary for protein production, crystallisation and X-ray structure determination. A Cryo-EM facility, currently being established by the Department, is expected to become fully operational in 2019.

You will be required to produce and purify bacteriophage capsids that can package DNA in vitro, and to perform structural studies of DNA packaging complexes by Cryo-EM. This post requires prior experience in Cryo-EM structure determination, protein production and in establishing model systems for nucleic acid machines, such as capsid-based DNA motors, that can function in vitro.

As a Department we strive to provide a working environment which allows all staff and students to contribute fully, to flourish, and to excel. We aim to ensure that there is a supportive and egalitarian culture at all levels and across all staff groups. We promote good practice and a strong culture of equality in higher education. Further information can be found within this brief and on our website: www.york.ac.uk/chemistry/
Main purpose of the role

- To conduct research under the supervision of senior colleagues and to contribute to the production of research.
- To assist in the identification and development of potential areas of research and the development of proposals for independent or collaborative research projects.

Key responsibilities

(Role holders will be required to undertake some or all of the duties below)

- To conduct individual and collaborative research projects, duties to include: analysis and interpretation of research data; use of appropriate research techniques and methods; writing up of research results and dissemination through publications, seminar and conference presentations and public engagement and outreach activities; contributing to the identification of possible new areas of research.
- To contribute to the preparation of research proposals and applications to external bodies.
- To undertake appropriate organisational and administrative activities connected to the research project, including conference organisation, and the development of promotional or educational material including website maintenance and development.
- To develop and initiate collaborative working internally and externally, duties to include: the building of internal contacts and participation in internal networks; collaboration with colleagues on joint projects as required; participation in and identification of external networks in order to share information and identify potential opportunities for collaboration and possible sources of funding; attendance at and contribution to relevant meetings.
- To provide guidance to other staff and students, as required, as well as coordinating the work of small research teams.
- To assist with undergraduate teaching in own area of expertise.

Post-specific responsibilities:

- For a set of bacteriophages, to produce and purify the small and large terminase proteins.
- For a set of bacteriophages, to produce and purify empty capsids and establish conditions for in vitro packaging.
- Perform symmetry-free reconstruction of the 3D structure of the DNA motor using images obtained by Cryo-EM.
- Analyse structural data to understand the mechanism of DNA packaging.
# PERSON SPECIFICATION

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<th>Qualifications</th>
<th>Essential / Desirable</th>
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<tr>
<td>First degree in Chemistry, Biology or similar</td>
<td>Essential</td>
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<td>PhD in Structural Biology or equivalent experience</td>
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<tr>
<th>Knowledge</th>
<th>Essential / Desirable</th>
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<tr>
<td>Knowledge in molecular and structural biology to engage in high quality research</td>
<td>Essential</td>
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<td>Knowledge of a range of research techniques and methodologies to include protein production and purification, isolation and production of viral capsids, in vitro nucleic acid packaging activity assays, reconstruction of 3D structure from images of single particles recorded by Cryo-EM</td>
<td>Essential</td>
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<td>Has research expertise in an area that will complement and enhance the department's research strategy and goals</td>
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<th>Skills, abilities and competencies</th>
<th>Essential / Desirable</th>
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<td>Highly developed communication skills to engage effectively with a wide ranging audience, both orally and in writing, using a range of media</td>
<td>Essential</td>
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<td>Ability to write up research work for publication in high profile journals and engage in public dissemination</td>
<td>Essential</td>
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<td>Ability to develop research objectives, projects and proposals for own and joint research, with the assistance of a mentor if required</td>
<td>Essential</td>
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<td>Competency to conduct individual and collaborative research projects</td>
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<td>Ability to identify sources of funding and contribute to the process of securing funds, with collaborators if required</td>
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<td>Competency to make presentations at conferences or exhibit work in other appropriate events</td>
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<td>Ability to work as part of a team and also to work independently using own initiative</td>
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<tr>
<td>Experience of carrying out both independent and collaborative research</td>
<td>Essential</td>
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<td>Experience of writing up research work for publication</td>
<td>Essential</td>
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<tr>
<td>Experience in purification and production of viral capsids, in vitro nucleic acid packaging activity assays, Cryo-EM 3D structure reconstruction</td>
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<td>Experience in structural biology</td>
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## Personal attributes

