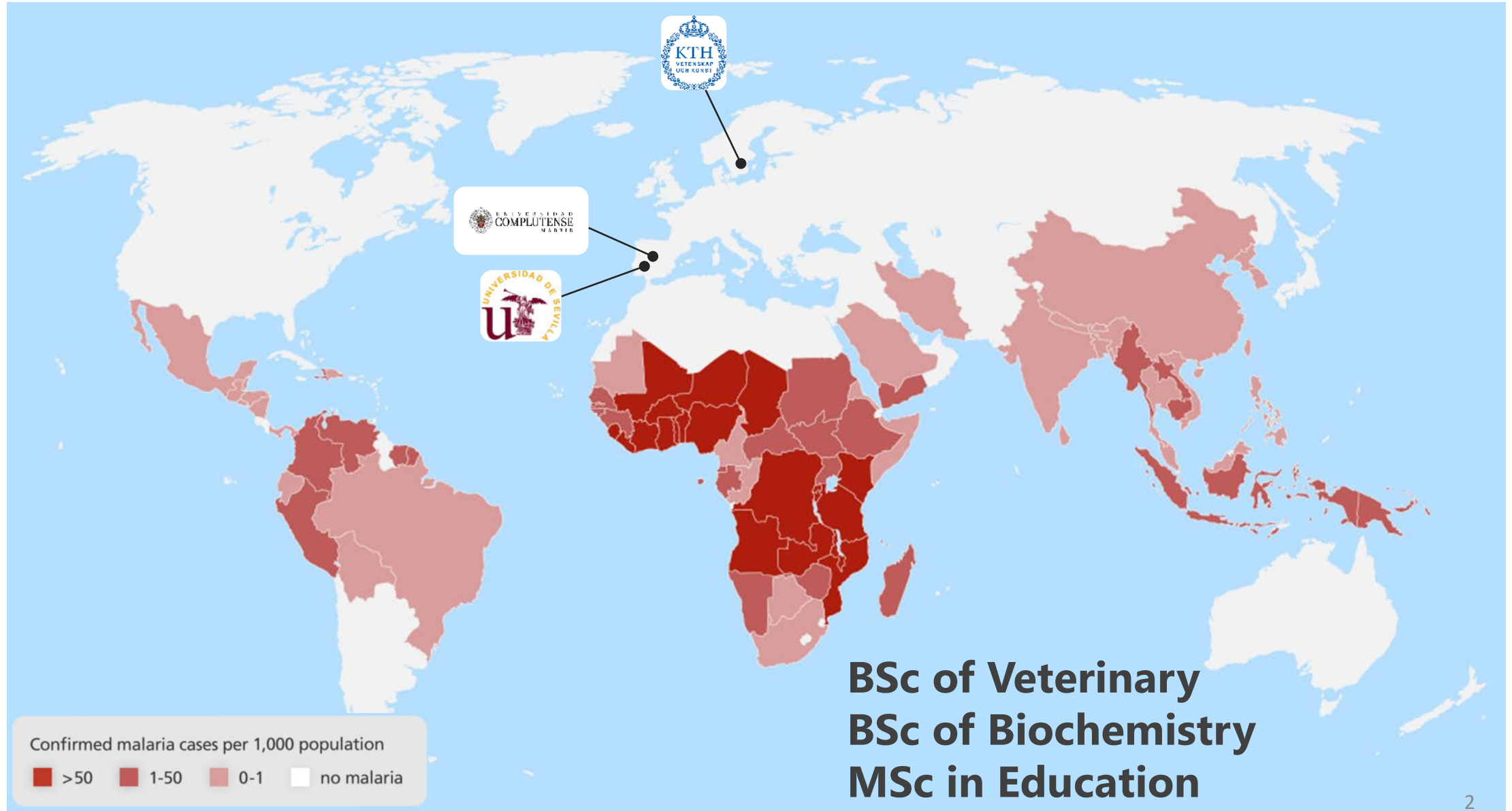


Unravelling **parasite & host** **biomarkers** for **severe malaria**

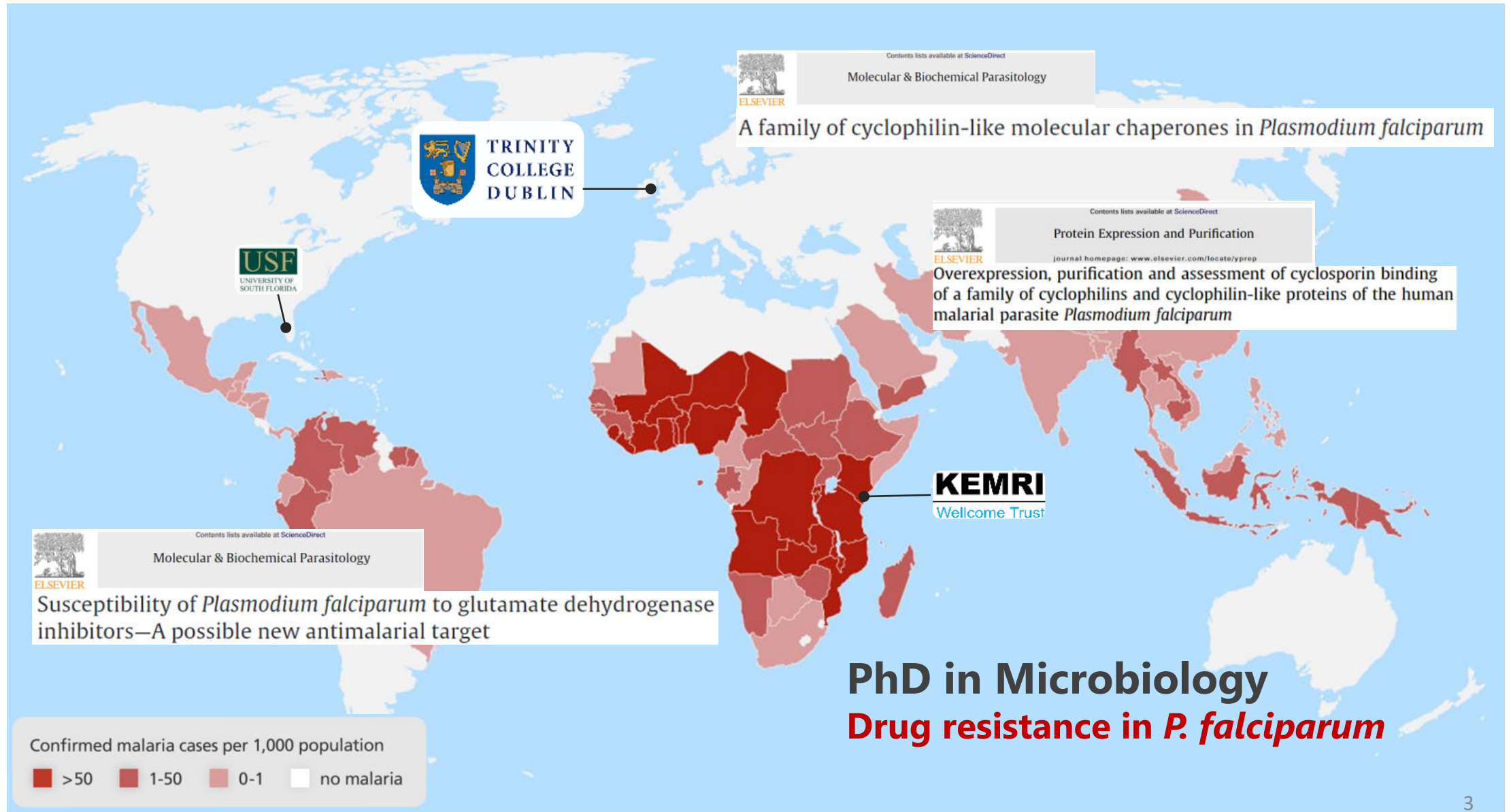
