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## Profile

*I am a postdoctoral research associate in molecular epidemiology and virus evolution at the Yale School of Public Health. I now primarily work on arboviruses, in particular building genomic surveillance systems for Dengue virus. Previously, I have worked extensively on the evolution and tracking of SARS-CoV-2. I am interested in combining genomic and non-genomic data for practical applications of complex phylodynamics.*

## Education

- 2017–2022 **PhD**, *BBSRC EASTBIO PhD programme*, University of Edinburgh  
*From epidemics to pandemics: elucidating the dynamics of Ebola Virus and SARS-CoV-2*  
Supervisors: Professor Andrew Rambaut and Professor Mark Woolhouse
- 2016–2017 **MSc**, *Control of Infectious Diseases*, London School of Hygiene and Tropical Medicine, Distinction, Highest mark in the year  
Research project: *Evaluating the use of the Open Data Kit Platform for Investigating a Typhoid Fever Outbreak*, Uganda Virus Research Institute.  
Supervisor: Dr Robert Downing  
Taught modules include: Extended Epidemiology, Statistical Methods in Epidemiology, Pathogen Genomics, Disease modelling and dynamics, Public Health Policy and Designing Disease Control Programmes for Developing Countries.
- 2013–2016 **BA(Hons)**, *Biological Sciences*, University of Oxford, First Class Honours  
Research project: *Does ROR $\gamma$ t inhibition affect the autoimmune phenotype of MAIT cells?*  
Supervisors: Professor Paul Klenerman and Dr Ayako Kurioka  
Extended Essay: *Can social evolution theory help to solve the antibiotic crisis?* Supervisor: Dr Craig MacLean  
Presentation: *Why was the 2014-15 Ebola epidemic so devastating?* Supervisor: Professor Sunetra Gupta

## Employment

- 2022–present **Yale University, USA**, *Postdoctoral research associate, Grubaugh Lab*  
Phylogenetic pillar lead in the Grubaugh research group. I support phylogenetic and evolutionary work in the lab, and am aiding the development of genomic surveillance for Dengue virus via setting up multiple international collaborations and developing a dengue lineage system

- 2020 **University of Edinburgh and COG-UK, Edinburgh, UK, Postdoctoral scientist, Rambaut Lab**  
Employed at a postdoctoral level by the UK COVID-19 genomics consortium COG-UK to support the public health response to COVID-19 in the UK.
- 2019 **World Health Organisation, Health Emergencies Team, Nigeria Country Office, Abuja, Nigeria, Intern**  
Over three months, developed and delivered a training course in sequencing, bioinformatics and phylogenetics to Nigerian Centres for Disease Control scientists, wrote a policy guidance document on the use of genomics for response to outbreaks of notifiable diseases and supported normative activities of the team including participating in a Yellow Fever outbreak investigation in Ebonyi state.
- 2017-2020 **University of Edinburgh, Edinburgh, UK, Demonstrator & Tutor**  
Teach a variety of coding, genomics and bioinformatics courses which are given to undergraduate and postgraduate students.
- 2015 **Madagascar SAVE, Antananarivo, Madagascar, Intern**  
Over six weeks, helped to launch a grass-roots NGO, including working with the UNAIDS Community Mobilization and Networking Advisor to adapt a UNAIDS diversity and inclusion workshop for this NGO and to organise and adapt a Training of Trainers session.