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<tr>
<td>Attention to detail and commitment to high quality</td>
<td>Essential</td>
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<td>Collaborative ethos</td>
<td>Essential</td>
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<td>Interest in and enthusiasm for the subject matter of the project(s)</td>
<td>Essential</td>
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<td>Positive attitude to colleagues and students</td>
<td>Essential</td>
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<td>Willingness to work proactively with colleagues in other work areas/institutions</td>
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<td>Ability to plan and prioritise own work in order to meet deadlines, including using initiative to plan research programmes</td>
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<td>Commitment to personal development and updating of knowledge and skills</td>
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The Antson group

The Antson group is investigating how viruses use molecular machines to manipulate their DNA and RNA, and how communication between proteins and nucleic acids enable the processes that are critical to viral biogenesis. The specific research questions are:

- What is the structure and mechanism of genome packaging motors of dsDNA viruses? What is the role of each component of the DNA-translocating motor, and what are the molecular interactions between individual protein components and DNA? How is ATP hydrolysis coupled to mechanical movement during DNA translocation?

- What is the structure and mechanism of RNA helicases in positive-sense ssRNA viruses? What is the molecular basis of communication between ATP hydrolysis and RNA separation?

- How can we translate structural and mechanistic knowledge about these systems into biomedical and biotechnological applications?

The group currently includes Dr Huw Jenkins working on structural biology of several protein-nucleic acid machines, Dr Sandra Greive working on biological nanopores and biochemical & biophysical characterization of protein-nucleic acid interactions, Dr Vladimir Levdikov working on structure determination of the several helicases, Ms Maria Chechik - a senior research technician working on protein production and electron microscopy investigations and also three PhD students working on understanding structure and mechanism of protein-nucleic acid assemblies found in viruses.

The York Structural Biology Laboratory

Professor Fred Antson is a member of the York Structural Biology Laboratory [hyperlink to http://www.york.ac.uk/chemistry/research/ysbl/], a large and internationally renowned grouping focusing on structural biology and biological chemistry whose research can be categorised broadly under three main headings:

- Structural Biology: the determination of the structure (s) of proteins and their complexes with other proteins, nucleic acids and ligands. When integrated with exploration of the cell and molecular biology of the targets, the structural work is providing major insights into the molecular mechanisms underlying biological function.

- Chemical Biology and Biological Chemistry: probing the chemistry of biological processes in areas such as structural enzymology, reaction mechanisms and fundamental studies of molecular interactions. There is also growing interest in biocatalysis: the discovery, optimisation and exploitation of enzymes for chemical
THE DEPARTMENT

synthesis. In addition, the group uses structure based methods to design ligands to act as chemical tools to disrupt and probe the biology of specific proteins and pathways.

- Crystallographic Methods: York is world renowned for the development of the experimental and in particular computational methods used by crystallographers worldwide. This includes new approaches in molecular replacement and refinement (MOLREP, REFMAC) as well as increased streamlining model building into electron density (QUANTA and COOT). York is also a major centre for the UK collaborative effort in crystallographic computing, CCP4.

The Department of Chemistry

The Department of Chemistry: [http://www.york.ac.uk/chemistry](http://www.york.ac.uk/chemistry) is one of the largest and most successful academic departments at York. The Department was placed in the top ten UK universities for Research Power by the 2014 Research Excellence Framework exercise (REF). Amongst our academic staff we have five Fellows of the Royal Society and many national and international prize winners, contributing to a dynamic and thriving department. The excellence of Chemistry at York was recognised in the 2019 Guardian League Table Guide, 2019 Complete University Guide and 2018 Times University League Table where it achieved outstanding 3rd, 6th and 4th places respectively.

The Department has nearly 60 academic staff (including teaching-only staff), more than 600 undergraduate students, approximately 160 graduate students (mainly studying for PhDs) and over 80 research associates and fellows. The Department has a group of coherent laboratories, recently extended and modernised, which provide an excellent environment for both teaching and research; £35M has been spent on new buildings and equipment in the last seven years.

