



The Asian tiger mosquito (*Aedes albopictus*) can transmit at least 22 different viruses.

DISEASE CONTROL

Europe on alert for flying invaders

Spread of disease-carrying mosquitoes prompts guidelines for boosting surveillance.

BY DECLAN BUTLER

The buzz of tiny wings has been growing ever louder in Europe over the past decade, as invasive mosquitoes carrying exotic diseases such as chikungunya and dengue fever have taken up residence around the continent. Now Europe's entomologists and public-health experts are joining forces to defend the region against the growing threat.

On 28 August, the European Centre for Disease Prevention and Control (ECDC) in Stockholm released guidelines that should help European countries to develop mosquito surveillance, which had become mostly unnecessary after malaria was largely eradicated from the continent in the mid-twentieth century. But the need for better vigilance has been growing again since the late 1990s, as the increased globalization of trade gives species such as the Asian tiger mosquito (*Aedes albopictus*) more opportunities to penetrate into Europe.

The surveillance data will feed into the three-year-old VBORNET consortium, a

Europe-wide network of some 400 medical entomologists, microbiologists and public-health experts that is funded by the ECDC. The wealth of data they are assembling should help researchers to better understand how invasive mosquitoes are spreading and the risks they pose, and so to develop control strategies.

The latest guidelines provide an A-Z of mosquito surveillance, covering topics ranging from what sort of mosquito traps should be used in particular circumstances to resource management and policy-making advice. Francis Schaffner, head of integrated pest management at the consultancy Avia-GIS in Zoersel, Belgium, and one of the lead authors of the guidelines, hopes that they will encourage scientists, local authorities and governments to carry out more comprehensive surveillance. By recommending standardized

➔ NATURE.COM
Read more on
vector control in this
Outlook:
go.nature.com/udwjju

surveillance reporting, the guidelines should also allow data generated by different researchers in different countries to be seamlessly combined

into pan-European databases, he says.

A key target of surveillance is the Asian tiger mosquito, which can transmit at least 22 different viruses, including chikungunya and dengue. After it was reported in Albania in 1979, this native of southeast Asia spread to Italy in 1990 and has now expanded along the Mediterranean coast to nations such as France and Spain, as well as around the Black Sea (see 'Multiplying mosquitoes') (J. M. Medlock *et al.* *Vector-Borne Zoonotic Dis.* **12**, 435–447; 2012). At least five other invasive mosquitoes capable of spreading diseases are also gaining ground in Europe, including *Aedes aegypti*, which can transmit dengue and other diseases.

The international tyre business brings most of the unwanted arrivals. Mosquitoes can breed in small volumes of water, such as rainwater in tyres, and invasive forms have drought-resistant eggs that enable stowaways to survive long-distance transport before being revived by rain once they reach their destinations. The invaders can also hitch a ride on imported plants, such as lucky bamboo (*Dracaena* species). In the future, climate change could accelerate the spread of these subtropical and tropical species: predictive models suggest that invasive mosquitoes could find suitable habitats in northern Europe by 2030.

In 2007, Italy saw an outbreak of several hundred cases of chikungunya, which causes nausea, vomiting and debilitating joint pain. Dengue fever, which causes similar symptoms and can be fatal, hit a handful of people in France and Croatia in 2010. And there has been a steady rise in cases of West Nile virus, the fever that is currently notching up a record year for infections in the United States.

Surveillance remains patchy or non-existent in many of the most affected countries around Europe, including Portugal, Greece, Turkey and those bordering the Black Sea. Monitoring insects is expensive and time-consuming, and governments that are preoccupied with existing health challenges may be reluctant to put funds towards tracking potential future threats. But one underlying message of the report is that early surveillance is ultimately cheaper than dealing with an established pest, which can require widespread spraying with insecticides.

The latest guidelines provide an A-Z of mosquito surveillance.

