**BIG DATA INSTITUTE**

<table>
<thead>
<tr>
<th><strong>Job title</strong></th>
<th>Postdoctoral Research Scientist - Evolutionary Modelling of Chronic Viral Infections</th>
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<tr>
<td><strong>Division</strong></td>
<td>Medical Sciences</td>
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<tr>
<td><strong>Department</strong></td>
<td>Nuffield Department of Medicine</td>
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<tr>
<td><strong>Location</strong></td>
<td>Big Data Institute, The Li Ka Shing Centre for Health Information and Discovery, Old Road Campus, Headington, Oxford, OX3 7LF</td>
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<tr>
<td><strong>Grade and salary</strong></td>
<td>Grade 7: £31,604 - £38,833 per annum (pro-rata)</td>
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<td><strong>Hours</strong></td>
<td>Full-time (part-time hours may be considered)</td>
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<td><strong>Contract type</strong></td>
<td>Fixed-term for 18 months with the possibility of renewal</td>
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<td><strong>Reporting to</strong></td>
<td>Katrina Lythgoe</td>
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<td><strong>Vacancy reference</strong></td>
<td>134385</td>
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**Research topic** | Evolutionary Modelling of Chronic Viral Infections

**Principal Investigator / supervisor** | Katrina Lythgoe

**Project team** | Lythgoe Group

**Project web site** | https://www.bdi.ox.ac.uk/Team/katrina-lythgoe

**Funding partner** | The funds supporting this research project are provided by Li Ka Shing

**Recent publications**

- Lythgoe et al 2017 Short-sighted virus evolution and a germline hypothesis for chronic viral infections, Trends in Microbiology 25(5) 336-348
- Doekes et al 2017 Effect of the latent reservoir on the evolution of HIV at the within- and between-host levels, PLoS Comp Biol 13(1) e1005228
- Lythgoe et al 2016 Large variations in HIV-1 Viral Load explained by shifting-mosaic Metapopulation dynamics PLoS Biology 14(10) e1002567
- Fraser et al 2014 Virulence and Pathogenesis of HIV-1 infection: an evolutionary Perspective Science 343(6177)
Introduction

About the University of Oxford

Welcome to the University of Oxford. We aim to lead the world in research and education for the benefit of society both in the UK and globally. Oxford’s researchers engage with academic, commercial and cultural partners across the world to stimulate high-quality research and enable innovation through a broad range of social, policy and economic impacts.

We believe our strengths lie both in empowering individuals and teams to address fundamental questions of global significance, while providing all our staff with a welcoming and inclusive workplace that enables everyone to develop and do their best work. Recognising that diversity is our strength, vital for innovation and creativity, we aspire to build a truly diverse community which values and respects every individual’s unique contribution.

While we have long traditions of scholarship, we are also forward-looking, creative and cutting-edge. Oxford is one of Europe’s most entrepreneurial universities. Income from external research contracts in 2015/16 exceeded £537.4m and we rank first in the UK for university spin-outs, with more than 130 companies created to date. We are also recognised as leaders in support for social enterprise.

Join us and you will find a unique, democratic and international community, a great range of staff benefits and access to a vibrant array of cultural activities in the beautiful city of Oxford.

For more information please visit www.ox.ac.uk/about/organisation

Medical Sciences

The Medical Sciences Division is an internationally recognized centre of excellence for biomedical and clinical research and teaching. We are the largest academic division in the University of Oxford World-leading programmes, housed in state-of-the-art facilities, cover the full range of scientific endeavour from the molecule to the population. With our NHS partners we also foster the highest possible standards in patient care.

For more information please visit: www.medsci.ox.ac.uk

Nuffield Department of Clinical Medicine (NDM)… fostering your career in science

The Nuffield Department of Clinical Medicine (NDM) is one of the largest departments of the University of Oxford and is part of the Medical Sciences Division, with responsibility for a significant part of the teaching of clinical students within the Medical School.

NDM has significant financial turnover and complexity, resulting from its diverse research portfolio, its geographical spread and its close links with NHS funding and strategic teams involved in the development and delivery of increasingly integrated clinical research platforms. For more information please visit: http://www.ndm.ox.ac.uk/home

The Nuffield Department of Clinical Medicine has been presented with a Departmental Athena SWAN Silver award in recognition of the commitment made to promote gender equality through our organisational and cultural practices and our efforts to improve...
the working environment for both men and women. For more information please see our Departmental Athena SWAN pages: https://www.ndm.ox.ac.uk/working-for-ndm/aboutndmatheneswan/

Oxford Big Data Institute (BDI)
The Big Data Institute (BDI) is a state-of-the-art building at Oxford University's Old Road Campus, which opened in March 2017. This interdisciplinary research centre focuses on the analysis of large, complex, heterogeneous data sets for research into the causes and consequences, prevention and treatment of disease. To this end, BDI researchers will develop, evaluate and deploy efficient methods for acquiring and analysing information for large clinical research studies. These approaches will be invaluable in identifying the associations between lifestyle exposures, genetic variants, infections and health outcomes around the globe.