Alejandro Marín-Menéndez
Stagiaire CRCN



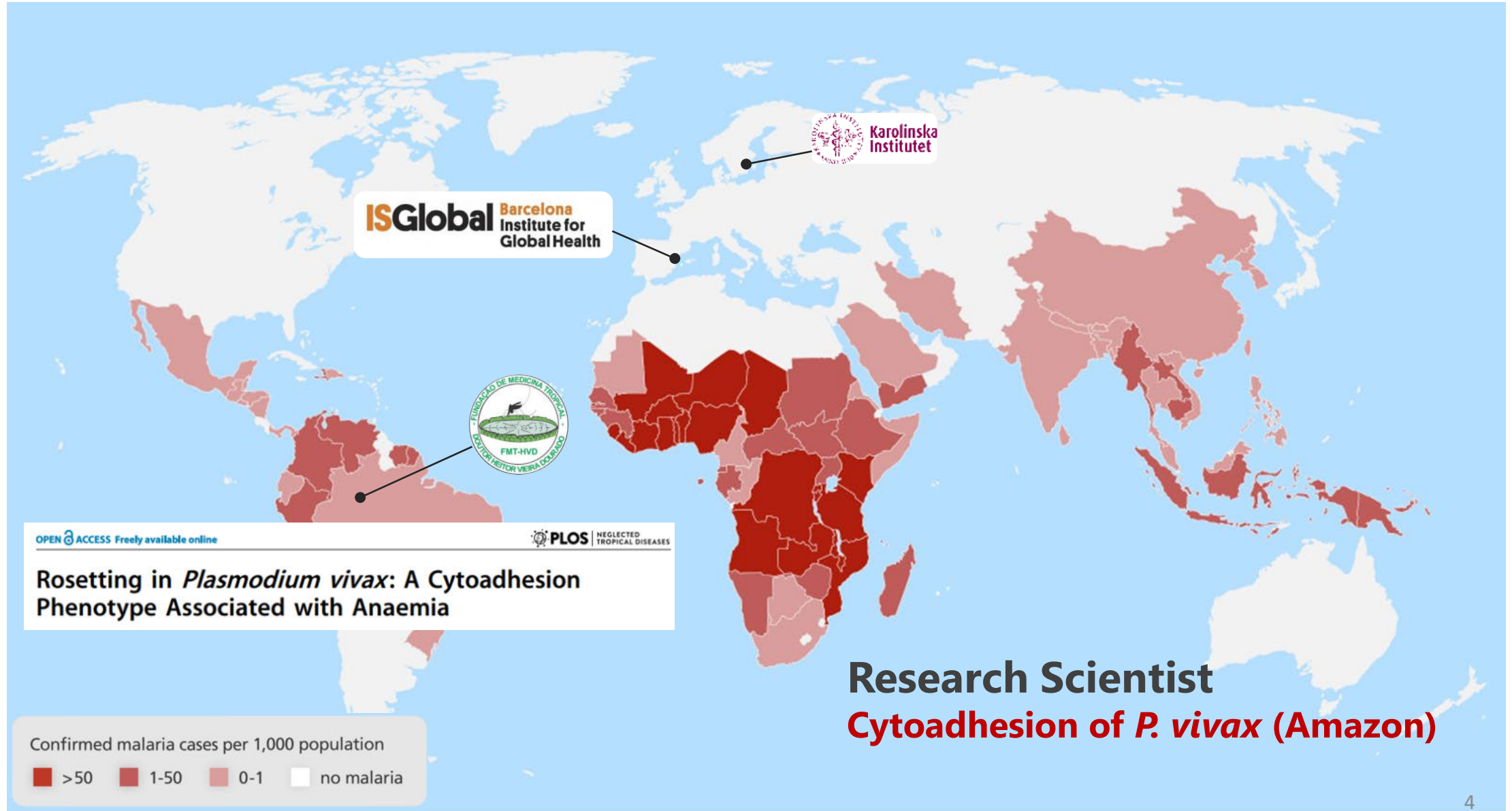
Who am I?



Who am I?



Who am I?