## Publications

Stars indicate co-first authorships

2023

28. Joseph Tsui\*, John T McCrone\*, Ben Lambert\*, Sumali Bajaj\*, Rhys Inward\*, Paolo Bosetti\*, Rosario Pena\*, Houriiyah Tegally, **Verity Hill** [and 31 others] and Moritz Kraemer  
*Genomic Assessment of invasion dynamics of SARS-CoV-2 Omicron BA.1*  
**Science** 381(6655)
27. **Verity Hill**\*, Toby Koch\*, Kiet Ngo, Sean M. Bialosuknia, Steven D. Zink, Cheri A. Koetzner, Joesph G. Maffei, Alan P. Dupuis, P Bryon Backenson, Joanne Oliver, Glen Gallagher, Matt Osborne, Sandra Smole, Laura D. Kramer, Guy Baele, Chantal B.F. Vogels, Phil M. Armstrong, Alexander T. Ciota, Nathan D. Grubaugh  
*Dynamics of Eastern equine encephalitis virus during the 2019 outbreak in the Northeast United States.*  
**Current Biology** 33(12)
26. Simon Dellicour, Samuel L. Hong, **Verity Hill**, Dacia Dimartino, Christian Marier, Paul Zappile, Gordon W. Harkins, Philippe Lemey, Guy Baele, Ralf Duerr, Adriana Heguy  
*Variant-specific introduction and dispersal dynamics of SARS-CoV-2 in New York City – from Alpha to Omicron.*  
**PLOS Pathogens** 19(4): e1011348. <https://doi.org/10.1371/journal.ppat.1011348>

25. **Verity Hill**, George Githinji, Chantal B.F. Vogels, Ana I. Bento, Chrispin Chaguza, Christine V. F. Carrington, Nathan D. Grubaugh  
*Towards a global virus genomic surveillance network.*  
**Cell Host and Microbe** Mar 6:S1931-3128(23)00107-5. doi: 10.1016/j.chom.2023.03.003. Epub ahead of print. PMID: 36921604; PMCID: PMC9986120.
24. Nikita S. D. Sahadeo, Soren Nicholls, Filipe R. R. Moreira, Áine O'Toole, Vernie Ramkissoon, Charles Whittaker, **Verity Hill**, John T. McCrone, [and 44 others] and Christine Carrington  
*Implementation of genomic surveillance of SARS-CoV-2 in the Caribbean: Lessons learned for sustainability in resource-limited settings*  
**PLOS Global Public Health** 3(2) <https://doi.org/10.1371/journal.pgph.0001455>
23. Chrispin Chaguza, Anne Hahn, Mary Petrone, Shuntai Zhou, David Ferguson, Mallory Breban, Kien Pham, Mario Pena-Hernandez, Christopher Castaldi, **Verity Hill**, Yale SARS-CoV-2 Genomic Surveillance Initiative, Wade Schulz, Ronald Swanstrom, Scott Roberts, Nathan Grubaugh  
*Accelerated SARS-CoV-2 intrahost evolution leading to distinct genotypes during chronic infection*  
**Cell Reports Medicine** 4(2) 10.1016/j.xcrm.2023.100943

## 2022

22. Áine O'Toole\*, **Verity Hill**\*, Ben Jackson\*, Rebecca Dewar\*, Nikita Sahadeo\* [and 16 others] and Andrew Rambaut  
*Genomics-informed outbreak investigations of SARS-CoV-2 using civet*  
**PLOS Global Public Health** 2(12) <https://doi.org/10.1371/journal.pgph.0000704>
21. John T. McCrone\*, **Verity Hill**\*, Sumali Bajaj\*, Rosario Evans Pena\* [and 37 others] and Moritz Kramer  
*Context-specific emergence and growth of the SARS-CoV-2 Delta variant*  
**Nature** 610 154-160 doi:<https://doi.org/10.1038/s41586-022-05200-3>
20. **Verity Hill**, Louis Du Plessis, Thomas P Peacock [and 26 others] and Andrew Rambaut  
*The origins and molecular evolution of SARS-CoV-2 lineage B.1.17 in the UK*  
**Virus Evolution** 8(2) doi:<https://doi.org/10.1093/ve/veac080>
19. Raquel Viana, Sikhulile Moyo, Daniel G. Amoako, Houriiyah Tegally, Cathrine Scheepers [and 93 others including **Verity Hill**] and Tulio de Oliveira  
*Rapid epidemic expansion of the SARS-CoV-2 Omicron variant in southern Africa*  
**Nature** 603 679-686 doi:<https://doi.org/10.1038/s41586-022-04411-y>