Research is conducted in 4 general themes: genomics, population health, infectious disease surveillance, and methodology (including informatics, statistics, and engineering). Big Data methods could transform the scale (breadth, depth and duration) and efficiency (data accumulation, storage, processing and dissemination) of large-scale clinical research. The work of the BDI requires people and projects that span traditional departmental boundaries and scientific disciplines, supported by technical resources to handle the vast quantities of data they generate.

Under the leadership of Professor Gil McVean (Director) and Professor Martin Landray (Deputy Director), the BDI will comprise around 350 researchers (approx. 30 research groups) drawn from a wide range of departments and will form an analytical hub, deeply connected to the wider experimental and clinical community in Oxford and beyond.

Overview of the role
We seek a highly-motivated Postdoctoral Research Scientist with strong quantitative skills to undertake cutting-edge interdisciplinary research at the interface of infectious disease, genomics, statistics, and evolutionary biology. Individuals with a background in a science other than biology are also eligible to apply. The position is available immediately for 18 months in the first instance, and part-time working will be considered for the right candidate. The successful candidate will join Dr Katrina Lythgoe’s Evolution of Viral Infections Research Group, whose members collaborate closely with the Pathogen Dynamics Research Group led by Prof Christophe Fraser, and the Evolutionary Biology and Infectious Disease Research Group led by Prof Oliver Pybus.

Long-term chronic virus infections, such as HIV, Hepatitis C virus (HCV), and Hepatitis B virus (HBV), place an enormous burden on global health. Viruses causing chronic infections are unique since their ability to evolve rapidly combined with long durations of infection mean that virus evolution within individuals can have a significant effect on the health of entire populations and regions, such as how quickly drug resistant strains will spread, how virulence evolves, and how the virus adapts to the immunological background of the host population. Understanding how these pathogens will respond to interventions therefore requires knowledge of how they evolve within individuals, and which virus variants are transmitted between hosts.

Improvements in the affordability of genetic sequencing have led to dramatic increases in the amount and quality of genetic data available for analysis, including high-coverage sequencing of viral populations sampled sequentially through time both within patients and in populations.
This, combined with advances in the modelling of infectious diseases at multiple scales, now makes it possible to test hypotheses about infection dynamics with genetic data, and ultimately to generate more accurate predictive models of viral evolution at the epidemiological scale. Research in the Lythgoe Group is currently focussed on HIV, HCV, and HBV, and encompass a broad range of questions including:

(i) What is the impact of within-host compartmentalization and viral life-history on the evolutionary dynamics of chronic viral infections?
(ii) What are the mechanisms leading to the slower evolution of chronic viruses at the population scale compared to the within-host scale?
(iii) How does including within-host evolution in our models alter predictions of how chronic viruses will evolve at the among-host scale under different intervention strategies?

Depending on the strengths and interests of the successful candidate, the focus of the project will be on the development of within-host models that can be tested using within-host sequencing data, and/or the development of new mathematical modelling frameworks across multiple scales (within- and between-host) that can be used to generate testable predictions. Primary data for this project, collected by our collaborators, includes serially-sampled viral sequences from individual patients, viral sequences from transmission pairs, and whole genome next generation viral sequences from seroconverters collected at a continental scale. The sequences have been obtained using both single genome amplification (SGA) and next generation sequencing (NGS).

Responsibilities/duties

- Undertake innovative research in the fields of virus evolution, epidemiology, statistical inference, population genetics, phylogenetics, quantitative immunology, or mathematical modelling.
- Contribute and develop ideas for new research projects.
- Carry out collaborative projects with colleagues in partner institutions, and research groups.
- Participate in and lead the publication of research findings in international peer-reviewed journals and other publications.
- Participate in the dissemination of this work via presentations at academic meetings and conferences.
- Maintain computer software and websites as required.
- Act as a source of scientific information and advice to other members of the group.
- Adapt existing and develop new scientific techniques and methods.
- Test hypotheses and analyse data, reviewing and refining working hypotheses as appropriate.
- Contribute to other tasks within the group that fall within the remit of the funded project.

Selection criteria

Essential

- A PhD in a relevant field of biology, or another appropriate science (e.g. computer science, statistics, mathematics, physics, chemistry)
- A strong interest in the research described here.
- Strong analytical and quantitative skills and excellent problem-solving abilities.
- Demonstrated ability to undertake high quality scientific research.
• Willingness to learn a computer programming language or mathematical platform (C, JAVA, PERL, R, Matlab etc.) if not already known.
• Excellent communication skills, including the ability to write for publication, present research proposals and results, and represent the research group at meetings.
• Evidence of the ability to independently lead a research project, to work collaboratively with others, and to work to deadlines.

Desirable

• Expertise in at least one programming language or mathematical platform (C, JAVA, PERL, R, Matlab etc.).
• Proficiency in one or more of: mathematical modelling, evolutionary analysis, statistical inference, stochastic processes, evolutionary theory, population genetics.
• Experience in mathematical modelling of infectious disease
• An understanding of evolution theory and population genetics
• Experience of handling and analysing genome sequence data
• Track record of publication in leading international scientific journals.

