



Press Kit

Uganda, Oct 2020



Uganda Virus Research Institute



**TARGET
MALARIA**
Uganda
A Vector Control
Research Alliance

Presentation

Malaria, a public health burden in Uganda

Malaria is still a public health burden and represents more than 200 million infections and half a million deaths each year.

It places a heavy burden on Uganda's public health system and economy. 90% of Uganda's population is at risk of becoming infected with malaria.

In 2017, there were more than 8 million cases and over 3000 deaths due to malaria in Uganda. Sub-Saharan Africa is still the most affected by malaria with 90% of cases globally. Despite recent progress, efforts to combat malaria are stalling, as shows the World Health Organisation's (WHO) latest World Malaria Report.

Existing methods to combat malaria such as insecticides treated nets, insecticides, antimalarial drugs have helped tremendously to reduce the malaria problem in Africa but unfortunately are not enough to eradicate malaria from Africa.

Various researches are carried out in order to contribute to the elimination of malaria by 2030 as advocated by WHO in its global technical strategy document for the fight against malaria 2016-2030 and Target Malaria is part of this effort.

Target Malaria

Target Malaria is a not-for-profit research consortium that aims to develop and share cost-effective and sustainable genetic technologies to modify mosquitoes and reduce malaria transmission. The research is still at a very early stage and there is still a long way to go. When the technology is complete, it will be freely licensed for use by authorities in countries affected by malaria and where it has been approved.

The Uganda Virus Research Institute (UVRI) is Target Malaria's partner in Uganda. In order to develop the research in-country, UVRI has built a new arthropod containment facility (ACL-2 insectary). It meets the international guidelines and national regulations for the containment of insects.

Target Malaria includes scientists, stakeholder engagement teams, regulatory affairs experts, project management teams, risk assessment specialists and communications professionals from Africa, North America and Europe.

Three pillars

Target Malaria's work is structured around three key pillars: science, stakeholder engagement and regulation.

In each of these areas, we seek to achieve excellence, creating a path for responsible research and development of genetic technologies. In order to succeed, our research requires the participation of many people, as no single institution has the knowledge or research environment necessary to succeed alone. The sustainability of our research and the effectiveness of our tools depend on sharing knowledge and in investing in partnerships across disciplines and among institutions.

Stakeholder Engagement

We are also committed to engaging a wide variety of stakeholders. As our research progresses, we have engaged an increasing number of stakeholders from the potential beneficiaries in local communities where we conduct our research activities to national, regional and global stakeholders. Our strategy is to focus on the communities that might benefit from the technology and that are more concerned by the research activities, but also to have an ongoing, transparent dialogue with other stakeholders.

We see engagement as a two-way dialogue and as a reinforcement of our commitment to co-development. Target Malaria believes that engaging stakeholders can help improve our working processes and the technologies we aim to develop.

Uganda Virus Research Institute (UVRI), Entebbe

The Uganda Virus Research Institute is a public health institute established in 1936 by the International division of Rockefeller Foundation as a Yellow Fever (YF) Research Institute. It became the East African Virus Research Institute in 1950 and in 1977, the Institute was subsequently named Uganda Virus Research Institute.

The UVRI conducts research on communicable diseases in man and animals, with emphasis on viral transmitted infections such as mosquito vectors (yellow fever, malaria), arboviruses, burkitt's lymphoma, HIV, influenza, viral diseases, haemorrhagic fever viruses (Ebola, Marburg).

Biography



Dr. Jonathan Kayondo's Profile

Dr Kayondo is a Senior Research Officer (SRO) at Uganda Virus Research Institute (UVRI), managing the department of Entomology.

Dr Kayondo is also the Principal Investigator of Target Malaria in Uganda, a multi-disciplinary research consortium focused on developing novel genetic technologies for malaria vector control.

Dr Kayondo's training background is in Biochemistry, Chemistry and Molecular genetics. He holds a B.Sc. from Makerere University, Uganda and Ph.D. in Vector Biology from the University of Notre Dame, USA.