18. Kathryn Campbell, Robert J. Gifford, Joshua Singer, **Verity Hill**, Aine O'Toole, Andrew Rambaut, Katie Hampson, Kirstyn Brunner  
*Making genomic surveillance deliver: A lineage classification and nomenclature system to inform rabies elimination*  
**Plos Pathogens** 18(5) doi:10.1371/journal.ppat.1010023
17. Dinesh Aggarwal, Ben Warne, Aminu Jahun, William Hamilton, Thomas Fieldman, Louis Plessis, **Verity Hill** [and 31 others] and Ian Goodfellow  
*Genomic epidemiology of SARS-CoV-2 in a UK university identifies dynamics of transmission*  
**Nature Communications** 13(751) <https://doi.org/10.1038/s41467-021-27942-w>

## 2021

16. Moritz UG Kraemer\*, **Verity Hill**\*, Christopher Ruis\*, Simon Dellicour\*, Sumali Bajaj\* [and 19 others] and Oliver Pybus  
*Spatiotemporal invasion dynamics of SARS-COV-2 lineage B.1.1.7 emergence*  
**Science** 373(6557) 889-895 doi: 10.1126/science.abj0113
15. **Verity Hill**, Christopher Ruis, Sumali Bajaj, Oliver Pybus, Moritz Kraemer  
*Progress and Challenges in Genomic Epidemiology*  
**Trends in Parasitology** doi:<https://doi.org/10.1016/j.pt.2021.08.007>
14. Samuel M Nicholls, Radoslaw Poplawski, Matthew J Bull, Anthony Underwood, Michael Chapman, Khalil Abu-Dahab, Ben Taylor, Rachel M Colquhoun, Will PM Rowe, Ben Jackson, **Verity Hill** [and 12 others] and Nicholas Loman  
*CLIMB-COVID: continuous integration supporting decentralised sequencing for SARS-CoV-2 genomic surveillance*  
**Genome Biology**, 22(196) doi:<https://doi.org/10.1186/s13059-021-02395-y>
13. Ben Jackson, Maciej F. Boni, Matthew J. Bull, Amy Colleran, Rachel M. Colquhoun, Alistair C. Darby, Sam Haldenby, **Verity Hill** [and 16 others] and Andrew Rambaut  
*Generation and transmission of interlineage recombinants in the SARS-CoV-2 pandemic*  
**Cell** doi:<https://doi.org/10.1016/j.cell.2021.08.014>
12. Áine O'Toole, Emily Scher, Anthony Underwood, Ben Jackson, **Verity Hill**, John T McCrone, Rachel Colquhoun, Chris Ruis, Khalil Abu-Dahab, Ben Taylor, Corin Yeats, Louis Du Plessis, Daniel Maloney, Nathan Medd, Stephen W Attwood, David M Aanensen, Edward C Holmes, Oliver G Pybus, Andrew Rambaut  
*Assignment of epidemiological lineages in an emerging pandemic using the pangolin tool*  
**Virus Evolution** 7(2) doi: <https://doi.org/10.1093/ve/veab064>

11. Áine O'Toole\*, **Verity Hill\*** [and 83 others] and Moritz Kraemer  
*Tracking the international spread of SARS-CoV-2 lineages B.1.1.7 and B.1.351/501Y-V2*  
**Wellcome Open Research** 2021;6:121. doi:10.12688/wellcomeopenres.16661.1
10. Yvan Butera\*, Enatha Mukantwari\*, Maria Artesi\*, Jeanne D'Arc Umuringa\*, Áine Niamh O'Toole, **Verity Hill** [and 28 others] and Nadine Rujeni  
*Genomic sequencing of SARS-CoV-2 in Rwanda reveals the importance of incoming travelers on lineage diversity*  
**Nature Communications** 5705(12) doi:https://doi.org/10.1038/s41467-021-25985-7
9. Louis du Plessis\*, John T McCrone\*, Alexander E Zarebski\*, **Verity Hill\***, Christopher Ruis\* [and 20 others] and Oliver G Pybus  
*Establishment and lineage dynamics of the SARS-CoV-2 epidemic in the UK.*  
**Science** 371(6530). doi: 10.1126/science.abf2946
8. Erik Volz, **Verity Hill**, John T McCrone [and 26 others] and Thomas Connor  
*Evaluating the effects of SARS-CoV-2 Spike mutation D614G on transmissibility and pathogenicity*  
**Cell** 184(1), 0.1016/j.cell.2020.11.020.
7. Erik Volz, Swapnil Mishra, Meera Chand, [and 30 others including **Verity Hill**] and Neil Ferguson  
*Assessing transmissibility of SARS-CoV-2 lineage B.1.1.7 in England*  
**Nature** 593(7858)266-269 https://doi.org/10.1038/s41586-021-03470-x