Staff in the Department of Chemistry undertake research in a wide range of fields and there are particular strengths in analytical and archaeological science, atmospheric chemistry, chemical and structural biology, green chemistry, materials chemistry, metalloproteins, organometallic and catalytic chemistry, synthetic organic chemistry and time-resolved spectroscopy.

We have nearly 30 administrative staff (including those funded externally), as well as over 50 technical staff who provide assistance in the teaching and research laboratories and maintain the workshops (mechanical, glass and electronics) supporting these activities.

The undergraduate programmes, which typically attract over 1200 applications for the ca 180 places, have a flexible, modular structure with opportunities for specialisation in environmental, industrial and medicinal chemistry. There are three-year (BSc) and four-year (MChem) courses with opportunities for students to spend a year at one of a number
of overseas universities or in industry. Students rated the Department with an overall satisfaction rating of 95% in the National Student Survey 2017.

The Gold Award from Athena SWAN: https://www.york.ac.uk/chemistry/ed/ for promoting women in science was won by the Department of Chemistry in 2007 and renewed in 2010 and 2015. This was the first Gold award made in this scheme. The Athena SWAN Charter recognises and celebrates good employment practice for women working in science, engineering and technology (SET) in higher education and research.

The case studies on our Equality and Diversity website: https://www.york.ac.uk/chemistry/ed/fam-friendly-work/ illustrate the variety of working arrangements of staff which are supported by the Department.

The Department of Chemistry operates a set of family-friendly practices. Staff working patterns are flexible and a formal Flexitime system is also in operation. The Department has developed a maternity and paternity leave procedure to help provide support for staff and the University has a nursery http://www.york.ac.uk/univ/nursery/ and a Child Care voucher scheme.

The Department provides support for all categories of staff in their applications for promotion, role reviews, awards, prizes and rewarding excellence nominations. Staff are encouraged to attend training events and take up opportunities for professional development including those offered by the award-winning University Learning and Development Team: http://www.york.ac.uk/admin/hr/training/. The Department strives to address diversity inequalities to ensure that there is a culture that supports equality and encourages better representation throughout the Department. Support for all staff at all stages of their career is recognised as being extremely important; individuals will be allocated a specific mentor to help support them in future career development. Social events are also held regularly for members of staff.

Opportunities for employment for partners exist across the University, Science City York or within the City of York. The Department recognises that employment for partners can be an issue for new employees and will be understanding if you raise this and will do its best to help.

The Department is committed to establishing a culture of environmental good practice and all staff are asked to go about their duties in a resource efficient way and minimise impacts to the environment wherever possible.

The University has recently invested heavily in Chemistry. The Dorothy Hodgkin Building was completed in two phases. The first, housing Analytical Science and Synthetic Chemistry, opened in 2005, while the second phase housing catalytic, materials and synthetic chemistry was completed in 2012. The department is exceptionally well equipped for NMR spectroscopy and departmental instruments are housed in a purpose-built building opened in 2006, while the Wellcome-Wolfson-funded Centre for Hyperpolarisation in Magnetic Resonance (CHyM) was completed in October 2012. The Wolfson Atmospheric Chemistry Laboratories were opened in 2013 and have recently been extended (2018) and a two-storey building housing new teaching and research laboratories (to house Green Chemistry) and offices was completed in March 2014. The department has recently secured funding from the Wellcome Trust, the Wolfson Foundation, a generous alumnus and the university to acquire a 200 kV cryo-electron microscope and a building in which to house it. Construction and installation are anticipated in 2018.
Founded on principles of excellence, equality and opportunity for all, the University of York opened in 1963 with just 230 students. In 2018 it is the home of more than 17,000 students across more than 30 academic departments and research centres. Since opening over fifty years ago, we have become one of the world’s leading universities and a member of the prestigious Russell Group.

We are consistently recognised as one of the leading Higher Education Institutes and are ranked 16th in the Times & Sunday Times league table (2017). The University of York has won six Times Higher Education (THE) Awards and five Queen’s Anniversary Prizes.