His research encompasses investigations on disease vectors and pathogens with a focus on the genetics of malaria transmitting mosquitoes and viruses.

He has specialized in vector biology and molecular genetics. Over the years, he has studied the main malaria transmitting mosquito in Uganda, the *Anopheles gambiae* species complex, Arbo-viral vectors, and HIV.

Dr Kayondo guides UVRI entomology's scientific direction, aimed at better understanding the local mosquito populations in order to inform current vector control strategies, and the development of alternative approaches to complement existing interventions.

As a principal investigator, Dr Kayondo is leading a multi-disciplinary team in Uganda that is carrying out extensive entomological work, stakeholder engagement and facility readiness for the newly built insectary in preparation for work on genetically modified mosquitoes.

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Target Malaria: Uganda

Who we are?

Target Malaria is a not-for-profit research consortium that aims to develop and share new technologies for malaria control. Uganda Virus Research Institute (UVRI) is a collaborating partner.

Our work

Target Malaria’s vision is to contribute to a world free of malaria.

Our approach is malaria control by mosquito control. By reducing the population of malaria mosquitoes, we aim to reduce the transmission of the disease.

We aim to develop a technology that can be complementary to other mosquito control methods and which offers a solution that is long term, cost-effective and sustainable.

Target Malaria includes institutions in Europe, North America and Africa. The project is currently working in four African countries:

- Uganda: Uganda Virus Research Institute (UVRI)
- Burkina Faso: Institut de Recherche en Sciences de la Santé (IRSS)
- Ghana: University of Ghana
- Mali: Malaria Research and Training Center (MRTC)
- Researchers in the UK, US and Italy are also involved

Context

Malaria continues to be the leading cause of ill health and deaths in Uganda.



Over **8 million** malaria cases and over **3,000** deaths in 2018.

Although pregnant women and children under 5 are mostly affected, **90%** of Uganda’s population is at risk of malaria.

Malaria is responsible for **20%** inpatient deaths and **15-20%** hospital admissions.

30-50% outpatient visits in Uganda due to malaria.

Malaria places a heavy burden on Uganda’s economy: over **\$500 million** is the average **economic loss** in Uganda due to malaria annually.



Our priorities

- Conduct Baseline Entomology surveys in field sites and laboratory to better understand mosquito populations, dynamics and behaviour.
- Engage stakeholders at local, regional and national level in Uganda to inform, consult and also provide feedback on the different aspects of the project and its research (science).
- Facility Readiness in preparation for future contained studies on genetically modified mosquitoes.

Our intention is to use this opportunity to introduce Target Malaria to the stakeholders to create more awareness about the project and provide information about Target Malaria activities.

The research is still at a very early stage and there is still a long way to go. When the technology is complete, it will be freely licensed for use by authorities in countries affected by malaria and where it has been approved.

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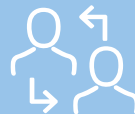
Linga Richard Ronny - Communication Officer
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Our activities in Uganda



Insectary & laboratory

- A specialized Arthropod Containment Level 2 (ACL-2) insectary has been constructed at the Uganda Virus Research Institute main campus in Entebbe.
- Several experiments with the local wild mosquitoes are being conducted in the new insectary in preparation for future contained studies.
- Baseline scientific studies are being conducted in the laboratory.



Stakeholder Engagement

- Inform and consult stakeholders at national level, in villages, districts and in the communities around UVRI about the project activities to ensure acceptance.
- Feedback to stakeholders about project progress and activities taking into account their views, opinions and concerns.
- Assuring stakeholders that their concerns are taken into consideration as the research progresses to the next level.



Entomology

Regular mosquito collections and studies carried out in villages in various districts in order to obtain information about mosquito populations, species, dynamics and behaviour.



The Science: What is gene drive?

What is gene drive?