## 2020 and earlier

6. Jing Lu\*, Louis du Plessis\*, Zhe Liu\*, **Verity Hill\*** [and 36 others] and Changwen Ke  
*Genomic epidemiology of SARS-CoV-2 in Guangdong province, China*  
**Cell** 181 (5) doi: 10.1016/j.cell.2020.04.023
5. Philippe Lemey, Samuel L Hong, **Verity Hill**, Guy Baele, Chiara Poletto, Vittoria Colizza, Áine O'Toole, John T McCrone, Kristian G Andersen, Michael Worobey, Martha I Nelson, Andrew Rambaut, Marc A Suchard  
*Accommodating individual travel history and unsampled diversity in Bayesian phylogeographic inference of SARS-CoV-2*  
**Nature Communications** 11 doi: 10.1038/s41467-020-18877-9
4. Michael Worobey, Jonathan Pekar, Brendan B Larsen, Martha I Nelson, **Verity Hill**, Jeffrey B Joy, Andrew Rambaut, Marc A Suchard, Joel O Wertheim, Philippe Lemey

*The emergence of SARS-CoV-2 in Europe and North America*

**Science** 370 (6516) doi: 10.1126/science.abc8169

3. Andrew Rambaut, Edward C Holmes, Áine O'Toole, **Verity Hill**, John T McCrone, Christopher Ruis, Louis du Plessis, Oliver G Pybus

*A dynamic nomenclature proposal for SARS-CoV-2 lineages to assist genomic epidemiology*

**Nature Microbiology** 5(11) doi: 10.1038/s41564-020-0770-5

2. Matthew Biggerstaff, Benjamin J Cowling, Zulma M Cucunubá, Linh Dinh, Neil M Ferguson, Huizhi Gao, **Verity Hill** [and 13 others] and Jessica Wong

*Early Release-Early Insights from Statistical and Mathematical Modeling of Key Epidemiologic Parameters of COVID-19*

**Emerging Infectious Diseases** 26(11) doi: 10.3201/eid2611.201074

1. **Verity Hill** and Guy Baele

*Bayesian estimation of past population dynamics in BEAST 1.10 using the Skygrid coalescent model*

**Molecular biology and evolution** 36 (11), 2620-2628 doi: 10.1093/molbev/msz172

## Skills and Experience

### Computational

Languages Python, R, bash, MATLAB, STATA

Practical  $\text{\LaTeX}$ , Github, Illustrator, Geneious, Prism, ArcGIS, Python visualisation tools including Matplotlib and Geopandas, FigTree, Javascript visualisation tools Vega and Vega-lite

Software Extensive experience in using BEAST and associated packages, especially phylogenetic analyses; Experience developing flexible and user-friendly software in Python and Snakemake; Open Data Kit

### Field

- 2019 **Yellow Fever outbreak investigation with the World Health Organisation and Nigerian Centres for Disease Control, Ebonyi state, Nigeria** We delivered supplies and community sensitisation, performed active and retrospective case finding and helped to organise the transportation of patient samples to laboratories with appropriate reagents. I also wrote the daily situation reports that were sent back to the country office in Abuja, including descriptive epidemiology and statistical analysis.

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- 2017 **Field epidemiology study with the Uganda Virus Research Institute, Entebbe, Uganda** Designed, developed and delivered a pilot study to test an electronic data collection tool for Typhoid fever outbreaks, including formulating and piloting a Case Investigation Form for Typhoid Fever, dealing directly with and training clinical officers in study clinics and performing descriptive epidemiological analyses.

