# Robert J. Noble

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https://scholar.google.com/citations?user=lDDprHkAAAAJ


## Education

Oct 2009- Jan 2014 — Department of Zoology, **University of Oxford**
DPhil: *Antigenic variation and its evolution in* P. falciparum *malaria*
Supervisors: **Sunetra Gupta** and **Mario Recker**

Oct 1999- Jul 2003 — University of York
Master of Mathematics (First Class)

## Academic employment

May 2018- — Department of Evolutionary Biology and Environmental Studies, **University of Zurich**
Postdoctoral researcher (20% contract) advised by **Hanna Kokko**
Affiliated with the Arizona Cancer Evolution Center (led by Carlo Maley)

Feb 2017- — Department of Biosystems Science and Engineering, **ETH Zurich**
Postdoctoral researcher (80% contract from May 2018) advised by **Niko Beerenwinkel**

Jan 2014- Jan 2017 — Institut des Sciences de l'Evolution de Montpellier (**ISEM**)
Postdoctoral researcher advised by **Michael Hochberg**

## Publications as first or co-first author

| | | |
|---|---|---|
| 2017 | *Spatial competition constrains resistance to targeted cancer therapy*<br>Bacevic K*, **Noble R***, Soffar A, Ammar OW, Boszonyik B, Prieto S, Vincent C, Hochberg ME, Krasinska L, Fisher D (* equal contributions) | **Nature Commun.**<br>8, 1995 |
| 2017 | *Antibiotic stress selects against cooperation in the pathogenic bacterium* Pseudomonas aeruginosa<br>Vasse M*, **Noble R***, Akhmetzhanov AR, Torres-Barceló C, Gurney J, Simon Benateau, Gougat-Barbera C, Kaltz O, Hochberg ME<br>(* equal contributions) | **PNAS**<br>114, 546-51 |
| 2016 | *Overestimating the role of environment in cancers*<br>**Noble R**, Kaltz O, Nunney L, Hochberg ME | **Cancer Prev. Res.**<br>9, 773-6 |
| 2015 | *Peto's paradox and human cancers*<br>**Noble R**, Kaltz O, Hochberg ME | **Phil. Trans. B**<br>370, 20150104 |
| 2013 | *The antigenic switching network of* Plasmodium falciparum *and its implications for the immuno-epidemiology of malaria*<br>**Noble R***, Christodoulou Z*, Pinches R, Kyes S, Recker M, Newbold CI<br>(* equal contributions) | **eLife**<br>2013.2:e01074 |
| 2012 | *A statistically rigorous method for determining antigenic switching networks*<br>**Noble R**, Recker M | **PLoS ONE**<br>7, e39335 |

## Other publications

| | | |
|---|---|---|
| 2017 | *A framework for how environment contributes to cancer risk*<br>Hochberg ME, **Noble R** | **Ecology Letters**<br>20, 117-34 |
| 2012 | *Erasing the Epigenetic Memory and Beginning to Switch—The Onset of Antigenic Switching of* var *Genes in* Plasmodium falciparum<br>Fastman Y, **Noble R**, Recker M, Dzikowski R | **PLoS ONE**<br>7, e34168 |

**Submitted for publication**

| | | |
|---|---|---|
| In review | *The logic of containing tumors*<br>Viossat Y, **Noble R** | **bioRxiv** 10.1101/2020.01.22.915355 |
| In revision | *When, why and how clonal diversity predicts future tumour growth*<br>**Noble R***, Burley JT*, Le Sueur C, Hochberg ME (* equal contributions) | **bioRxiv** 10.1101/2019.12.17.879270 |
| In revision | *Spatial structure governs the mode of tumour evolution*<br>**Noble R**, Burri D, Kather JN, Beerenwinkel N | **bioRxiv** 10.1101/586735 |

**Software**

| | | |
|---|---|---|
| 2017 | *ggmuller: Create Muller Plots of Evolutionary Dynamics*<br>**Noble R** | **CRAN** |
| 2019 | *demon: Deme-based oncology model*<br>**Noble R** | **GitHub** |

**Teaching**

2017-2019 **Supervision (ETH Zurich)**
Second year MSc thesis, Alexander Stein (six months; ongoing): *Modelling solid tumour growth and evolution with diffusion approximations*
Second year MSc thesis, Jeanne Lemant (six months; ongoing): *Sample vs clone trees: A mathematical analysis of tumour phylogenies*
Second year MSc thesis, Dominik Burri (six months): *Study of clonal selection in healthy epidermal tissue*
Research internship Cécile Le Sueur (seven months, ongoing) in computational modelling of tumour evolution
First year MSc lab rotation project, Dominik Burri: *The speed of propagation in a model of invasive cancer*

**Lecturing and tutoring (ETH Zurich)**
Evolutionary dynamics (MSc; three terms; group tutorials, setting and marking exercises, and a self-authored two-hour lecture)

2016 **Supervision (ISEM)**
First year MEME MSc project, John Burley: *Forecasting tumour growth*

2010-2013 **Supervision (University of Oxford)**
Second year BSc project, Charlotte Ward: *Calculating the* $R_0$ *of malaria*

**Tutoring (University of Oxford)**
Quantitative Methods (BSc; two terms)

**Demonstrating (University of Oxford)** Quantitative Methods (BSc; three terms); Epidemiology (BSc; two terms); Epidemiological Models (MSc; one term)

**Funding**

€17K personal funding per year until May 2023 from the NCI, via the Arizona Cancer Evolution Center

Co-awardee of Fondation Mathématique Jacques Hadamard grant *Optimization of a new type of cancer therapy* (€5K to support international collaboration in 2019-2020)