Gene drive is a genetic phenomenon that occurs in nature and causes a selected trait to spread rapidly through a species via sexual reproduction over several generations. Gene drive works by increasing the likelihood that a modified gene will be inherited by its offspring. Normally, genes have a 50/50 chance of being inherited, but gene drive systems could increase that chance to upwards of 99 percent. This means that over the course of several generations, a selected trait could become increasingly common within a specific species.

Researchers have been studying how to harness gene drives to solve some of society's most intractable problems for a long time. Public health and ecosystem conservation are two of the main areas where research has focused, although other uses are also possible.

What are gene drive applications in public health?

In public health, several proposals have been made which would use gene drive to limit the spread of diseases, particularly those spread by insect vectors, such as malaria, which affect several hundred million people a year. For malaria, this could be done by inserting a trait which makes the mosquitoes unable to host the malaria parasite, or one which affects the local population dynamics of the mosquitoes to reduce their numbers.

Gene drive approaches to vector control represent a potentially highly effective, long term and cost-effective tool that could, in the context of integrated approaches, help eliminate malaria.

How is Target Malaria using gene drive technology?

We aim to tackle malaria at the source. Target Malaria is using gene drive approaches to insert a modification in malaria mosquitoes that would affect the mosquito's ability to reproduce. By reducing the population of malaria mosquitoes, we aim to reduce the transmission of the disease.

Worldwide there are more than 3,500 species of mosquito, with 837 of them in Africa. Of these, a single cluster of three very closely related species are responsible for most of the malaria transmission – *Anopheles gambiae*, *Anopheles coluzzii* and *Anopheles arabiensis*.

The project is investigating the use of genes that produce enzymes (called nucleases) that cut specific sequences of DNA. The concept for these nucleases is based on Homing Endonuclease Genes (HEGs) which are a class of nuclease genes, found in simple single celled organisms, which are capable of copying themselves from one chromosome to another.

Two of the main areas we are currently focusing on are biasing the sex ratio of mosquito populations and reducing female fertility.

When introduced in the malaria mosquito, the nuclease work by identifying and cutting through essential genes targeted by our researchers, such as fertility genes. The interrupted gene will no longer function, and modified mosquitoes will be affected according to the nature and importance of the gene.

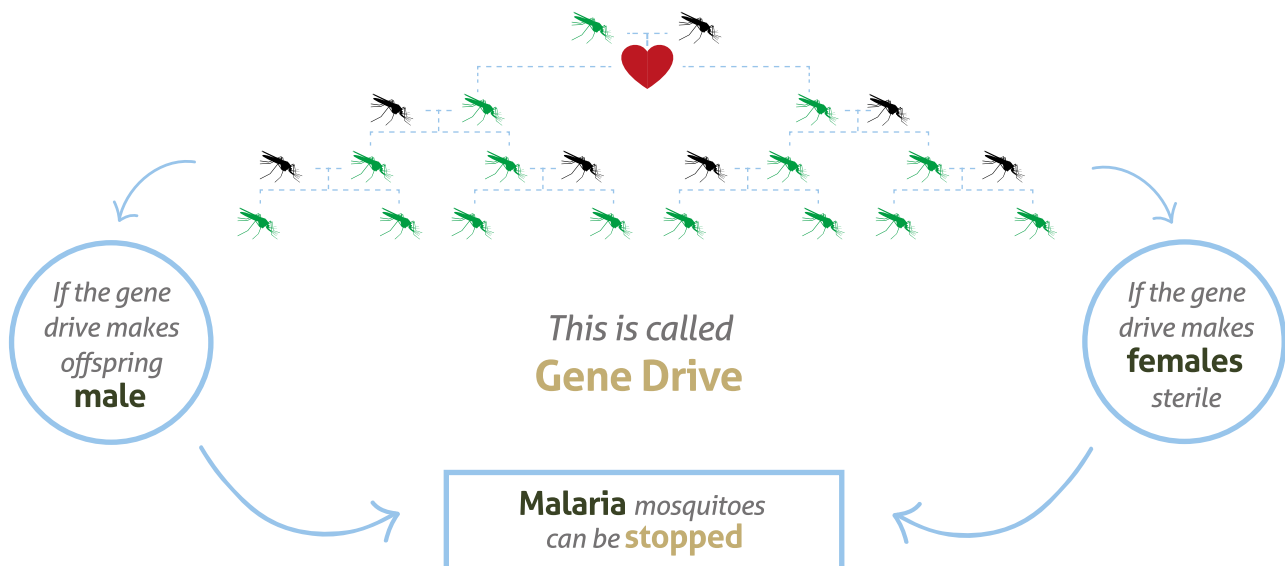
The ultimate goal is to produce modified malaria mosquitoes that can pass these genes on to a disproportionately high percentage of their offspring, so the modification is spread throughout the specific population relatively quickly and is effectively "self-sustaining". This makes the reduction of the malaria mosquito vector population relatively cost effective and simple to implement because the mosquitoes themselves do the work.

