Sanjay Curtis Nagi

MRC CASE PhD student

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About

I am a third-year PhD student at the Liverpool School of Tropical Medicine, having recently completed an MRes in quantitative skills at Lancaster University. My research sits at the interface of population genomics, bioinformatics and molecular biology, and the rapid evolution and spread of insecticide resistance is of major interest. For much of my PhD, I have developed software and analytical pipelines to allow other researchers to perform effective analyses. 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 – Present

- Population genomics and mechanisms of insecticide resistance of *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

Unix & **Bash**
Python & R
Snakemake
Tableau

Software skills

LaTeX, MS Office
Git, Github
Continuous integration (CI) and unit tests

Numpy, Pandas
Numba, Scikit-learn
Data visualisation - Matplotlib, Seaborn, Bokeh
Supervised learning - Linear/Logistic regression, GLMs, decision trees
Unsupervised learning - Principal components analysis, K-means clustering
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

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

June 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

Capturing the transcription factor interactome in response to sub-lethal insecticide exposure

Victoria A Ingham, Sara Elg, Sanjay C. Nagi, Frank Dondelinger

July 2021 Current Research in Insect Science

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.*

Feb 2021 bioRxiv

Molecular drivers of insecticide resistance in the Sahelo-Sudanian populations of a major malaria vector

Sulaiman Ibrahim, Abdullahi Muhammad, Jack Hearn, Gareth D. Weedall, Sanjay C. Nagi *et al.*

April 2022 bioRxiv

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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PhD supervisor
Pembroke Place, L3 5QA
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Prof. Hilary Ranson
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Previous Employer
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