

Accelerating *Anopheles* *genomics* in Africa

PAMCA / BMGF / Wellcome Sanger Institute

Alistair Miles - @alimanfoo
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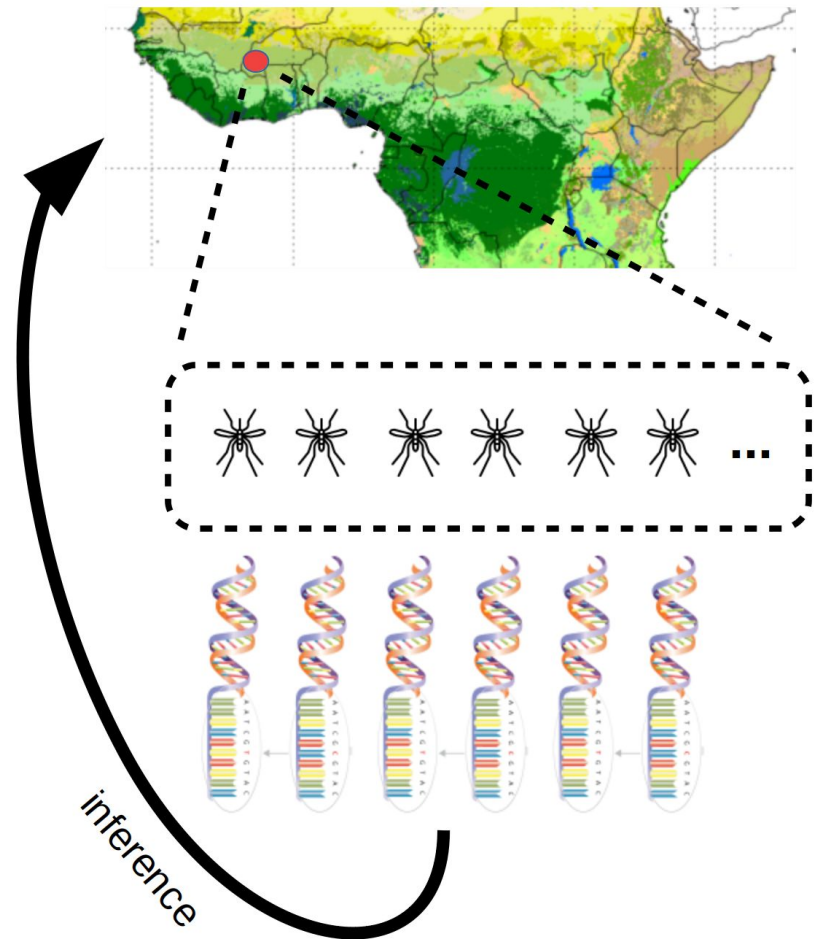
wellcome
sanger
institute



Funds and capability for Illumina whole genome sequencing of 10,000 *Anopheles* mosquitoes per year.

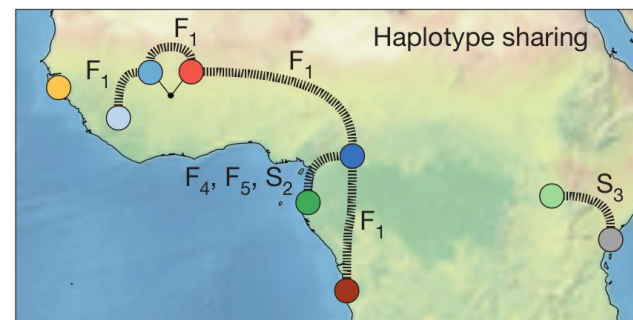
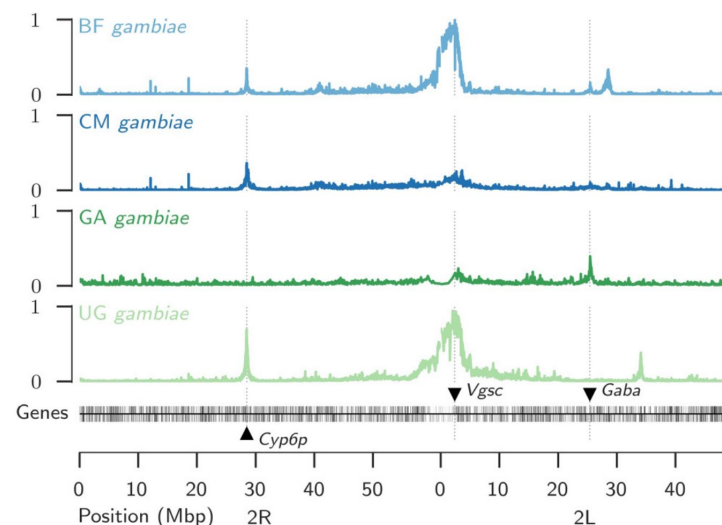
Genomic surveillance

- Partner with local researchers and NMCPs performing entomological monitoring/surveillance
 - Sentinel sites
 - Regular collections
- Sequence a sample of ~50 mosquitoes from each site, season species
- Sequence each mosquito individually
- Compare sequences from different mosquitoes, study genetic variation
- Make inferences about mosquito populations



Genomic surveillance - IRM use cases

- Insecticide resistance surveillance
 - Predict the resistance profile
 - Infer resistance mechanisms
 - Observe adaptive changes in response to interventions
 - Early warning of emerging resistance mutations
 - Infer geographical origins and transmission routes of resistance mutations
- Local decision support
 - What combination of interventions is most effective in a given setting?
 - Should we use rotations and/or mosaics? If so how?
- International coordination
 - Are there resistance hot spots?
 - Which mosquito populations are connected by gene flow?
 - How far and how fast does resistance spread?