What is the timeline for gene drive applications for malaria control?

Current research on gene drive is at an early stage, and so definitive decisions about gene drive-based products is premature at best. Based on current progress, products ready for field testing are 5 years out, possibly longer. This gives scientists and stakeholders, particularly those from countries where gene drives might one day be employed, time to consider the important questions of regulation, risk assessment, ethics, and engagement, and to prepare for assessing an actual application.

Gene drives *increase* gene spread

With only a few individuals, a **driving gene** can spread a modification through the target population **effectively**



For more information go to our website:
www.targetmalaria.org/ourwork

Stakeholder Engagement

How do communities make informed decisions about our work?



Stakeholder engagement is essential to Target Malaria, reflecting its core values of co-development, openness and accountability. Engagement takes various forms and has different objectives, including co-developing a better technology with stakeholders.

Part of this engagement also aims at ensuring that communities can make an informed decision about project activities and that these decisions are recorded. At each phase of our technology development, we are committed to work closely with local participating communities to ensure that no activity goes ahead without their acceptance.

Why do we need communities to make informed decisions?

Target Malaria is committed to engage communities and ensure that they take part in decisions concerning our activities in their village or neighbourhood.

Ethics committees at different levels – national level, project level and partner institution level – are paying particular attention to ensure that this research is done according to ethical standards. The institutional ethics committees review all the research protocols involving communities and individual participants, and no field activities take place without their prior approval.

Beyond the moral and ethical imperative for engagement and informed decision, the project believes that co-developing this technology with local stakeholders will ensure that local knowledge is integrated to improve it and help ensure its acceptance.

What is the difference between informed consent and informed community acceptance?

The concept of consent is well established and refers in most cases to an individual informed decision for an activity that involves a person or a household, as part of a clinical trial. When Target Malaria collects mosquitoes from individuals' bedrooms, prior informed consent is required before any activity can take place.

However, when considering an activity taking place at a community level, the concept of prior individual informed consent is inadequate (WHO¹, Kolopack and Lavery²). Area-wide interventions call for a different type of consultation and agreement, which is a community level informed acceptance (also called authorization, Neuhaus and Caplan³). Target Malaria seeks informed community acceptance for all community level activities.

How are individuals and communities informed before making a decision?

A process of knowledge sharing is the basis of Target Malaria's engagement strategy. This process recognises that both the project and the communities have information to share. The project provides information about the proposed activities, including potential risks and benefits, and the expectations regarding the community. The content of this information sharing is reviewed and approved by institutional ethics committees. This process goes back and forth to ensure that all the questions and concerns from communities, as well as their own knowledge, have been taken into account and addressed by the project.

How was the decision on the acceptance model made?

There are many different ways of asking and recording informed community acceptance. Target Malaria decided not to make the decision of what would be appropriate, but rather through engagement with communities, asked them to design what would be appropriate considering their social and cultural context. A dialogue was established early on to agree on a set of principles – transparency, inclusiveness, gender and minority representation, openness to different perspectives – and communities elaborated their acceptance models. As a result, the process to reach a community decision and to record this decision varies between countries, while still following the same guiding principles.

