



EDENext is a research project (2011-2014) funded under the Health component of the European Commission's 7th Framework Programme (FP7)

AN INTEGRATED PROJECT TO PREDICT THE RISK OF VECTOR-BORNE INFECTIONS



## Building knowledge on vector-borne infections

EDENext is building on the knowledge gained in the EDEN project (2004-2010) to improve our knowledge on the biology and control of vector-borne infections in Europe. These diseases, transmitted by vectors such as mosquitoes and ticks etc., are problematic for both human and animal health as vaccines are rarely available, and vector-control methods are not yet sufficiently well developed. This means we need to understand the biological, ecological and epidemiological mechanisms involved in order to develop tools to improve prevention and intervention at the start of an epidemic, when it is still possible to take action.

### → Basic research for better prevention and intervention

EDENext brings together 46 partners teams from 22 countries, a record for a health-focused project under the European Commission's 7th Framework Programme, dedicated to investigating the biological, ecological and epidemiological components of vector-borne infections introduction, emergence and spread, and the development of new strategies to control them.

In particular, EDENext seeks to:

- Explain the bio-ecological processes of the introduction, establishment and spread of human and animal vector-borne infections
- Develop and assess methods for the prevention, surveillance and control of vectors and vector-borne infections
- Identify public health communication strategies based on actual risk perceptions by the human populations exposed to these risks.



European mink investigations - Danube Delta National Institute

### Inside



- Basic research for better prevention and intervention
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## → Focusing on vectors

EDENext aims to meet its objectives through five vector-focused groups (see Vector groups).

Each group has work packages on “emergence and spread”, and “intervention and control”, and is supported by integration teams providing modelling, data management and public health expertise.



Mosquitoes trap close to host

## → Vector groups

Research is focused on five vector groups. Each group is examining the mechanisms by which vectors and pathogens are introduced, then emerge and spread, and an assessment of the methods available to control vector and reservoir populations. The aim is to identify appropriate and environmentally friendly control strategies.



- **Ticks** and the risk of transmission of emerging pathogens in Europe such as *Anaplasma*, *Bartonella* and *Rickettsiae* species as well as Crimean-Congo hemorrhagic fever virus.



- **Mosquitoes** such as *Aedes albopictus* and the risk of transmission of dengue and chikungunya, and *Culex* mosquitoes and the risk of transmission of West Nile virus. The latter has recently caused major outbreaks in Greece, Romania and Central Europe, and around the Mediterranean basin.



- **Sandflies** and the risk of transmission of *Leishmania*, and of viruses that cause summer encephalitis in several Mediterranean countries.



- **Culicoides** biting midges and the risk of transmission of viruses that cause animal diseases such as bluetongue and African horse sickness, which affects a large part of Africa and is now threatening the Mediterranean and Europe.



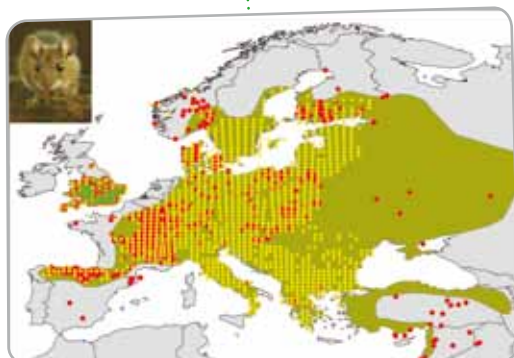
- **Rodent** and insectivore-borne pathogens, such as hantaviruses, orthopox viruses and the lymphocytic choriomeningitis virus complex. The emergence, dynamics and transmission of these pathogens in various European ecosystems is being studied.



## → A major role for modelling

Mathematical and statistical modelling are important tools for assessing, analysing and predicting the introduction, emergence and spread of vector-borne infections and the potential impact of new and existing control and intervention methods.

A common goal for all the disease systems under study is to develop predictive quantitative models of vector-population dynamics or disease transmission and spread.



*Different datasets for the Yellow-Necked Mouse which EDENext will reconcile and model*

## → The importance of extensive and reliable data

Data management was a key strength of EDEN, providing data and related services to a broad network of partners involved in specific research tasks. This is being improved still further in EDENext, which will have a wider remit and seek collaborations with other European Union funded projects and networks. There is a particular focus on host distribution mapping and wind spread models.

## → Supporting better public health strategies

For efficient preventive, surveillance and control programmes, we also require relevant and accurate data on risk perception by both public health agencies, relevant stakeholder groups and the exposed human population. This will help identify the necessary content and style of human and veterinary public health messages needed to reach those most at risk.

To meet these challenges, EDENext's public health team is working in close collaboration with stakeholders in the human and animal health sectors, as well as public health agencies and international organisations.