In the Netherlands, for example, Asian tiger mosquitoes are introduced every year, but surveillance and control measures have so far prevented them from becoming established, says Marieta Braks, an entomologist at the National Institute for Public Health and the Environment in Bilthoven, and leader of VBORNET's strategic consultation group. The Dutch authorities pay close attention to companies that import tyres from countries harbouring dangerous mosquitoes, and that stock tyres outdoors, ▶

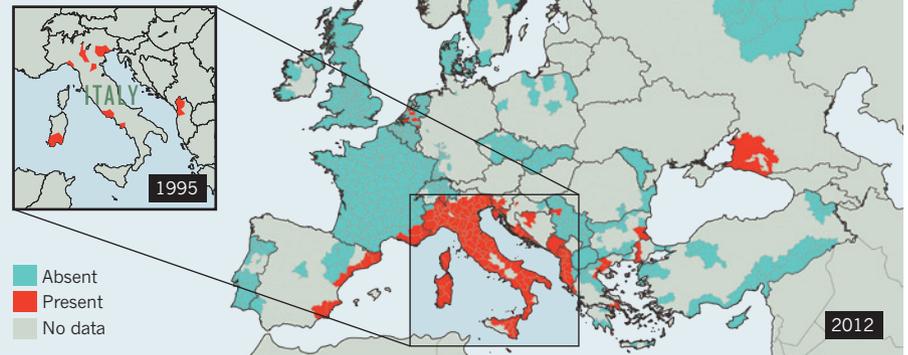
► where rain could allow mosquito eggs to hatch. In countries such as Italy, where the tiger mosquito is already widespread, surveillance is instead geared more towards keeping numbers under control.

VBORNET's geographical information system allows scientists to combine surveillance data with environmental factors, including temperature and humidity, to better track the main invasive mosquito species. Models based on these combined data can reveal, for example, how environmental conditions can affect mosquitoes' ability to transmit pathogens, and so provide information on the likelihood of outbreaks in various regions.

The maps may also perform a useful peer-pressure function, says Braks, by highlighting where researchers and authorities have failed to supply and share data. "What we hope is that no one will want to be a blank on the map." ■

MULTIPLYING MOSQUITOES

Data from June 2012 show that the Asian tiger mosquito (*Aedes albopictus*) has spread rapidly across southern Europe over the past decade.



SOURCE: ECDC/VBORNET

FUNDING

EU battles over research billions

Politicians will spend the next few months negotiating cuts to Horizon 2020's budget.

BY NATASHA GILBERT

Tens of billions of euros are at stake as negotiations ramp up to shape Europe's next seven-year research programme. The discussions will cover familiar divisions over applied versus basic research and conflicting national agendas, but the continent's ongoing financial problems will add an extra measure of anxiety.

The European Commission proposed the general size and shape of the Horizon 2020 research and innovation programme in November 2011 (see *Nature* <http://doi.org/dtvtbx>; 2011). European Union (EU) member states and members of the European Parliament will negotiate and agree on the budget and final

details of the programme, which will run from 2014 to 2020, over the next 15 months.

Last year, the commission requested €77.6 billion (US\$99 billion) for Horizon 2020, out of a total European budget for 2014–20 of about €1 trillion (at constant 2011 prices). But many members of the European Parliament (MEPs) want research to get €100 billion, twice as much as was allocated to Horizon 2020's predecessor, the Seventh Framework Programme (FP7), which runs from 2007 until 2013 (see 'Budget breakdown'). Most scientists and EU science officials say that such a large jump is unrealistic, and there are growing fears that even the lower budget proposed by the commission is unlikely, given Europe's shaky economy.

At a meeting on 30 August, high-level ministers said that cuts to the proposed EU budget are "inevitable", implying that spending on Horizon 2020 will be eroded. Ministers are aiming to reach a consensus on the size and shape of the EU budget by the end of the year, but in the meantime, MEPs, scientists and member-state officials will fight over which of Horizon 2020's ambitions should bear the brunt of any budget reductions. The first sortie will come on 17–18 September, when MEPs on the European Parliament's Industry, Research and Energy (ITRE) committee will begin discussing around 3,000 suggested amendments to the Horizon 2020 budget.

Most likely to feel the pinch is the European Institute of Innovation and Technology (EIT), a virtual institute headquartered in Budapest and made up of scientific 'communities' that conduct research on themes such as climate change and sustainable energy. The institute also runs postgraduate education programmes and knowledge-transfer activities to disseminate the fruits of research to businesses and policy-makers (see *Nature* 440, 8–9; 2006). The EIT concept was developed and championed by the European Commission, which now suggests that the institute's budget should win €2.8 billion from Horizon 2020, 3.6% of the total research budget and vastly more than the €309 million in European funds allocated to it between 2008 and 2013.

However, few outside the commission want the EIT to claim so much; some argue that the

SOURCE: EUROPEAN COMMISSION

BUDGET BREAKDOWN

The proposed budget for Europe's Horizon 2020 research-funding programme, the successor to its Seventh Framework Programme, would boost the European Research Council (ERC), the Marie Curie Actions career-development programme and the European Institute of Innovation and Technology (EIT).

