# Infectious Diseases Through an Evolutionary Lens

British Medical Association House, London, UK
17 – 19 October 2023

## Programme

### Day 1: Tuesday 17 October 2023

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| **11:30** | **Registration opens** |
| **12:00 – 13:20** | **Lunch** |
| **13:30 – 13:45** | **Welcome** |
| **13:45 – 14:20** | **Keynote speaker**<br>**Harmit Malik** Fred Hutchinson Cancer Center, USA<br>Fitness landscapes during adaptation in host-virus arms races |
| | **Session I – Host response**<br>**Chair: Wendy Barclay** Imperial College London, UK |
| **14:30 – 14:50** | **Sonja Best** National Institutes of Allergy and Infectious Diseases, USA<br>New effector functions of the primate antiviral restriction factor TRIM5 |
| **15:00 – 15:20** | **João Marques** Federal University of Minas Gerais, Brazil<br>Nucleic acid sensing during viral infection in *Drosophila* and vector mosquitoes |
| **15:30 – 15:40** | **Lucy Thorne** Imperial College London, UK<br>Evolution of enhanced innate immune suppression by SARS-CoV-2 variants of concern |
| **15:45 – 16:10** | **Coffee break and posters** |
| | **Session I cont. – Host response**<br>**Chair: Patrick Mitchell** University of Washington, USA |
| **16:15 – 16:35** | **Russell Vance** University of California, Berkeley, USA<br>Effector-triggered immunity during nuclear arms races with pathogens |
| **16:45 – 17:05** | **Lalita Ramakrishnan** University of Cambridge, UK<br>*Mycobacterium tuberculosis* pathogenicity viewed through the lens of molecular Koch's postulates |
| **17:15 – 17:25** | **Desmond Richmond-Buccola** Harvard Medical School, USA<br>Convergent mutations in phage virion assembly proteins enable evasion of Type I CBASS immunity |

**17:30 – 17:40** **Amy Goldberg** Duke University, USA
Integrating epidemiological and population-genetic models of *Plasmodium vivax* genomic variation

**17:45 – 18:00** **Poster flash talks**

**18:00 – 19:30** **Poster session**

## Day 2: Wednesday 18 October 2023

### Session II – Pathogen emergence and evolution
**Chair: Elizabeth Ballou** MRC Centre for Medical Mycology, UK

**09:00 – 09:20** **Paul Sharp** The University of Edinburgh, UK
African ape origins of human malarias

**09:30 – 09:50** **Alfred Amambua-Ngwa** MRC Unit The Gambia at LSHTM, The Gambia
Dynamics of antimalarial resistance evolution in *Plasmodium falciparum* from West Africa

**10:00 – 10:10** **Teresa O'Meara** University of Michigan, USA
Evolution of outbreak potential and pathogenesis via a novel fungal adhesin

**10:15 – 10:40** **Coffee break and posters**

### Session II cont. – Pathogen emergence and evolution
**Chair: Sumana Sanyal** University of Oxford, UK

**10:45 – 11:05** **Linfa Wang** Duke-NUS Medical School, Singapore
The contrasting evolution story of bat-borne zoonotic viruses: coronaviruses versus henipaviruses

**11:15 – 11:35** **Andrea Gamarnik** Fundación Instituto Leloir, Argentina
Flavivirus host adaptation and viral mechanisms of immune evasion

**11:45 – 12:05** **Tyler Starr** The University of Utah, USA
Molecular evolution of SARS-CoV-2 and related bat coronaviruses

**12:15 – 12:25** **Gemma Murray** University College London, UK
The emergence and diversification of a zoonotic pathogen from within the microbiota of intensively farmed pigs

**12:30 – 13:35** **Lunch and posters**

### Session III – Evolutionary history of human infectious disease
**Chair: Russell Vance** University of California, Berkeley, USA

**13:45 – 14:05** **Sarah Tishkoff** University of Pennsylvania, USA
Adaptation to infectious disease in Africa

**14:15 – 14:35** **Kirsten Bos** Max Planck Institute for Evolutionary Anthropology, Germany
Ancient pathogen genomics

**14:45 – 14:55** **Matthew Daugherty** University of California, San Diego, USA
Evolution of effector-triggered immune sensing of viral infection by the CARD8 and NLRP1 inflammasomes

**15:00 – 15:10** **Group photo**

**15:10 – 15:40** **Coffee break and posters**

**Session III cont. – Evolutionary history of human infectious disease**
**Chair: Serge Mostowy** London School of Hygiene & Tropical Medicine, UK

**15:45 – 16:05** **David Tobin** Duke University, USA
An ancestral bacterial effector promotes disseminated infections

**16:15 – 16:35** **Heran Darwin** New York University, USA
Identification of a new vulnerability in *Mycobacterium tuberculosis*: what has evolution taught us?

**In conversation with**
**16:45 – 17:30** **Katherine Wu** The Atlantic, USA
In conversation with Sara Cherry

**17:30 – 17:45** **Poster flash talks**

**17:45 – 19:15** **Poster session**

**19:15** **Dinner at Camino, King's Cross**

## Day 3: Thursday 19 October 2023

**Session IV – Evolutionary insights from diverse host responses**
**Chair: Clare Smith** Duke University, USA

**09:00 – 09:20** **Judi Allen** The University of Manchester, UK
Type 2 immunity and tissue repair: learning from helminths

**09:30 – 09:50** **Nels Elde** The University of Utah, USA
Infection biology in zebrafish

**10:00 – 10:20** **Emily Troemel** University of California, San Diego, USA
*C. elegans* host response to infection by the Orsay virus and microsporidia

**10:30 – 10:55** **Coffee break**

**Session V – Evolution of virulence traits**
**Chair: Jason King** University of Sheffield, UK

**11:00 – 11:20** **Philip Kranzusch** Harvard University, USA
Evolution of antiviral immunity

**11:30 – 11:50** **Sara Cherry** University of Pennsylvania, USA
Defining the interface between RNA biology and emerging RNA viruses

**12:00 – 12:10** **Mary Petrone** University of Sydney, Australia
Evidence for an ancient aquatic origin of the RNA viral order *Articulavirales*

**12:15 – 12:25** **Tera Levin** University of Pittsburgh, USA
Dynamics of bacterial virulence gene evolution via HGT

**12:30 – 13:35** **Lunch**

## Session VI – Clinical consequences and therapeutic opportunities

**Chair: David Tobin** Duke University, USA

**13:45 – 14:05** **Brenda Kwambana-Adams** Liverpool School of Tropical Medicine, UK
Linking prolonged carriage, adaptive evolution and the emergence of antimicrobial resistance in *Streptococcus pneumoniae*

**14:15 – 14:35** **Vanessa Sancho-Shimizu** Imperial College London, UK
Inborn errors of immunity: human genetic insights on understanding life-threatening infections

**14:45 – 14:55** **Stephen Goldstein** The University of Utah, USA
Rise and fall of horizontally acquired host genes during coronavirus evolution

**15:00 – 15:25** **Coffee break**

## Session VI cont. – Clinical consequences and therapeutic opportunities

**Chair: Marcel Behr** McGill University, Canada

**15:30 – 15:40** **Aïda Nitsch** University of Turku, Finland
How do epidemics spread? A comparative study of the spatio-temporal dynamics of childhood diseases across pre-health care Nordic countries

**15:45 – 16:05** **Wendy Barclay** Imperial College London, UK
Evolution of pandemic influenza

**16:15 – 16:35** **Stephen Russell** Mayo Clinic, USA
Targeting virus attachment and entry for biomedical applications

**16:45** **Closing remarks**