STOP-MATING PROJECT WORKSHOP

STOP-MATING

23rd April 2026
CiA2A-CSIC: Av. de León, 1, 28805 Alcalá de Henares, Madrid, Spain

AGENDA

Stop-Mating Consortium

15.00-15.20 Marta Andrés (Animal Health Research Centre, INIA-CSIC): STOP-MATING, novel approaches for mosquito reproductive control.

15.20- 15.40 Federica Bernardini (Imperial College London, UK): Rewriting mosquitoes to stop malaria

Invited Speakers

15.40- 15.55 Catuxa Cerecedo-Iglesias (Centre for Advanced Studies, CSIC, Spain): Unlock the use of citizen science on public-health concerning mosquito species distribution modelling.

15.55-16.10 Maria I. González (Centre for Advanced Studies, CSIC, Spain): From smart traps to ciMzen science: using novel approaches to advance our understanding of vector ecology in urban settings.

16.10-17.10 Coffee Break

16.40-17.10 Ruth Mueller (Institute of Tropical Medicine, Belgium): Heatwaves constrain the future persistence of mosquito vectors in Europe (remote)

17.10-17.40 David Roiz (Institute for Game and Wildlife Research, CSIC, Spain): Ecology, control, and costs of diseases caused by mosquito-borne pathogens

17.40-18.00 Discussion

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STOP-MATING
Funded by the EU
(GA No. 101183033)

15.00-15.20 Marta Andrés (Animal Health Research Centre, INIA-CSIC)

STOP-MATING, novel approaches for mosquito reproductive control.

STOP-MATING aims at building a research and innovation network to advance towards developing novel tools to target the mating behaviour of disease-transmitting mosquitoes for vector control. Challenges related to climate change and insecticide resistance are putting human populations at risk of mosquito-borne diseases. Novel strategies are required to tackle this public health challenge. In STOP-MATING we propose to use the mating systems of disease-transmitting mosquitoes as novel vector control targets. Although disrupting mosquito mating would have a clear impact on mosquito vector numbers, this mechanism is underexploited from a public health perspective. In STOP-MATING we bring together experts from academic and industrial partners with interdisciplinary expertise on bioinformatics, molecular neuroscience, genetic control, behaviour, biophysics, vector ecology and vector control to explore novel vector control approaches. Our objectives are to identify molecular targets for mosquito mating disruption, to mutate those targets and analyse associated behaviouraL effects and explore their potential application into developing mating disruptors and gene drive systems for vector control. We also aim at exploiting the mating behaviour of mosquitoes to develop traps that mimic the environmental stimuli that they respond to during courtship behaviour. STOP-MATING approach is to merge knowledge from laboratory and field researchers to deliver real-world solutions, and to tackle different mosquito species of increasing public health relevance in Europe. Our innovative approaches have the potential to make great impact to reduce the burden of mosquito-borne diseases.

I am interested in the fundamental biology of auditory function and mating behaviour in diseasetransmitting mosquitoes, and in applying this knowledge to develop novel vector control strategies that target mosquito behaviour. At the Mosquito Molecular Neuroscience Lab, we focus on how genetic and molecular mechanisms shape mosquito audition across species, and on identifying strategies to disrupt these pathways and block mating. Our research is highly collaborative and integrates interdisciplinary approaches.

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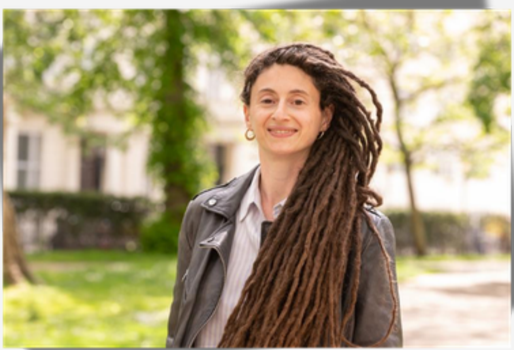
15.00-15.20 Federica Bartini (Imperial College London, UK)

Rewriting mosquitoes to stop malaria

Malaria remains a major public health threat, with mosquitoes of the Anopheles gambiae complex serving as the primary vectors in sub-Saharan Africa, where about 95% of malaria-related deaths occur. Although interventions such as insecticide-treated bed nets and indoor residual spraying have reduced transmission, their effectiveness is increasingly undermined by insecticide and pathogen resistance, mosquito behavioural changes, and funding limitations. In this context, genetic vector control strategies have emerged as promising alternatives, largely supported by results from controlled laboratory studies. This talk will examine the development of these approaches in the Anopheles gambiae complex and assess their potential for malaria control.