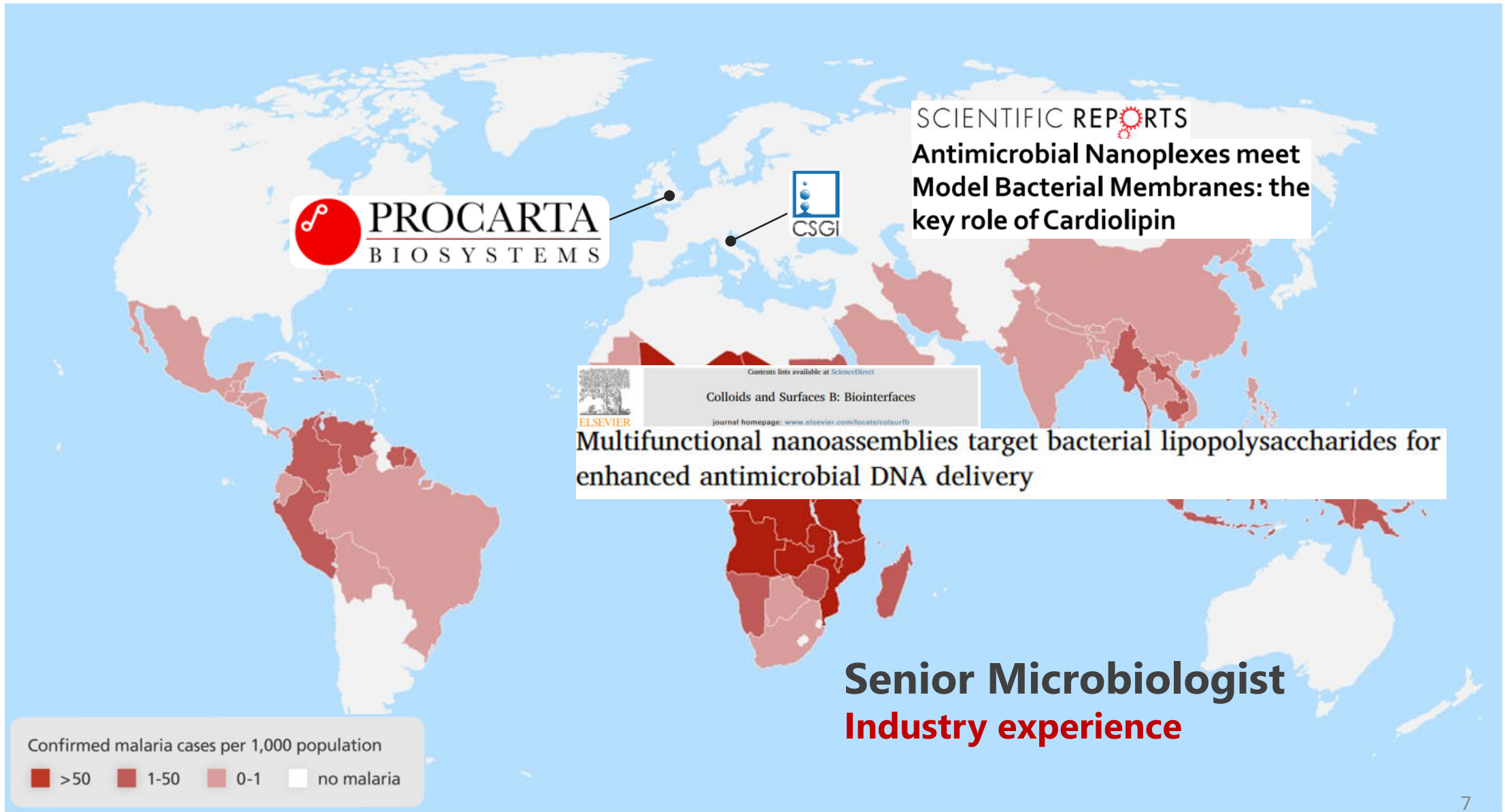


Career Break (1st = 2 years)

Who am I?



Who am I?



Career Break (2nd = 1 year)

Who am I?



Who am I?

SCIENTIFIC REPORTS

Defining multiplicity of vector uptake in transfected *Plasmodium* parasites



nature

Article

Red blood cell tension protects against severe malaria in the Dantu blood group

SCIENTIFIC REPORTS

The erythrocyte membrane properties of beta thalassaemia heterozygotes and their consequences for *P. falciparum* invasion



A forward genetic screen reveals a primary role for *Plasmodium falciparum* Reticulocyte Binding Protein Homologue 2a and 2b in determining alternative erythrocyte invasion pathways

KEMRI

Wellcome Trust

Postdoctoral Fellow
Genetics in the field (Kenya)
Parasite invasion of RBCs

Who am I?



Antimicrobial Agents
and Chemotherapy®

Genetic diversity of *P. falciparum* and distribution of anti-malarial drug resistance mutations in symptomatic and asymptomatic infections

nature

A genetic switch controls sex determination in *P. falciparum*

Submitted

Host cell preference and circulating parasite heterogeneity in natural *P. falciparum* infections

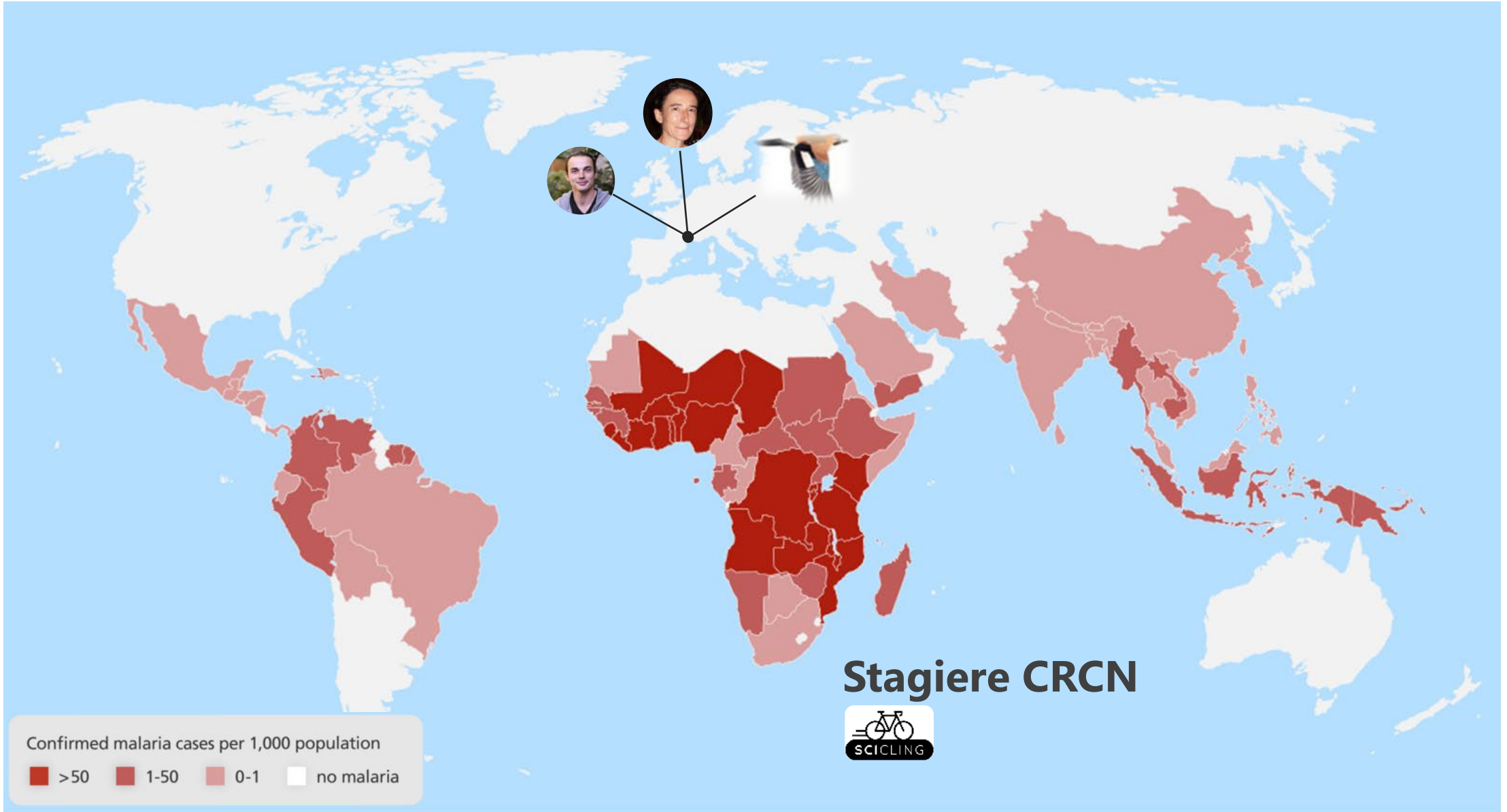
Artemisinin-induced developmental delay in *P. falciparum*