The University is proud of its association with Athena SWAN, holding 12 awards in support of gender equality, representation and success for all, with gold awards for Chemistry and Biology and a University-wide bronze award.

Of 154 universities that took part in the Research Excellence Framework (REF) in 2014, The University of York ranked 14th overall and 10th for the impact of our research. The University is consistently in the top ten UK research universities and attracts over £60m a year of funding from research alone.

Our vision is to make the University of York a world leader in the creation of knowledge through fundamental and applied research, the sharing of knowledge by teaching students from varied backgrounds and the application of knowledge for the health, prosperity and well-being of people and society.
Attractive workplace

Centred around the picturesque village of Heslington on the edge of the city of York, our colleges are set in an attractive landscaped campus. York enjoys a safe, friendly atmosphere with facilities including bars, shops, theatres and concert halls all within easy walking distance.

The University has undergone an unprecedented period of expansion and renewal since 2000. We have invested in twenty new buildings on the original campus and have completed the first and second phases of a £750m campus expansion. Our investment in new colleges, teaching and learning spaces, laboratories, research facilities and a new sports village mean there has never been a better time to join us.

During this period of change we've worked hard to retain our friendly, informal and collegiate atmosphere, which is important to our core values of inclusivity and interdisciplinarity.

We have a thriving international community and are committed to providing staff moving to York with as much support as possible through our Relocation Package and Welcome Officers.

The University is committed to promoting a diverse and inclusive community - a place where we can all be ourselves and succeed on merit. We offer a range of family friendly, inclusive employment policies, flexible working arrangements, staff engagement forums, campus facilities and services to support staff from different backgrounds.

For further information please visit our employee benefit pages.
The City of York

Internationally acclaimed for its rich heritage and historic architecture, York’s bustling streets are filled with visitors from all over the world. Within its medieval walls you will find the iconic gothic Minster, Clifford’s Tower and the Shambles - just a few of the many attractions.

But York isn’t just a great place to visit - it’s also a great place to live and work. While nourishing a vibrant cosmopolitan atmosphere, York still maintains the friendly sense of community unique to a small city.

Visit www.visityork.org for more information on the city of York

Shopping, culture and entertainment

York boasts specialist and unique boutiques but also all the high street stores on its busy shopping streets. Alongside them you will find cinemas, theatres, an opera house, art galleries, a vast range of restaurants, live music venues and clubs. York is particularly renowned for its multitude of pubs and bars, from the modern to the medieval.

Housing and schools

Whether you choose to live close to the city, in one of the surrounding villages or further afield, you will find a wide range of housing within comfortable distance of York and the University. For families, the area has a range of excellent schools both in the state and independent sector.

Great location

York is one of Britain’s best-connected cities. Halfway between London and Edinburgh on the East Coast mainline, on intercity trains you can reach London King’s Cross in less than two hours and Edinburgh in two and a half hours. York is also well served by road links, and it is easily accessible from the A1, M1 and the M62.

For those travelling from overseas, Manchester Airport is two hours away and Heathrow Airport just three and a half. Flights from nearby Leeds Bradford Airport provide easy access to mainland Europe. By Eurostar from London St Pancras, Paris is just over six hours away.

Yorkshire

The Lonely Planet guide recently declared Yorkshire the third best region in the world to visit. There is something to cater to every taste, whether it be the rugged landscapes of the Moors or the Dales, the picturesque seaside towns of Scarborough and Robin Hoods Bay, the gothic architecture of Whitby or the vibrancy of cosmopolitan Leeds.
Apply online

- Go to https://jobs.york.ac.uk
- Find this job using reference 6822
- Complete the online application form

You will need to submit your completed application by midnight (local UK time) on 2 August 2018

What will I need?

You will need to upload:

- your CV
- a letter describing how you meet the requirements of the job

You will also need details of 2 referees.

Help and assistance

Direct any informal queries to fred.antson@york.ac.uk

If you have any questions about your application, contact the HR Services team:

recruitment@york.ac.uk

+44 (0)1904 324835