Biotechnology and Biological Sciences Research Council PhD fellowship 2009-2013

Travel grants: Lorentz Center 2017; Moffitt Cancer Center 2015; ECMTB 2011

**Professional activities**

Elected Advisory Committee member of the International Society for Evolution, Ecology and Cancer 2018-21

Reviewer: Cancer Research, Evolutionary Applications, F1000Research, Journal of Theoretical Biology, Nature Communications, Nature Ecology & Evolution, npj Genomic Medicine, PLoS Computational Biology, PNAS, Proceedings of the Royal Society B, Royal Society Open Science, Scientific Reports

Symposia: Co-organizer of "How does spatial structure affect tumour evolution?" (MBE conference 2017); co-organizer of "Aging & cancer through the lens of evolution" (ESEB conference 2019)

**Other employment**

Dec 2008- **International HIV/AIDS Alliance, Preece House, Hove, BN3 1RE**
Sep 2009 Communications

Aug 2004- **AVERT, 4 Brighton Road, Horsham, West Sussex, RH13 5BA**
Dec 2008 Science/heath communication and web development

**Invited departmental seminars**

Jan 2020 *Cancer: evolution, ecology and bad luck*
University of Bath (hosted by Ben Ashby)

Sep 2019 *Cancer: evolution, ecology and bad luck*
University of Southampton (hosted by Lindy Holden-Dye)

Feb 2019 *Characterising the evolutionary modes of cancer and normal tissue*
TU Dresden (hosted by Andreas Deutsch)

Mar 2018 *Characterising the evolutionary modes of cancer and normal tissue*
University of Basel (hosted by Richard Neher)

Feb 2018 *The mode and predictability of intra-tumour evolution*
Wellcome Sanger Institute (hosted by Iñigo Martincorena)

Dec 2017 *The mode and predictability of intra-tumour evolution*
Boston University (hosted by Kirill Korolev)

Nov 2017 *Spatial constraints on intratumour evolution*
Harvard University (hosted by Martin Novak)
Part of two weeks as a visiting researcher in the Program for Evolutionary Dynamics

May 2017 *Models for understanding tumour evolution and improving cancer therapy*
University of Edinburgh (hosted by Bartlomiej Waclaw)

Mar 2017 *Evolution, ecology, and cancer risk: from naked mole rats to modern humans*
Chalmers University (hosted by Philip Gerlee)

Sep 2016 *Cancer: evolution, ecology and bad luck*
Harvard University (hosted by Martin Novak)

Feb 2015 *Data-based modelling of tumour evolution*
Moffitt Cancer Center (hosted by Robert Gatenby)
Part of two weeks as a visiting researcher in the Integrated Mathematical Oncology department

**Conference talks**

Aug 2019 *Spatial competition constrains resistance to targeted cancer therapy*
International Society for Evolution, Medicine & Public Health conference, Zurich

Jul 2019 *Spatial structure governs the mode of tumour evolution*
Intelligent Systems for Molecular Biology / European Conference on Comp. Biology, Basel

Jun 2019 *Spatial structure governs the mode of tumour evolution*
Modelling Ecology & Evolution Zurich seminar, Zurich

Sep 2018 *Characterising the evolutionary modes of cancer and normal tissue*
Evolutionary Models of Structured Populations workshop, Plön

Dec 2017 *Spatial competition constrains resistance to targeted cancer therapy*
International Society for Evolution, Ecology and Cancer Conference, Tempe

Oct 2017 *Impact of tissue architecture on the nature and predictability of tumour evolution*
Satellite Symposium to the Louis-Jeantet Symposium, Geneva

Sep 2017 *Impact of tissue architecture on the nature and predictability of tumour evolution*
Basel Computational Biology Conference, Basel

Jul 2017 *Impact of tissue architecture on the nature and predictability of tumour evolution*
Intelligent Systems for Molecular Biology / European Conference on Comp. Biology, Prague

Apr 2017 *Evolutionary ecology of senescence and cancer risk: from naked mole rats to modern humans*
Modelling Biological Evolution conference, Leicester

Nov 2016 *Controlling drug resistance with adaptive therapy*
Invited talk at the second Modeling Tumour Evolution conference, Bielefeld

Sep 2016 *Cancer: evolution, ecology and bad luck*
Invited talk at the first Modelling Tumour Evolution conference, Bielefeld

Jul 2016 *Cancer risk: evolution, ecology and bad luck*
Joint Meeting of European Society for Mathematical and Theoretical Biology & Society for Mathematical Biology, Nottingham

Dec 2015 *Peto's paradox and human cancers*
Third International Biannual Evolution and Cancer Conference, San Francisco

Sep 2015 *Modelling ecological interactions of cancer clones*
Cancer Evolution Through Space and Time workshop, Plön

Jun 2015 *Peto's paradox and human cancers*
Invited talk at the Institute of Cancer Research, London

Apr 2015 *Eco-evolutionary models of tumour heterogeneity*
Invited talk at the Modelling Biological Evolution conference, Leicester

Mar 2015 *Modelling the evolution of tumour heterogeneity*
Invited talk at the Evolution and Cancer Conference, Montpellier

Nov 2014 *Data-based modelling of tumour evolution.*
Joint Meeting: Institute of Cancer Research & French Consortium on Cancer Evolution, London

June 2011 *Using iterative methods to determine an antigenic switching network in* Plasmodium falciparum
European Conference on Mathematical and Theoretical Biology, Krakow

May 2011 *Determining the switch pathway of the* var *gene repertoire of* Plasmodium falciparum
Biology and Pathology of the Malaria Parasite, Heidelberg

## Referees

**Professor Niko Beerenwinkel**
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**Professor Michael Hochberg**
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**Professor Hanna Kokko**
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**Dr Mario Recker**
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