How to apply

Before submitting an application, you may find it helpful to read the ‘Tips on applying for a job at the University of Oxford’ document, at www.ox.ac.uk/about_the_university/jobs/research

If you would like to apply, click on the Apply Now button on the ‘Job Details’ page and follow the on-screen instructions to register as a new user or log-in if you have applied previously. Please provide details of two referees and indicate whether we can contact them now.

You will also be asked to upload a CV and a supporting statement. The supporting statement should explain how you meet the selection criteria for the post using examples of your skills and experience. This may include experience gained in employment, education, or during career breaks (such as time out to care for dependants).

Your application will be judged solely on the basis of how you demonstrate that you meet the selection criteria stated in the job description.

All applications must be received by midday on the closing date stated in the online advertisement.

Information for priority candidates

A priority candidate is a University employee who is seeking redeployment because they have been advised that they are at risk of redundancy, or on grounds of ill-health/disability. Priority candidates are issued with a redeployment letter by their employing departments.

If you are a priority candidate, please ensure that you attach your redeployment letter to your application (or email it to the contact address on the advert if the application form used for the vacancy does not allow attachments)

Should you experience any difficulties using the online application system, please email recruitment.support@admin.ox.ac.uk. Further help and support is available from
www.ox.ac.uk/about_the_university/jobs/support/. To return to the online application at any stage, please go to: www.recruit.ox.ac.uk.

Please note that you will be notified of the progress of your application by automatic emails from our e-recruitment system. Please check your spam/junk mail regularly to ensure that you receive all emails.

Important information for candidates

Pre-employment screening

Please note that the appointment of the successful candidate will be subject to standard pre-employment screening, as applicable to the post. This will include right-to-work, proof of identity and references. We advise all applicants to read the candidate notes on the University’s pre-employment screening procedures, found at:

www.ox.ac.uk/about/jobs/preemploymentscreening/

The University's policy on retirement

The University operates an Employer Justified Retirement Age (EJRA) for all academic posts and some academic-related posts. From 1 October 2017, the University has adopted an EJRA of 30 September before the 69th birthday for all academic and academic-related staff in posts at grade 8 and above. The justification for this is explained at:

www.admin.ox.ac.uk/personnel/end/retirement/acrelretire8+/.

For existing employees, any employment beyond the retirement age is subject to approval through the procedures: www.admin.ox.ac.uk/personnel/end/retirement/acrelretire8+/

From 1 October 2017, there is no normal or fixed age at which staff in posts at grades 1–7 have to retire. Staff at these grades may elect to retire in accordance with the rules of the applicable pension scheme, as may be amended from time to time.

Equality of Opportunity

Entry into employment with the University and progression within employment will be determined only by personal merit and the application of criteria which are related to the duties of each particular post and the relevant salary structure. In all cases, ability to perform the job will be the primary consideration. No applicant or member of staff shall be discriminated against because of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief, sex, or sexual orientation.
Benefits of working at the University

University Club and sports facilities

The University Club provides social, sporting and hospitality facilities. It incorporates a bar, café and sporting facilities, including a gym. Staff can also use the University Sports Centre on Iffley Road at discounted rates, including a fitness centre, powerlifting room, and swimming pool. See: www.club.ox.ac.uk and www.sport.ox.ac.uk/oxford-university-sports-facilities.

Information for international staff (or those relocating from another part of the UK)

If you are relocating to Oxfordshire from overseas, or elsewhere in the UK, the University's International Staff website includes practical information related to moving to and settling in Oxford such as advice on immigration, relocation, accommodation, or registering with a doctor. See: www.internationalstaffwelcome.admin.ox.ac.uk/

The University of Oxford Newcomers' Club

The University of Oxford Newcomers' Club is an organisation run by volunteers that aims to assist the partners of new staff to settle into Oxford and to provide them with an opportunity to meet people in the area. See www.newcomers.ox.ac.uk/

Childcare

The University has excellent childcare services with five University nurseries, as well as University-supported places at many other private nurseries. For full details including how to apply and the costs, see www.admin.ox.ac.uk/childcare.

Family-friendly benefits

The University subscribes to My Family Care (www.admin.ox.ac.uk/personnel/staffinfo/benefits/family/mfc/) and staff are eligible to register for emergency back-up childcare and adultcare services, a 'speak to an expert' phone line and a wide range of guides and webinars through a website called the Work + Family space.

Disabled staff

We are committed to supporting members of staff with disabilities or long-term health conditions. Please visit www.admin.ox.ac.uk/eop/disab/staff for further details including information about how to make contact, in confidence, with the University’s Staff Disability Advisor.

Staff networks

The University has a number of staff networks including the Oxford Research Staff Society, BME staff network, LGBT+ staff network and a disabled staff network. You can find more information at www.admin.ox.ac.uk/eop/inpractice/networks/

Other benefits

Staff can enjoy a range of other benefits such as free visitor access to the University’s colleges and the Botanic Gardens as well as a range of discounts. See www.admin.ox.ac.uk/personnel/staffinfo/benefits