From Genetic diversity of the African malaria vector *Anopheles gambiae*, Nature, volume 552, pages 96–100 (7 December 2017).

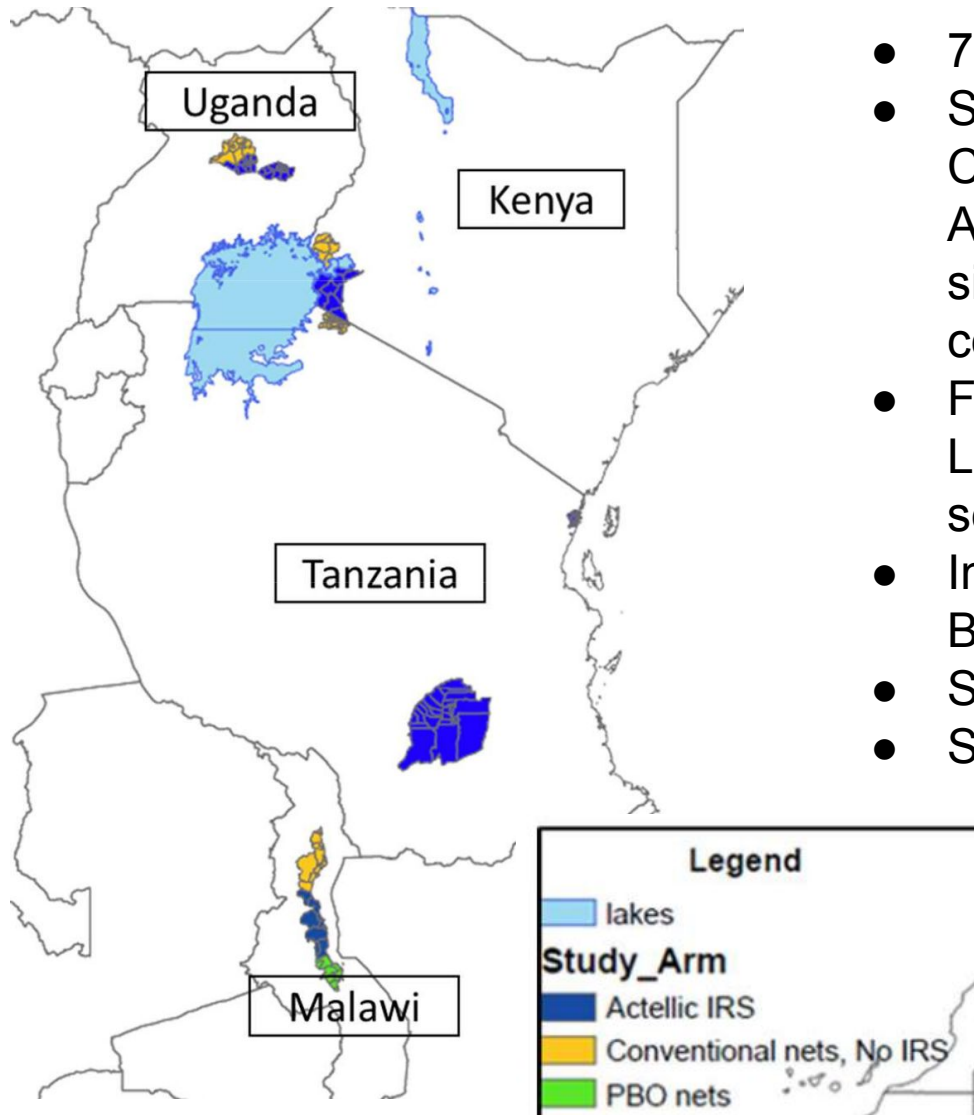
PAMCA / BMGF *Anopheles* genomics projects

- Goals
 - Build surveillance capacity
 - Fill gaps in current genomic data resources
 - Geographical
 - Temporal
 - Species
 - Intervention context
- 9 projects funded by BMGF in 2019
- Wellcome Sanger Institute will sequence 500 mosquitoes from each project
- Open data release

BILL & MELINDA
GATES *foundation*



Example project: East-South Africa *Anopheles funestus* Consortium



- 7 institutions in 4 countries
- Sampling in 3 sites in each of the 4 Countries, with 2 of the 3 sites being Actellic IRS or PBO LLIN sites and one site having intervention with only conventional pyrethroid LLINs
- From each site with Actellic IRS or PBO LLIN intervention, mosquitoes will be sequenced pre- and post-intervention
- Insecticide resistance and intensity Bioassays, sequence dead and alive
- Standardized sampling strategy
- Standardized data collection