## Lecturing

- 2023 **Guest seminar for Genomic Epidemiology, Yale University, USA**, *Phylogenetics and Phylogeography*
- 2022 **Genomic epidemiology workshop at CIDEIM, Cali, Colombia**, *Applications of Genomic epidemiology and Introduction to Phylogenetics*
- 2021 **Guest seminar for Quantitative Methods in Infectious Disease Research, Georgetown University, USA**, *Phylogenetic Approaches to Epidemic Control*
- 2021 **ARTIC/CLIMB workshop, online**, Delivered a lecture on genomic epidemiology, and developed an outbreak investigation exercise for participants
- 2020 **Guest lecture for Health Geography students at Georgetown University, online**, *Phylogenetic Approaches to Epidemic Control*
- 2019 **Nigerian Centres for Disease Control, Abuja, Nigeria**, Designed and delivered a lecture course of three 1.5 hour sessions, with assigned reading, quizzes and accompanying monitoring and evaluation, Lecture
- 2019 **Plant-ID Network, Edinburgh, UK**, *Bayesian Phylogenetics*, 1 week, Lectures and practical tutorials
- 2018 **West African Centre for Cell Biology of Infectious Pathogens, Accra, Ghana**, 1 week on real-time sequencing and analysis for acute viral outbreaks with ARTIC Network, Lectures and practical tutorials

## Conferences and workshops

### Invited talks

- 2023 **ACAV committee subgroup meeting, ASTMH**, *Developing a dengue virus lineage system to improve genomic surveillance*
- 2022 **Massachusetts Consortium on Pathogen Readiness Seminar**, *The origins and molecular evolution of B.1.1.7 in the UK*
- 2022 **Georgetown Department of Biology Seminar**, *The Dynamics of Eastern Equine Encephalitis in the US*
- 2021 **Annual PQC conference: From COVID-19 Genomics to spread, vaccine and therapy**, *The origins, evolution and spread of B.1.1.7 in the UK*
- 2021 **Genomics at Edinburgh launch event**, *Reconstructing the spatial epidemiology of SARS-CoV-2*

- 2021 **Research Institute for Tropical Medicine, Philippines**, *Genomic epidemiology of SARS-CoV-2*
- 2021 **Wellcome Trust Sanger Institute seminar series**, *Large scale genomic sequencing for investigating the dynamics of SARS-CoV-2 in the UK*
- 2021 **Applied Bioinformatics and Public Health Microbiology**, *Investigating outbreaks of SARS-CoV-2 using civet*
- 2021 **Edinburgh University Science Journals Society Conference**, *Genomics and communication in a pandemic*
- 2020 **Verena Consortium Lighthouse Talks**, *Exploring Ebola Virus Disease Dynamics using a Phylodynamically-informed Agent Based Model*
- 2020 **CZ BioHub**, *Tools for SARS-CoV-2 phylogenetics to inform public health*
- 2020 **COG-UK consortium**, *Civet: Cluster Investigation and Viral Epidemiology Tool*

## Submitted talks

- 2023 **7th Pan-American Dengue Research Network Meeting**, *Talk: Developing a dengue virus lineage system to improve genomic surveillance*
- 2023 **American Society for Tropical Medicine and Hygiene**, *Poster: Developing a dengue virus lineage system to improve genomic surveillance*
- 2022 **29th International Dynamics & Evolution of Human Viruses**, *Talk: The origins and molecular evolution of B.1.1.7 in the UK*
- 2019 **Elsevier, Epidemics - 7th international conference on Infectious Disease dynamics**, *Talk: Phylodynamic approaches for investigating Ebola Virus Disease dynamics in Sierra Leone*
- 2018 **University of Granada**, *European Meeting of PhD Students in Evolutionary Biology*, *Poster and Talk: Real-time sequencing and its applications to public health*
- 2018 **Wellcome Trust Sanger Institute**, *Virus and Genome Evolution conference*, *Poster: Examining the drivers behind the West African Ebola Virus Disease epidemic*
- 2018 **University of Glasgow**, *Evolution and Ecology of Infectious Diseases conference*, *Poster: Examining the drivers behind the West African Ebola Virus Disease epidemic*

