

# Dr. Sanjay Curtis Nagi

## Post-doctoral researcher

📍 UK, USA

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## About

I am a post-doc at the Liverpool School of Tropical Medicine, having recently completed my PhD studying genomic surveillance of *Anopheles gambiae*. My research sits at the interface of population genomics, molecular, and vector biology, and the rapid evolution and spread of insecticide resistance is of major interest. I enjoy developing software to empower other scientists to perform their own advanced and reproducible research. I am a highly motivated, enthusiastic and independent learner, and believe in a culture of continuous improvement and learning. I feel strongly about reproducibility in computational research, and use workflow managers for computational analyses.

## Education

### PhD. Vector biology

#### Liverpool School of Tropical Medicine

📅 Oct 2019 – April 2023

- Genomic surveillance of the African malaria mosquito, *Anopheles gambiae*

### MRes. Quantitative skills in Global Health

#### Lancaster University

📅 Sept 2018 – Sept 2019

📄 Distinction | 74%

- Studied statistics and statistical genetics
- Built gene regulatory networks (GRNs) from transcriptomic data in *Anopheles gambiae s.l*
- Applied machine learning algorithms to genomic data to uncover genotype-phenotype associations
- Performed fieldwork in Chikwawa, Malawi, investigating patterns of insecticide resistance

### MSc. Molecular Biology of Parasites & Disease Vectors

#### Liverpool School of Tropical Medicine

📅 Sept 2016 – Sept 2017

📄 Distinction | 77%

- Mechanisms of resistance to the volatile pyrethroid, transfluthrin, in mosquitoes

## Experience

### Data Scientist Internship

#### ILLUMINA

📅 July 2021 – Oct 2021

- Building **automated software** to perform **value stream mapping** on the Illumina sequencing service, **identifying waste** and **delays** which were to be prioritised to **improve efficiency** and reduce turnaround times

## Selected Awards

🏆 **MRC CASE studentship**  
£125,000

🏆 **InfraVec**  
Investigating the role of small RNAs in insecticide resistance in *Anopheles gambiae* | £11000

🏠 **RNA transcriptomics 2019**  
MRC funding to attend training | £1220

🏠 **Evomics Pop Gen**  
MRC funding to attend training | £2000

## Skills

### Programming languages

Python & R  
Snakemake  
React/NextJS

### Software skills

LaTeX, MS Office  
Git, Github  
Continuous integration (CI) and unit tests  
**Numpy, Numba, Pandas**  
**DataViz** - Mpl, Bokeh, Plotly  
**Supervised learning** - regression, GLMs, decision trees  
**Unsupervised learning** - PCA, K-means  
**Geospatial methods**

### Molecular biology

Illumina sequencing  
Amplicon sequencing panel design  
qPCR & LNA probe qPCR assay design  
Metabolism assays & HPLC  
Cloning & Sequencing

Molecular biology research technician

**Liverpool School of Tropical Medicine**

📅 Oct 2017 – Sept 2018

- Running molecular diagnostics on mosquito samples, investigating insecticide resistance
- *In silico* work on the role of small RNAs in resistance in *Anopheles gambiae*

## Publications

Parallel evolution in mosquito vectors – a duplicated esterase locus is associated with resistance to pirimiphos-methyl in *An. gambiae*

**Sanjay C. Nagi, Eric.R Lucas, Alexander-Egyir Yawson, ..., Alistair Miles, David Weetman, Martin J Donnelly**

📅 February 2024

📄 bioRxiv

RNA-Seq-Pop: Exploiting the sequence in RNA-Seq - a Snakemake workflow reveals patterns of insecticide resistance in the malaria vector *Anopheles gambiae*

**Sanjay C. Nagi, Ambrose Oruni, David Weetman, Martin J Donnelly**

📅 January 2023

📄 Molecular Ecology Resources

Genome-wide association studies reveal novel loci associated with pyrethroid and organophosphate resistance in *Anopheles gambiae* and *Anopheles coluzzii*

**Eric R. Lucas, Sanjay C. Nagi, ..., Martin Donnelly, David Weetman**

📅 August 2023

📄 Nature Communications

AgamPrimer: Primer Design in *Anopheles gambiae* informed by range-wide genomic variation

**Sanjay C. Nagi, Alistair Miles, Martin J. Donnelly**

📅 December 2022

📄 bioRxiv

High concentrations of membrane fed ivermectin are required for substantial lethal and sublethal impacts on *Aedes aegypti*

**Max Hadlett, Sanjay C. Nagi, Manas Sarkar, Mark JI Paine, David Weetman**

📅 January 2021

📄 Parasites & Vectors

Identification of a rapidly-spreading triple mutant for high-level metabolic insecticide resistance in *Anopheles gambiae* provides a real-time molecular diagnostic for anti-malarial intervention deployment.

**Harun Njoroge, Arjen van't Hof, Ambrose Oruni, Dimitra Pipini, Sanjay C. Nagi et al.**

📅 August 2022

📄 Molecular Ecology

## Training

Dev Ops culture and mindset

**UC Davis**

📅 4 weeks, July 2022

Coursera online course into the Dev Ops culture, mindset and its importance

Snakemake

**University of Cambridge**

📅 2 days, Jan 2020

Snakemake workshop for reproducible data analysis, ran by Johannes Koester

RNA transcriptomics

**Wellcome Genome Campus**

📅 10 days, June 2019

Hands-on training in the latest laboratory and computational methods for transcriptomic analysis

Amplicon Sequencing

**MalariaGEN, Sanger Institute**

📅 7 days, Dec 2019

Hands-on lab workshop - "Genomic Surveillance of Malaria"

## Referees

**Prof. Martin J Donnelly**

📧 Liverpool School of Tropical Medicine

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PI

Pembroke Place, L3 5QA

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**Prof. Hilary Ranson**

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**Dr. David Weetman**

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MSc supervisor

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