Particular emphasis is being placed on the public health aspects of hemorrhagic fever with renal syndrome, caused by the Hantavirus and transmitted by rodents, and Crimean-Congo hemorrhagic fever, transmitted by ticks.

Several Hantaviruses are found in Europe and nearby regions. The environmental factors that govern rodent densities vary between host species and viruses, and geographically, emphasising the need for comparative studies around Europe. However, the human infection route is identical: inhalation of dust contaminated by rodent excreta, and this is often related to professions such as forestry and agriculture, or hobbies. Rodent-borne diseases often also emerge during crisis situations.

*A female Hyalomma*



*Farmers at the high risk of Hyalomma infestation in the field*



Crimean-Congo hemorrhagic fever is emerging strongly in Turkey and south-eastern Europe and is endemic in many African and Middle Eastern countries. Humans are infected by tick bites or when slaughtering ruminants carrying the virus. It is also a hospital-acquired disease, with staff in dispensaries and hospitals paying a high price.

## Sharing results, ethical focus

During the project, particular attention will be paid to develop scientific capacities in less well developed countries and to ensure that local populations will actually benefit from EDENext results, for example, better control of African horse sickness in Senegal.

An ethical board has been implemented to ensure that EDENext research complies with European regulations and, more importantly, that ethical questions are increasingly integrated in European research.

*Investigations by canoe*



*Farmers in the field at Hyalomma risk*



*Tick trapping site*

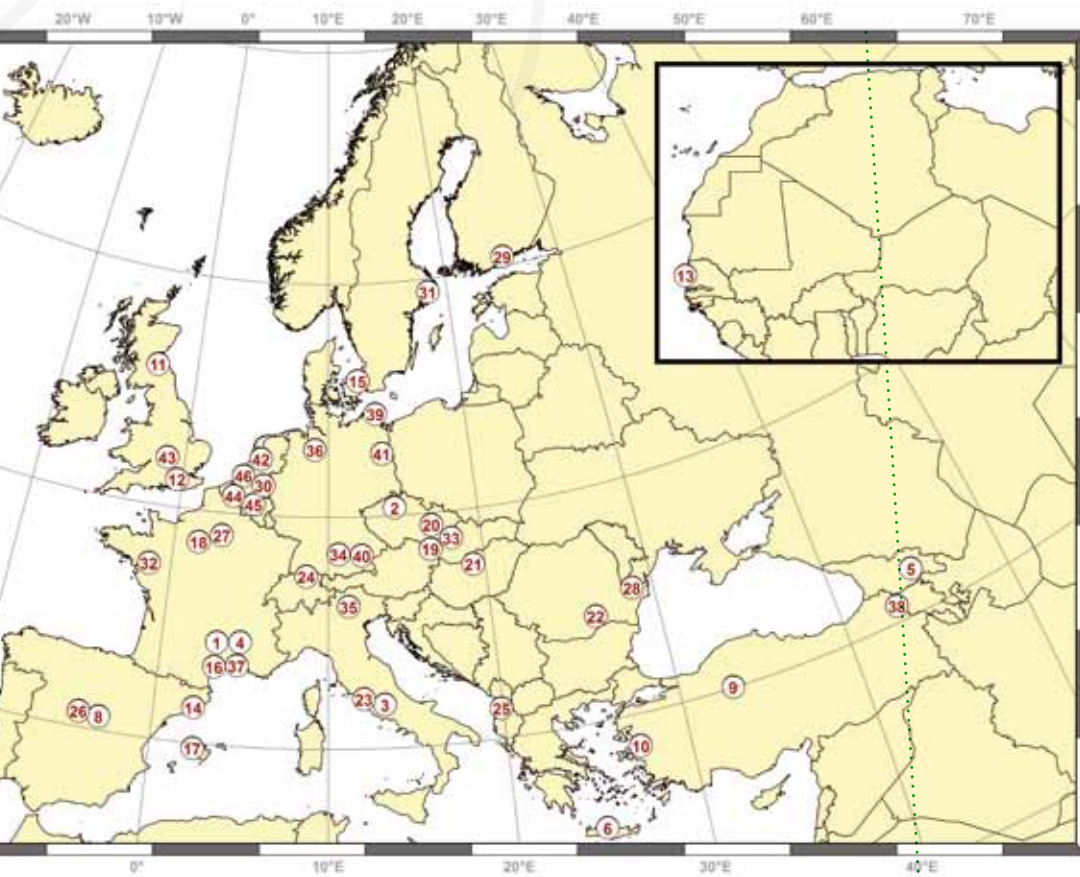




Monitoring tick-borne and rodent-borne pathogen at high altitude



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