MSCA
Individual
Fellowships



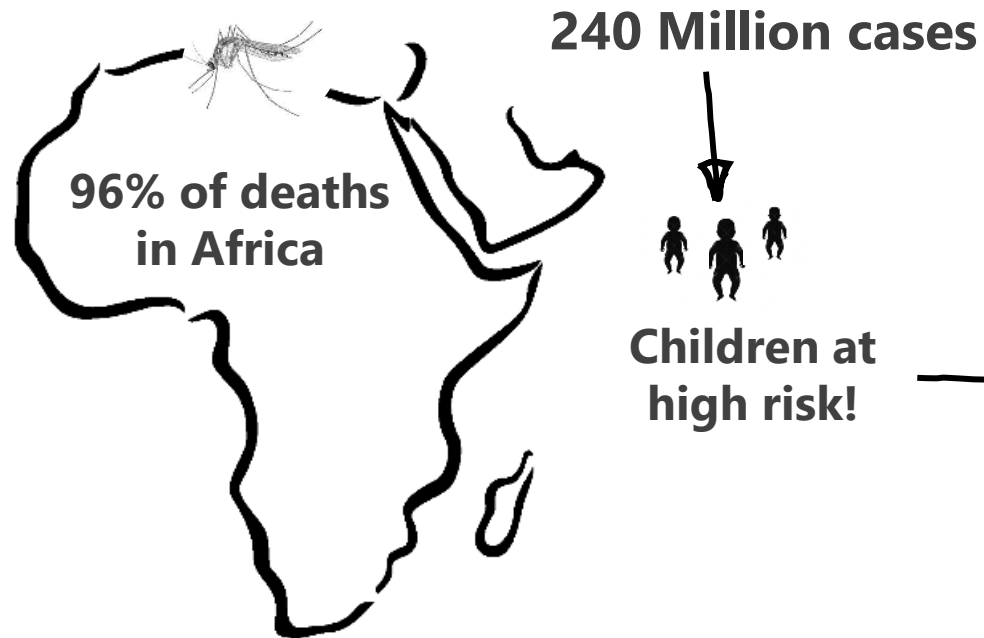
MSCA-Individual Fellow
Co-supervisor of 2 PhD students
(Mali & Cameroon)



The Scientific Project

Did you know that...?

GLOBAL MALARIA BURDEN



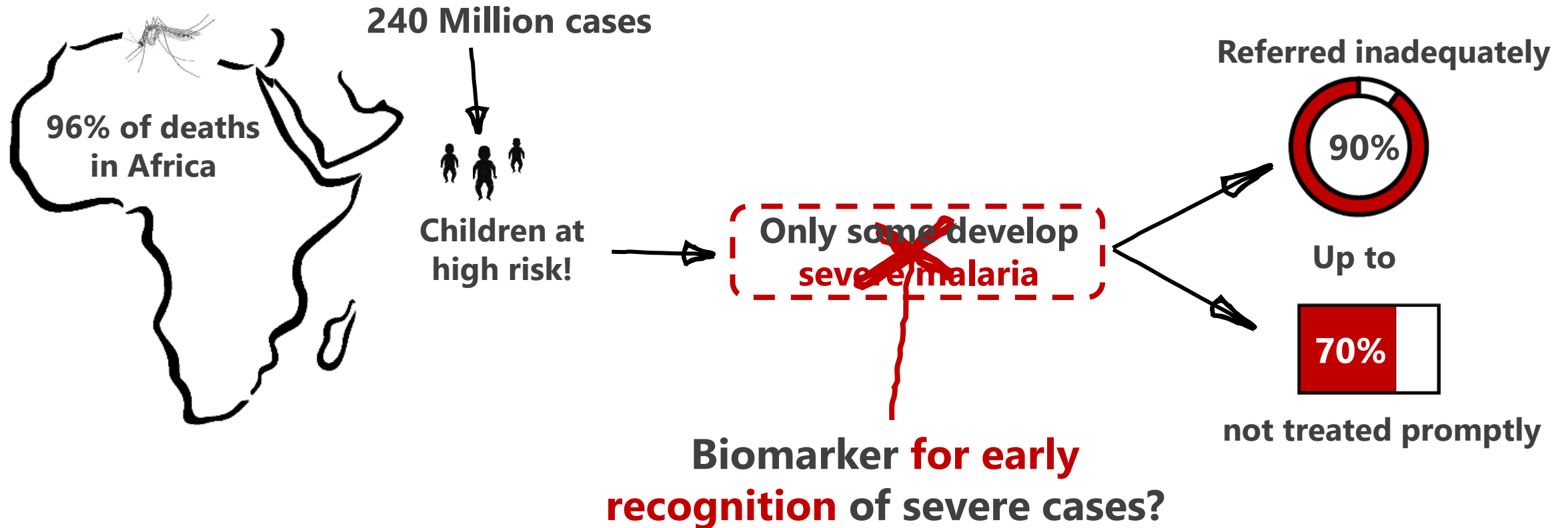
Why?

