Personal Data

Name:	Duncan N. Ndegwa, PhD
Address:	University of Embu, Po Box 6-60100, Embu, Kenya
E-Mail:	ndungu.duncan@embuni.ac.ke

Bio

Duncan N. Ndegwa, holds a PhD from the University of Tuebingen in Germany where he studied the biology of the apicoplast during erythrocytic schizogony of *P. falciparum*. He then joined Embu University as a Lecturer in Biochemistry and molecular cell biology during which he secured a Postdoctoral fellowship with Julian Rayner at the Welcome Sanger Institute, UK, focusing on antigen screening for blood stage vaccine candidates in *Plasmodium vivax* using genetics, molecular and cellular biology. He later worked as a Post-Doc associate with Dr. Amy Bei lab at Yale University, US, where he researched on the mechanisms behind the persistence of specific parasite genotypes and the role of naturally arising polymorphisms in blood stage vaccine candidate antigens on receptor binding and immune evasion. He is now working as a Lecturer at Embu University. His interests are both in basic and applied research using experimental genetics, proteomics and bioinformatics to study host-parasite interaction and to apply this for development of intervention strategies against malaria and other neglected tropical diseases.

Career

01/2022 – To Date **Lecturer in the Department of Biological Sciences**
University of Embu, Kenya

- Duties and responsibilities: Lecturing and training of both undergraduate and Post graduate students

10/2019-12/2021 **Post-Doctoral Scientist**
Yale University New Haven CT.
- Research Project:
  - Mechanisms behind the persistence of specific parasite genotypes and
  - The role of naturally arising polymorphisms in blood stage vaccine candidate antigens on receptor binding and immune evasion

06/2017- 09/2019 **Post-Doctoral Scientist**
Welcome Sanger Institute, Hinxton, Cambridge, UK
- Research Project:
  - Antigen screening of *Plasmodium vivax* blood-stage malaria vaccine targets using *P. Knowlsei* as a model

Education and Training

10/2012 – 07/2016 **Doctor of Science in Biochemistry (Grade: *Magna cum laude*)**

Tübingen University and Magdeburg University, Germany

- Thesis:
  - Study of the apicoplast biology in *Plasmodium falciparum* during erythrocytic schizogony

08/2009 – 12/2011 **Masters of Science in Biochemistry (Grade: A)**

Heidelberg University, Germany and Edgerton University, Kenya

- Thesis:
  - Study of resistance to artemisinin in *Plasmodium falciparum* isolates from Kilifi County, Kenya

08/2005 – 06/2009 **Bachelor of Science (Grade: First-class honors)**
Egerton University, Kenya

Other experiences

01/2017 – 06/2017 **Lecturer in the Department of Biological Sciences**
University of Embu, Kenya

- Duties and responsibilities: Lecturing undergraduate and Post graduate students

04/2015 – 06/2016 **Development of new malaria diagnosis methods**
Carl Zeiss AG / Institute for tropical medicine, Tübingen University, Germany
- Cell culture, cell-based assays, sample preparation, evaluation of assays and equipments, report writing, training of colleagues, project management

04/2014 – 05/2016 **Volunteer Microscopist**
Institute for tropical medicine, Tübingen University, Tübingen Germany

- Malaria diagnosis during malaria clinical trials

08/2011– 12/2011   **Volunteer Intern**
Wellcome Trust Kemri-Kilifi, Kilifi, Kenya
- Sample processing of field isolates for sequencing and preservation (parasite, freeze down), carrying out research experiments, data collection, database management, project managements

Skills

Wet-lab skills	**Genetic modification**: CRISPR-cas9, DNA and RNA Isolation, cDNA- synthesis, PCR, qPCR, cloning, transfection construct design and generation for gene targeting, unconditional and conditional gene knock-out, transfection, agarose electrophoresis **Cell culture:** *P. falciparum, P. knowlesi,* HEK293, THP1 **Inhibition assays:** Invasion/growth inhibition assays, drug inhibition assays, flow cytometry **Immuno-assays:** Polyclonal and monoclonal antibody purification, protein microarray, western blot, ELISA, immunofluorescence assay(IFA) **Cellular Imaging:** Fluorescence microscopy, light microscopy **Others**: Parasite synchronisation, merozoite isolation, protein expression, protein purification, SDS-Page electrophoresis, NGS library preparation
Computational-skills	**Data analysis:** Protein microarray analysis, Python, Bash (Basic user), R, Stata and Prism GraphPad **Bioinformatics:** NGS Whole genome sequence analysis, Bash, Python, Benchling, DNASTAR Navigator **Others:** Flow jo

Additional Information

Languages	English (Fluent), German (Intermediate level), and Swahili (Native speaker)
Awards	1. 2012 German Academic Exchange Services PhD fellowship 2. 2011 German Academic Exchange Services Masters fellowship 3. 2010 German Academic Exchange Services in country scholarship-Kenya
Conferences/Workshops	1. Aspiring leaders in science, Sanger Institute, Hinxton, UK 2. 7th Short Course for Young Parasitologists, Hamburg, Germany 3. Innovation workshop on malaria diagnosis, Carl Zeiss, Jena Germany 4. RNAseq data analysis, University of Glasgow, Scotland, UK

References

Dr. Amy Bei   Yale University. Yale School of Public Health. 60 College Street. New Haven CT 06520-8034

Prof. Julian Rayner   Cambridge University. CIMR, The Keith Peters Building, Hills R, Cambridge, CB2 0XY. UK

Publications

Published:

- **Ndegwa DN,** Kundu P, Hostetler JB, Marin-Menendez A, Sanderson T, Mwikali K, et al. (2021) Using *Plasmodium knowlesi* as a model for screening *Plasmodium vivax* blood-stage malaria vaccine targets reveals new candidates. PLoS Pathog 17(7): e1008864. https://doi.org/10.1371/journal.ppat.1008864

Preprints:

- **Ndegwa DN**, Tuju J, Chepsat E, Mwai R, Mwai K, Nyamako L, Mosobo M, Deme AB, Dieye B, Ndiaye PI, Diedhiou Y, Mbaye AM, Wirth D, Ndiaye D, Osier F, Bei AK. High-throughput profiling of natural acquired humoral immune response to a large panel of known and novel full length ectodomain P. falciparum merozoite vaccine candidates under reduced malaria transmission. doi: https://doi.org/10.1101/2022.02.15.479108

- Khadidiatou Mangou, Adam J. Moore, Laty Gaye Thiam2, Aboubacar Ba, Alessandra da Silva Orfano, Ife Desamours, **Duncan Ndungu Ndegwa**, Justin Goodwin, Yicheng Guo, Zizhang Sheng, Saurabh D. Patel, Fatoumata Diallo, Seynabou Diouf Sene, Mariama Nicole Pouye, Awa Thioub Faye, Bacary Djilocalisse Sadio, Lawrence Shapiro, Ousmane Faye, Alassane Mbengue, Amy K. Bei1. Identification of novel variants in the vaccine candidate PfRh5 in a highly endemic region of Senegal. doi:https://doi.org/10.1101/2022.03.17.22271950