Synthetic species of the mosquito vectors of human disease: from hybrid genetics to a new type of vector control

Fact Sheet

Project Information

VecSyn

Grant agreement ID: 335724

Project closed

Start date
1 February 2014

End date
31 January 2019

Funded under
Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Total cost
€ 1 497 606,00

EU contribution
€ 1 497 606,00

Coordinated by
IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE
United Kingdom

Objective

In this project I aim to generate the first synthetic species of mosquitoes derived from

Anopheles gambiae, the main vector of malaria, and also from Aedes albopictus, a vector of several viral diseases, that has recently invaded Europe. The experimental generation of artificial species will prove invaluable to shed light on major biological questions concerning reproductive isolation. Furthermore, I propose a novel strategy to reduce the incidence of disease transmitted by these vectors based on the release of synthetic strains. Mathematical modelling indicates this to be a highly effective way to simultaneously suppress and replace a wild disease transmitting vector population with disease-refractory insects.
In Objective 1, I will identify genes that constitute the natural reproductive barriers in mosquitoes by analyzing the genetic makeup of progeny arising from crosses of related mosquito species. Such genes can be drawn upon for the construction of artificial barriers and help to reveal the mechanisms underlying speciation in mosquitoes.
In Objective 2, I will introduce, into the mosquito genome, artificial reproductive barriers that cause post-zygotic lethality in hybrids but that will not otherwise affect the mating propensity of parent and synthetic species. I propose a generalizable approach for the construction of artificial species barriers utilizing synthetic transcriptional activators.
In Objective 3, synthetic strains will be transformed with genes that interfere with the replication of malaria or viral pathogens and their transmission to humans and tested in cage experiments to validate their efficacy for vector control.
To carry out these experimental activities I will utilize cutting-edge next generation genetic mapping and site-specific genome-editing technologies. Knowledge arising from the development of synthetic mosquito strains will be applicable to beneficial species with a range of applications in biosafety, agriculture and biotechnology.

Fields of science (EuroSciVoc)

medical and health sciences > health sciences > infectious diseases > **malaria**

natural sciences > biological sciences > zoology > **entomology**

natural sciences > biological sciences > genetics > **genomes**

natural sciences > biological sciences > zoology > **invertebrate zoology**

natural sciences > mathematics > applied mathematics > **mathematical model**

Programme(s)

FP7-IDEAS-ERC - Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to

2013)

Topic(s)

ERC-SG-LS9 - ERC Starting Grant - Applied life sciences and biotechnology

Call for proposal

ERC-2013-StG
See other projects for this call

Funding Scheme

ERC-SG - ERC Starting Grant

Host institution

IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE

EU contribution

€ 1 497 606,00

Total cost

No data

Address

SOUTH KENSINGTON CAMPUS EXHIBITION ROAD
SW7 2AZ LONDON
United Kingdom

Region

London > Inner London — West > Westminster

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Beneficiaries (1)

IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE

United Kingdom

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