Only some develop
severe malaria

Host genetics & inflammatory processes
Not yet fully & broadly understood!
Expression of parasite genes (eg. *var...*)

Did you know that...?

GLOBAL MALARIA BURDEN



What's The Plan ?

The Plan

Dr. Sandrine Nsango

Longitudinal study in Mfou, Cameroon (MLD 2023)

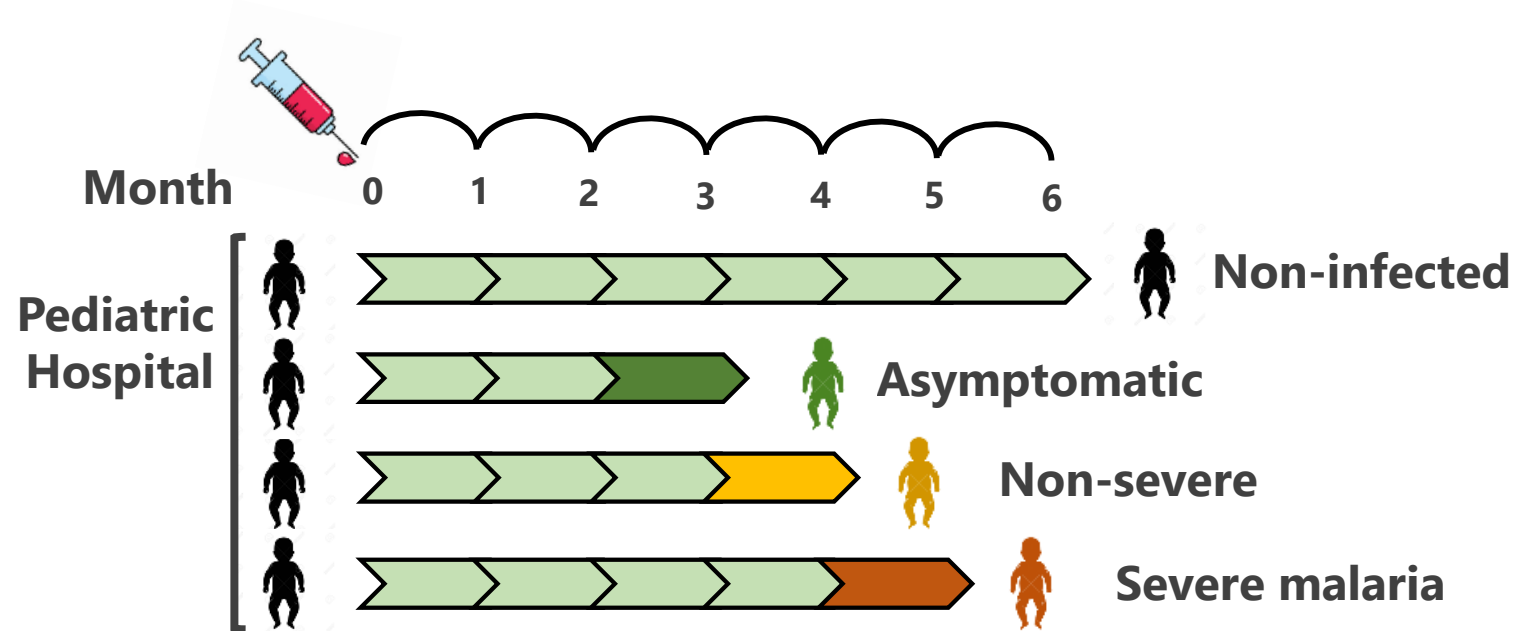
Remarkably well-organised logistiques



The Plan

Longitudinal study in Mfou, Cameroon (MLD 2023)

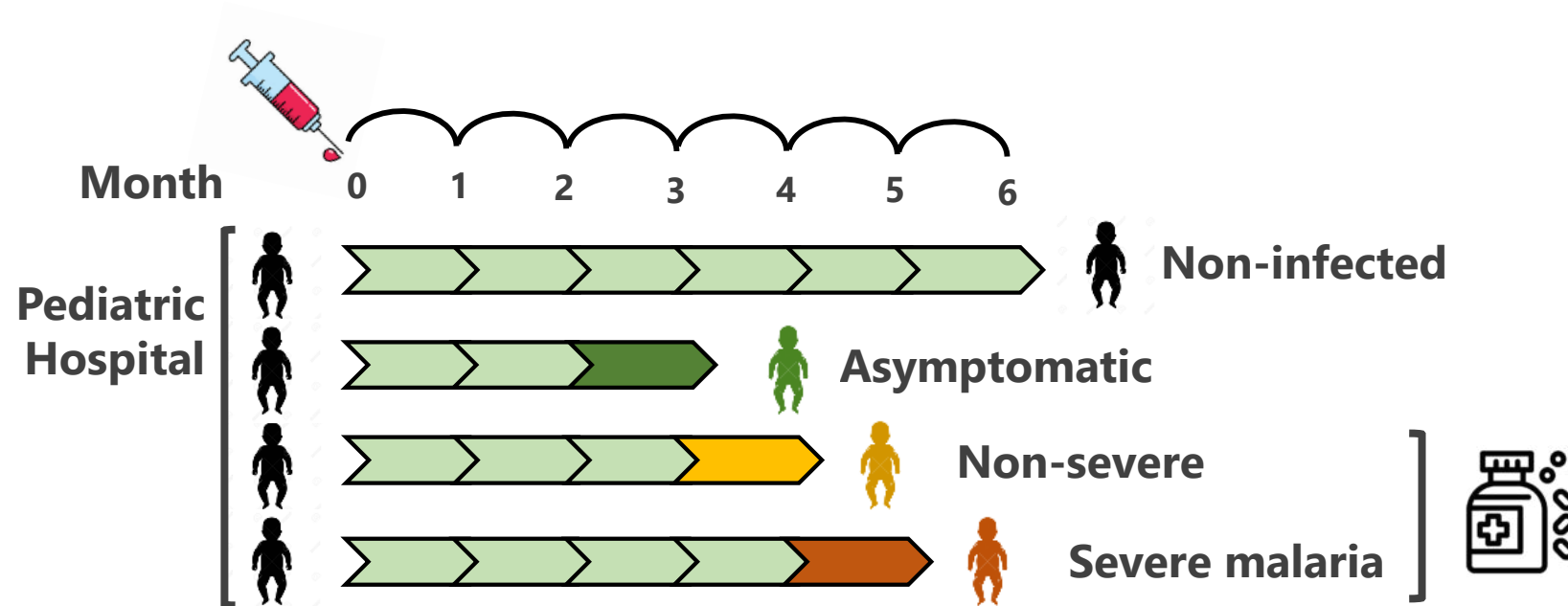
Monthly monitoring/collection for 6 months