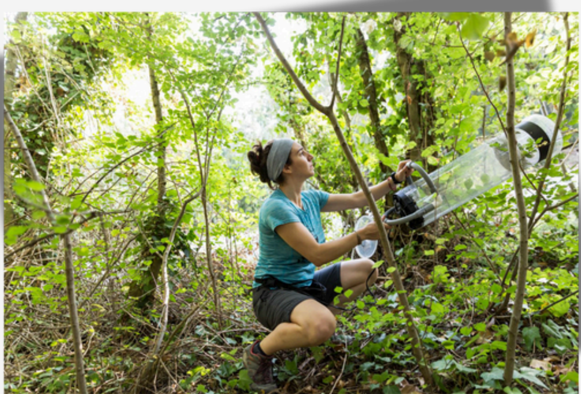


Federica is a senior postdoctoral researcher with over 10 years of experience at Imperial College London, working within the Crisanti Group—a leading molecular biology laboratory dedicated to developing genetic vector control strategies against malaria. As a team leader, Federica directs the group's research efforts focused on the design and development of genetic approaches, with a particular emphasis on gene drive systems in Anopheles mosquitoes. They lead the conceptualisation, design, and implementation of advanced genetic technologies, leveraging tools such as CRISPRCas9 to engineer and refine genetic constructs aimed at mosquito population suppression. These research activities contribute directly to the objectives of the Target Malaria consortium, where Federica holds a strategic role in advancing gene drive science and supporting its future field deployment. In parallel, Federica collaborates closely with researchers, regulators, and public health stakeholders across Africa to ensure that our scientific innovations are developed and delivered in alignment with ethical, regulatory, and implementation frameworks

15.40 - Catuxa Cerecedo-Iglesias (Centre for Advanced Studies, CSIC, Spain)

Unlock the use of citizen science on public-health concerning mosquito species distribution modeling

As mosquito-borne diseases expand globally, traditional surveillance based on fixed traps faces limitations in spatial-temporal coverage and cost-effectiveness. This constrains create an opportunity for non-traditional data (NTD), such as the citizen science, to fill information gaps at public health threats. However, this "opportunistic" and "unstructured" NTD brings critical methodological challenges for producing reliable ecological models. This research evaluates the usage and integration of NTD from Mosquito Alert citizen science system to enhance the species distribution modeling (SDM) of two concerning mosquito vectors: Aedes albopictus and Culex pipiens. In the first case study, focused on Ae. albopictus in Spain, results show that utilizing sampling effort as a proxy for inferred-absences proved essential to correct for human-driven reporting intensity. Reliable suitability estimates of Ae. albopictus in Spain based on NTD and traditional data clearly correlate but citizen science accounted for larger spatial coverage, and therefore, captured broader range of environmental variability, often missed by traditional traps. In the second case, we address more complex inherent biases of NTD, including not only uneven sampling effort but also species identification "noise" that comes from annotation challenges of Cx. pipiens citizen science images. By applying thermal niche filtering (based on the reproductive number, RM) to European scale Cx. pipiens observations, we removed biologically implausible records. The results of Cx. pipiens distribution models case revealed that while indoor reports capture behavioral signals such as shelter-seeking and overwintering, outdoor observations provide the most ecologically consistent predictions when validated against independent trap data. These studies demonstrate that citizen science is a complement to traditional monitoring. By bridging data gaps and providing high-resolution spatiotemporal insights, the integration of carefully filtered NTD offers a powerful tool for large-scale vector surveillance, predictive modeling, and public health decision-making.



I am a postdoctoral researcher in the Department of Ecology and Complexity at CEAB-CSIC (Blanes, Girona, Spain), where I focus on mosquito ecology, vector and host surveillance, and ecological modeling. I completed my PhD in spatial ecology, which provided me with a strong foundation in movement ecology and conservation biology, and has since evolved towards vector ecology.
My research integrates high-resolution data sources (e.g., GPS tracking, smart traps, and citizen science) with quantitative and spatial modeling approaches to better understand and predict ecological dynamics across scales. I am particularly interested in how these dynamics can inform both biodiversity conservation and public health strategies.

15.55 - Maria I. González (Centre for Advanced Studies, CSIC, Spain)

From smart-traps to citizen science: using novel approaches to advance our understanding of vector ecology in urban settings

The rise of mosquito-borne diseases in temperate regions like Europe is a growing public health concern, with urban areas particularly vulnerable to outbreaks. This underscores the need for early-warning systems and precision vector control. Novel surveillance tools such as automated smart-traps and citizen science platforms have opened new opportunities in this sense, allowing to obtain high-resolution entomological data across large spatial scales, which would be unfeasible through conventional monitoring methods. The work presented here, structured in two studies, explores how these approaches can improve our understanding of urban vector ecology and inform public health responses. The first study uses real-time mosquito data collected from the automated smart-trap network deployed by the Public Health Agency of Barcelona between 2021 and 2024 to characterise the daily and seasonal activity rhythms of females and males of Aedes albopictus and Culex pipiens within an urban context. The second study draws on a large European dataset of mosquito bite reports submitted through the Mosquito Alert citizen science platform since 2021 to the present to provide a proxy for human–vector contact. Taken together, these studies contribute to advancing our understanding of vector activity by characterising the activity peaks of key mosquito species relevant for targeted prevention and control, while also providing insights into human–vector contact, a key metric for assessing vectorial capacity. In doing so, they illustrate how innovative, high-resolution data sources can can support more precise and data-driven approaches to mosquito surveillance and control programs.