For example, in Burkina Faso, the community in the villages decided to establish a reference community group, representing the whole community and that communicates the community decision to the project, after their consultation. On behalf of the community, they are in charge of signing an acceptance form, accompanying the information sheet summarising the activity proposed.

In each country, the acceptance model proposed is submitted to the institutional ethics committee to ensure that what is proposed is aligned with ethical principles.

On what activities/steps do communities express their opinion?

At Target Malaria we seek consent and/or community acceptance for:

- **Entomological collections**
Target Malaria conducts a variety of entomological activities that involve collecting mosquitoes from various villages. Based on the information provided, household representatives are invited to consent for in-house collections, and village representatives to express community acceptance more broadly.
- **Work under containment**
Contained work in our laboratories is an important phase of our work. Before we are able to import mosquitoes into our laboratories in Africa, we require approval from national regulators, who assess the application proposed and ensure that the facility meets all the containment requirements before making any decision. The project decided voluntarily that acceptance from the communities surrounding the laboratory was important. When surrounding communities feel they have been informed and their questions have been adequately addressed, the project asks them to make a collective decision about the contained work.
- **Small-scale releases**
In each stage of development of the technology we propose to conduct small-scale releases. These releases take place in villages where the project has been present with field entomological collections. The small-scale releases depend on the approval of the national authorities where we work. Along with the regulatory process, Target Malaria also asks the communities if they approve the small-scale releases proposed.

- 1 WHO, *The Guidance Framework for Testing Genetically Modified Mosquitoes*, WHO/TDR, 2014
- 2 Kolopack and Lavery, *Informed consent in field trials of gene drive mosquitoes*, Gates Open Research, 2017
- 3 Neuhaus and Caplan, *Ethical lessons from a tale of two genetically modified insects*, *Nature Biotechnology*, 2017

Medias



Pictures

Photographies in high resolution of Target Malaria in Uganda are available on demand. Please contact **Linga Richard Ronny**, *Communication officer* - rlinga@uvri.go.ug



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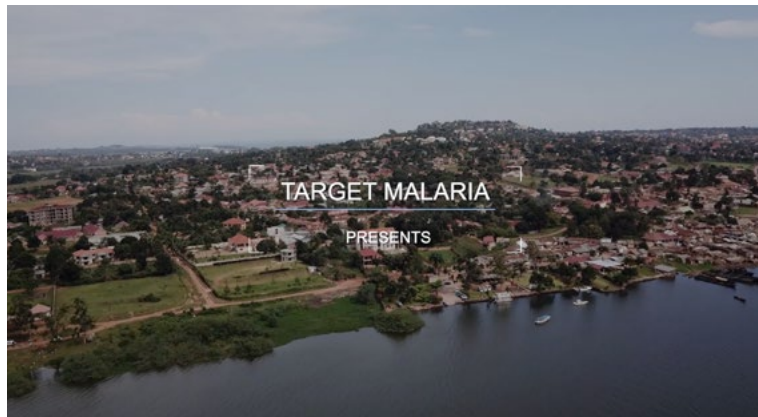


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Videos

Videos of Target Malaria are available on our Vimeo account. Please click here to visit [Vimeo](#)



Target Malaria's insectary in Terni, Italy.

from Target Malaria Facility: Dr. Ruth Muller
Deputy: Dr. Paola Pollegioni
Chief Executive Officer PoloGGB: Dr. Greta Immobile Molaro
Biosafety manager: Dr. Alessia Cagnetti
Other authorized users: Tania Persampieri
Alessandro Bucci
Dr. Roxana Minuz

The 8 Rules of Conduct for Visitors

1. Did you stay in a malaria-endemic country during last six weeks?
YES? -> Rapid diagnostic blood test for malaria pathogens is needed to confirm non-infection. Otherwise access is denied.
2. Follow the instructions of authorized personnel and stay accompanied to authorized personnel during your visit.

conçues pour garantir que les insectes à l'intérieur du

10:06



Contact us

Find out more about the project:

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