The Plan

Longitudinal study in Mfou, Cameroon (MLD 2023)

Monthly monitoring/collection for 6 months

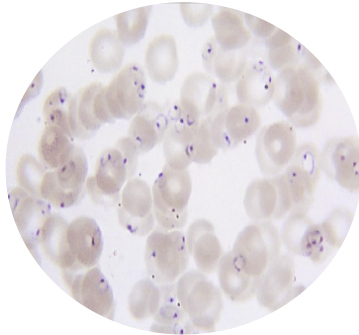


Before symptoms appear & when those do appear!

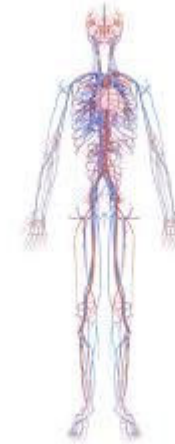


Factors contributing to severe malaria

Parasite



Host





Factors contributing to severe malaria

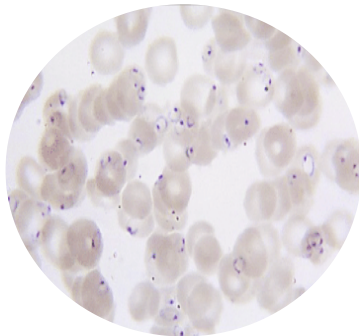
Parasite



RBC invasion



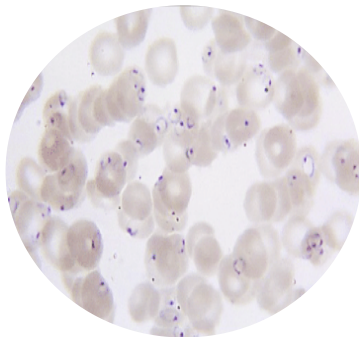
Severity





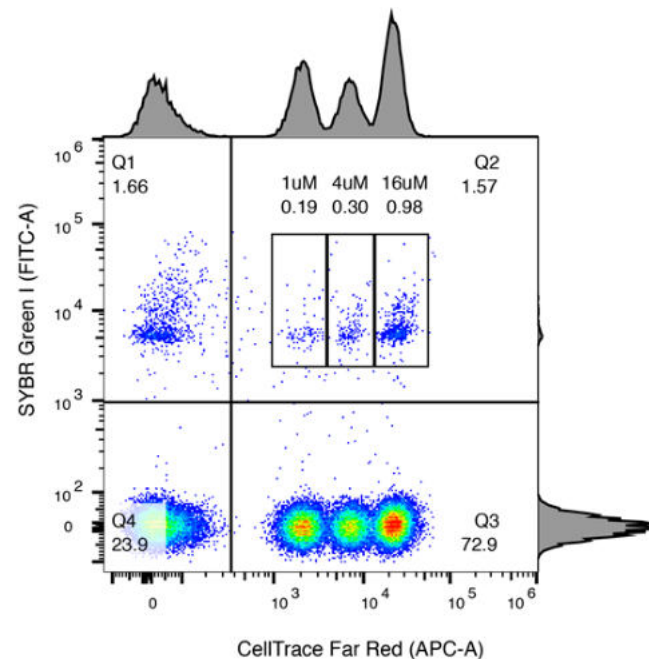
Factors contributing to severe malaria

Parasite



RBC invasion

Flow cytometry



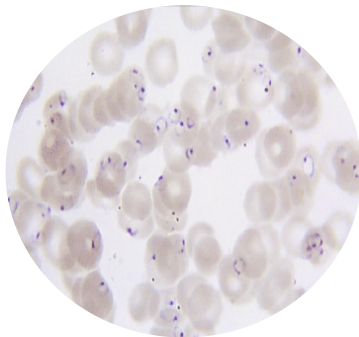
Quantify & Compare
invasion abilities of
wild parasites

Correlation with
clinical data



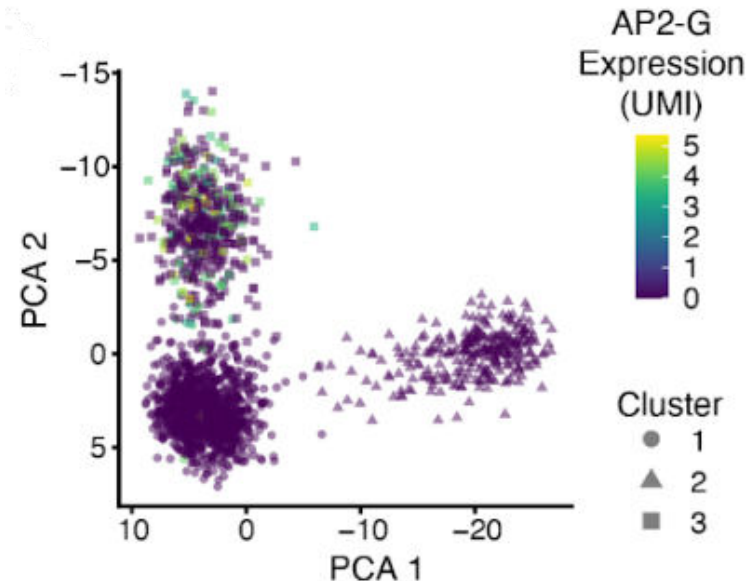
Factors contributing to severe malaria

Parasite



Transcriptomics

scRNAseq



**Parasite population
composition**

**Correlation with
clinical data**

Expression of:

- **invasion**
- **antigenic variation**
- **unknown?**

Parasites circulating in patients from Cameroon

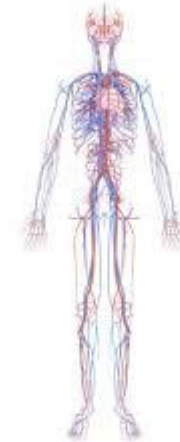
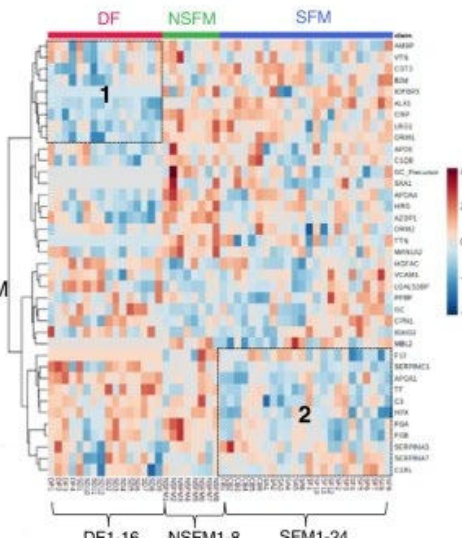
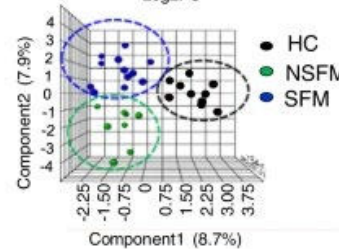
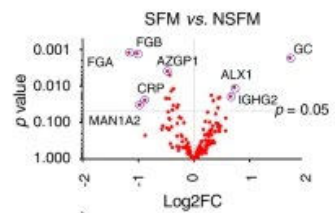
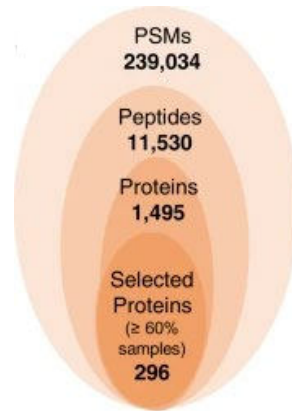
Ngou C*, Marin-Menendez A* *et al.* **submitted to Cell, Host & Microbe (2022)** ²³

The Plan



Factors contributing to severe malaria

Mass Spectrometry **Host**
1500 proteins



The Plan



Factors contributing to severe malaria

Breakthrough
Proteomics Technology

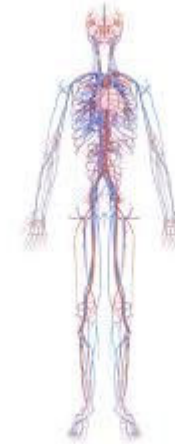
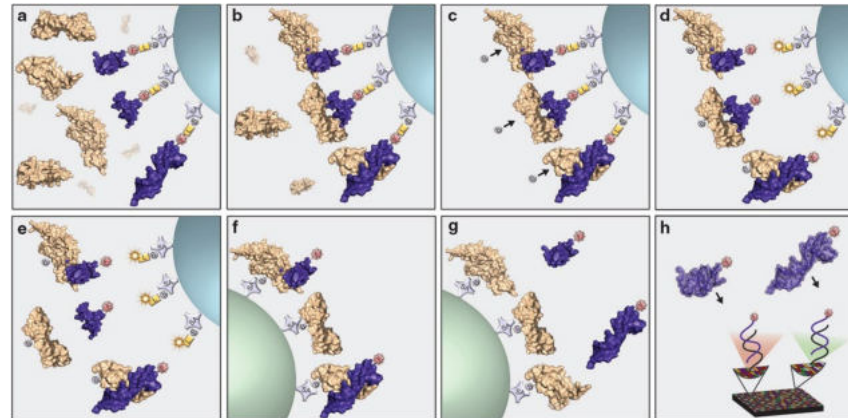
somalogic 

7200 proteins

Host

ssDNA probes > specific
binding to protein targets

Real-time picture of what's
happening in the body



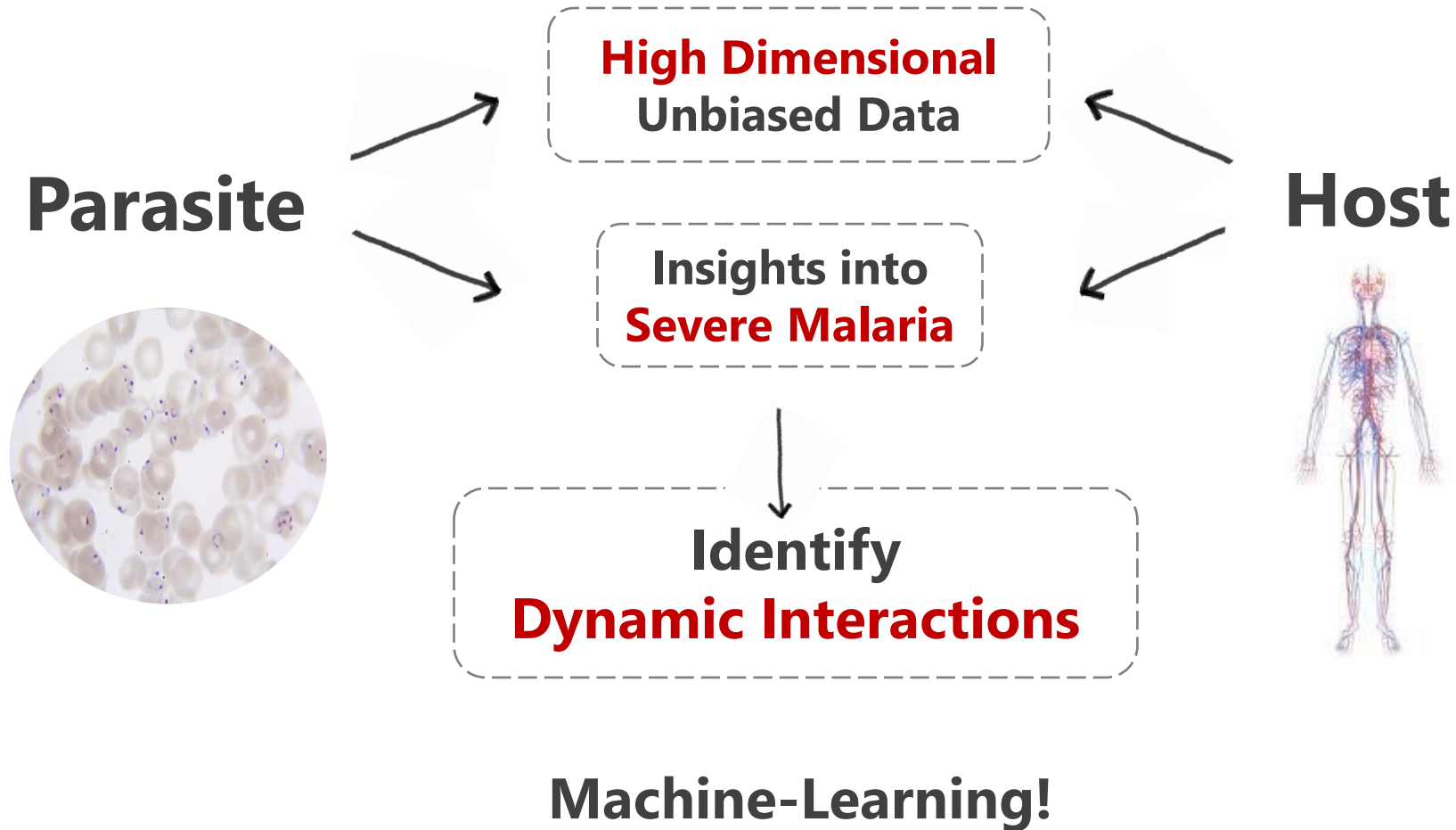
First pilot study submitted!

