



# INFRAVEC: Research Capacity for the Implementation of Genetic Control of Mosquitoes

**Mosquitoes represent a major and global cause of human suffering due to the infectious diseases they transmit, with some two million people dying from mosquito-borne diseases every year. The concept behind INFRAVEC is to bridge the gap between recent advances in transgenic technology– where technology is used to alter the genetic material of an organism by transferring genes from another species – and its implementation as a novel powerful approach to mosquito control.**

## ● A QUESTION OF CONTROL

Mosquitoes are a 'vector agent' that carries disease-causing viruses and parasites from person to person without catching the disease themselves. With mosquitoes estimated to transmit disease to more than 700 million people annually in Africa, South America, Central America, Mexico and much of Asia, the principal mosquito-borne diseases being the viral diseases – yellow and dengue fever – and malaria.

Indeed, the threat represented by mosquitoes is rising due to the inadequacy of existing control measures and the progressive spread of insecticide-resistant insects. Moreover, due to increases in international trade and climate changes, the threats posed by mosquitoes are increasingly affecting large parts of Europe.

In the last five years, European researchers have made significant contributions towards understanding the biology and the genetics of important mosquito vectors of human disease – mainly the major malaria vector *Anopheles gambiae* and the dengue and yellow fever mosquito *Aedes aegypti*. Translating these scientific achievements into novel mosquito control measures has, however, proven difficult. One reason is that none of the European laboratories (though at the cutting edge of their respective fields of interest) combines molecular biology and genetics expertise with the capacity of mosquito



mass rearing, population genotyping, access to confined field facilities and detailed knowledge of population biology and regulatory approval procedures.

The INFRAVEC project brings together a number of academic and industrial laboratories operating in the field of mosquito biology, genetics, epidemiology, genetic engineering and population biology into one multi-centred European infrastructure. Access to this infrastructure will provide the participating laboratories and the European scientific community with a formidable leverage to enhance the understanding of mosquito biology and to develop new control measures against vector-borne diseases.

## ● COLLABORATION AND EXCHANGE

INFRAVEC will operate through a number of networking, joint research, transnational and service activities, towards the objective of considerably strengthening research capability in Europe by sharing knowledge, resources and technology. Efforts will be focused on two mosquito species: the malaria mosquito *Anopheles gambiae*, and *Aedes aegypti*, which spreads a variety of viral diseases, including dengue fever and Chikungunya that is rapidly spreading throughout Europe.

Networking activities have been specifically designed to improve the performance of the infrastructure and increase its capacity. The services of the infrastructures will be made accessible to the wider scientific community via networking and specific access activities. The infrastructure will significantly increase the research capacity of individual laboratories and teams beyond their current levels.

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In addition, INFRAVEC will exploit the infrastructure to execute four collaborative projects that seek to increase the basic knowledge of mosquito biology and address the major bottlenecks in the development of vector control measures based on genetically modified (GM) mosquitoes. The goals of these four projects will be to:

1. improve gene manipulation technologies
2. systemically reduce the mosquito capability to transmit diseases
3. analyse population structure of mosquito species
4. assess the fitness and the spread of GM mosquitoes under confined conditions.

Both the infrastructure and the research projects will involve the participation of laboratories and institutions from developing countries where mosquito vector control is a primary

health problem. The infrastructure and the participating laboratories bring together a unique combination of cutting-edge expertise that will be exploited to promote training of young researchers. Moreover this proposal will actively seek to coordinate and align its action and initiatives with national and international programmes.



**Project acronym:** INFRAVEC

**Funding scheme (FP7):** Integrating Activities (IA)

**EU financial contribution:** €8.5 million

**EU project officer:** Christos Profilis

**Duration:** 48 months

**Start date:** 1 September 2009

**Completion date:** 31 August 2013

**Partners:**

Imperial College of Science, Technology and Medicine (UK)  
Agricultural University of Athens (EL)  
Centro Agricoltura Ambiente Giorgio Nicoli SRL (IT)  
Ministère de la Santé CNRFP (BF)  
Centre National de la Recherche Scientifique (FR)  
Europaisches Laboratorium Fur Molekularbiologie Emblebi (international organisation)  
International Centre of Insect Physiology and Ecology (KE)  
Instituto de Higiene e Medicina Tropical (PT)  
Foundation for Research and Technology Hellas (EL)  
Institut Pasteur (FR)  
Institut Pasteur de Dakar (SN)  
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Università degli Studi di Pavia (IT)  
Università degli Studi di Roma La Sapienza (IT)  
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