I am a postdoctoral researcher in the Ecology and Complexity Department at CEABCSIC (Blanes, Girona, Spain), working on mosquito ecology, vector surveillance, and ecological modelling. Following my PhD in Medicine and Animal Health (UAB), my research integrates remote real-time information from smart- trap networks, citizen-science apps, and climatic and environmental sources to study the spatiotemporal dynamics of urban mosquitoes and to assess the human-exposure risk to mosquito bites. As part of the Horizon Europe project MOBVEC, my research aims to strengthen early responses to epidemiological crises caused by mosquito-borne diseases. I am particularly interested in urban ecosystems and the integration of science, technology, and public health to support data- driven strategies addressing One Health challenges..

16.40 - Ruth Mueller (Institute of Tropical Medicine, Belgium)

STOP-MATING

Heatwaves constrain the future persistence of mosquito vectors in Europe

Climate warming is intensifying heatwaves across Europe, but the upper thermal limits of arboviral mosquito vectors - and their implications for future distribution - remain poorly understood. Using experimentally derived life-stage-specific upper thermal limits, we identified the impact of heat extremes on the persistence of Culex pipiens, Aedes albopictus, and Aedes aegypti in Europe under present and future climate scenarios (SSP126, SSP370, SSP585). Our projections reveal that by 2100, large parts of southern Europe, including the Iberian Peninsula, will exceed the thermal limits for Cx. pipiens, with heat-limited zones expanding northward into central Europe. Aedes albopictus faces moderate future constraints, while Ae. aegypti remains largely unrestricted by extreme heat, though high mortality at low humidity may still limit its establishment in continental Europe. Divergent plasticity in heat tolerance among life-stages, species, their acclimation status and the interplay with humidity exposure underscores the complexity of thermal adaptation. This integrative experimental-modelling framework highlights when and where it may become too hot for Europe's major mosquito vectors, refining spatial risk forecasts for arbovirus emergence under climate change.

Ruth Müller is Professor of Entomology at the Institute of Tropical Medicine, Antwerp, and parttime Associate Professor at the University of Antwerp, Belgium. With a background in ecotoxicology and medical entomology, her research integrates ecological, evolutionary, and biomedical perspectives on vector-borne disease systems. She studies mosquito eco-physiology environmental change, biodiversity, surveillance, and sustainable vector control, with the aim of improving preparedness for emerging infectious disease risks under global change. She has authored more than 100 peer-reviewed publications and contributes actively to international research on vector ecology and global health.

17.10 - David Roiz (Institute for Game and Wildlife Research, CSIC, Spain)

Ecology, control, and costs of diseases caused by mosquito-borne pathogens

In the current context of accelerating global change, we are observing an increase in the emergence of mosquito-borne viruses, associated with the expansion of invasive species and the rise in global mobility. It is necessary to integrate ecological, epidemiological, social, and economic approaches from a more holistic perspective. My research is structured around three interrelated objectives: understanding the ecological determinants of transmission, critically evaluating the effectiveness of control measures, and quantifying the economic and social impacts of invasive mosquitoes and arboviral diseases.The risk of transmission depends on the structure of ecological interactions among vectors, hosts, and pathogens, and we propose an index to evaluate them. We generate solid evidence on innovative non-insecticidal interventions, such as the sterile insect technique or mass trapping. We quantify economic costs and social impacts. An integrated framework is proposed that combines innovative ecological indicators, adaptive intervention strategies, and economic and social analyses to improve the governance of health risks in a context of global change.

David Roiz is a biologist with a PhD from Complutense University of Madrid and a Master's from Institut Pasteur, specializing in medical entomology, viral ecology and vector control. His research focuses on the eco-epidemiology, surveillance, control, and economic impact of mosquito-borne diseases, particularly dengue, chikungunya, West Nile among others. His interdisciplinary approach integrates ecological interactions among viruses, vectors, hosts, climate, and landscapes. He also evaluates control strategies, assesses economic impacts, and leads One Health capacity-building initiatives. With over 20 years of international experience, more than 100 publications, being some of them highly cited, and strong involvement in collaborative projects, policy expertise and supervision, he contributes actively to global health research and policy in mosquito-borne diseases.