## Additional training

- 2023 **Fundamentals of equitable teaching**, *Poorvu center, Yale University, New Haven, CT*
- 2018 **Advanced Python for Biologists**, *Edinburgh Genomics, University of Edinburgh, UK*
- 2017 **Linux and Workflows for Biologists**, *Edinburgh Genomics, University of Edinburgh, UK*
- 2017 **Infectious Disease Mapping Workshop**, *London School of Hygiene and Tropical Medicine, UK*



## Funding and Awards

- 2023 **ACAV Student travel awarded**, *Awarded for travel to ASTMH meeting*
- 2023 **Ker Memorial Prize**, *Awarded for best PhD thesis in Infectious Disease at the University of Edinburgh, University of Edinburgh*
- 2018 **Most Scientifically Innovative Content (Presentation award)**, *European Meeting of PhD students in Evolutionary Biology, Grenada, Spain*
- 2017 **£93,000 EASTBIO BBSRC DTP award**, *Four year duration PhD programme, University of Edinburgh*
- 2017 **Eldryd Parry Prize**, *Awarded for highest results in MSc Control of Infectious Diseases, London School of Hygiene and Tropical Medicine*
- 2017 **£2000 award from Enhancing Research Activities in Epidemic Situations fund**, *To undertake MSc Research Project in Uganda, Wellcome Trust*
- 2015 **£500 Morris Long Vacation Award**, *To undertake internship with Madagascar SAVE, New College, Oxford University*
- 2015 **£2200 Higher Education Funding Council Scholarship**, *To undertake internship with Madagascar SAVE*
- 2015 **Academic Scholar**, *New College, Oxford*

## Reviewing

*Science, Nature Communications, Virus Evolution, Epidemics, Molecular Biology and Evolution, Methods in Ecology and Evolution, The Lancet Regional Health - Americas, PLOS Genetics, Genome Biology and Evolution Cell reports: Medicine*

## Public Engagement

- 2023 **Newspaper interview**, *The next worrisome coronavirus variant could come from China - will it get detected, Dyani Lewis, Nature*
- 2023 **Newspaper interview**, *How worried should we be about XBB.1.5, Katherine Wu, The Atlantic*
- 2022 **Newspaper interview**, *Will we get Omicron'd again, Katherine Wu, The Atlantic*
- 2022 **Podcast interview**, *Looking ahead to our third pandemic winter, Science Friday*
- 2022 **Newspaper interview**, *The BA.5 wave is what COVID normal looks like, Katherine Wu, The Atlantic*
- 2021 **Panel discussion**, *Shedding light on the invisible - how genomics is helping defeat a pandemic, Wellcome Trust*
- 2021 **Panel discussion**, *How UK science leads the fight against Coronavirus, Swindon Science Festival*
- 2021 **Podcast interview**, *The New Variant Drama, The Vax Files*

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- 2020 **Radio interview**, *20 minute segment on COVID-19*, Radio Verulam
- 2020 **Newspaper interview**, *Genetic tracking helped us fight Ebola. Why can't it halt COVID-19*, Philip Keifer, 538
- 2018-2020 **BioPod interviewer and fact checker**, *Edinburgh University podcast about research ongoing in the School of Biological Science*
- 2018 **Participant in I'm a scientist, get me out of here!**, Two week event responding to online questions and live chats from secondary school children about any aspect of my research, research on epidemics, and science in general.
- 2017 **Presenter for Sci-fun roadshow**, I helped to demonstrate a number of small and quick science workstations in schools around Edinburgh to show to children in early secondary school.
- 2016-2020 **Blog**, Explaining topics in virus evolution and public health, aimed at interested members of the general public. Over 3,500 views., <https://wordpress.com/view/viralverity.wordpress.com>
- 2016-2017 **Presenter for Sublime Science**, Performing science experience for children's birthday parties aged 5-12
- 2015-2016 **Volunteer in Royal Socieity public engagement events**, Worked with Professor Ashleigh Griffin's research group on two events to demonstrate key concepts in social evolution to members of the general public people of all ages.
- 2015 **Mentor for Schools plus**, I mentored secondary school children from the Oxford Academy in science for seven one-hour sessions to improve their confidence and interest in science, as well as their GCSE grades.

## References

### **Prof. Andrew Rambaut**

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### **Prof. Nathan Grubaugh**

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