+ 85 samples from Cameroon



... and The Impact ?

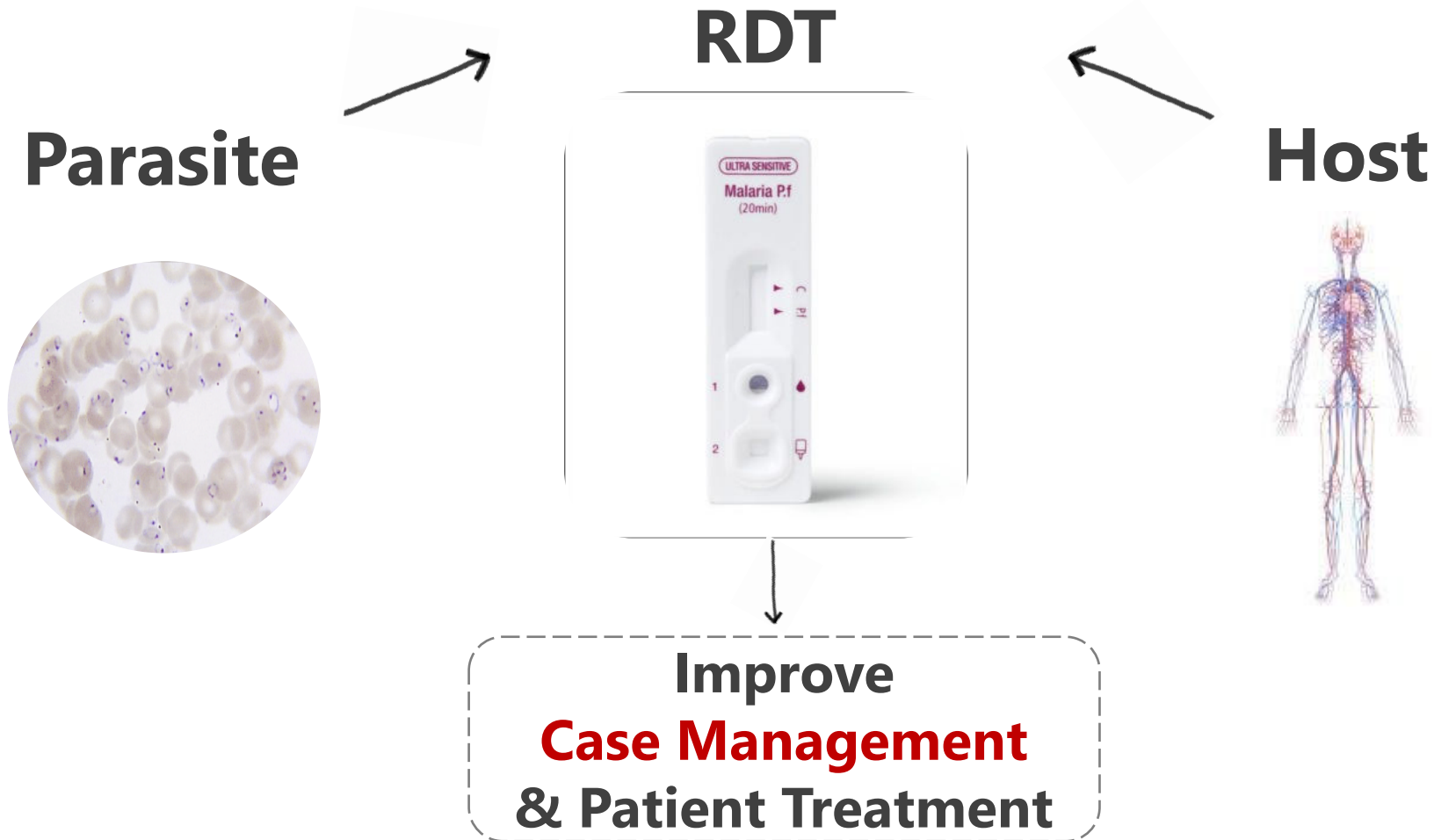
The Impact



Theo Sanderson



The Impact (long-term)



The Funds



2022



2024



EDCTP

2025

BILL & MELINDA
GATES *foundation*

Other projects

Public Engagement

Vulgarisation

What ?

- **Multiple & varied ways**





Public Engagement Initiative



Innovation!

Science

The whole world?

Simple



st

70 agents involved in May

Next action November 7-25th

Students

WELCOME GENOME CAMPUS
CONNECTING SCIENCE
PUBLIC ENGAGEMENT



What for ?

- **Multiple & varied ways**
- **It's FUN**
- **It helps to get FUNDS**
- **It should be an important part of what we do**

MERCI!

