INFECTION DISEASES

Chikungunya: No Longer a Third World Disease

An explosive outbreak in a remote corner of France—and fears that it may threaten Europe and the United States—have brought fresh attention to an exotic virus

SAINT-PIERRE, LA RÉUNION—To say that few scientists used to care about the chikungunya virus is putting it mildly. The mosquito-borne disease has caused massive outbreaks for at least half a century, but they all happened in developing countries in Asia and Africa. And although the virus causes severe rashes and joint pains, it never seemed to be fatal; many even called it “benign.” Few researchers took an interest.

No longer. Things have changed in large part, researchers say, because chikungunya has finally struck a rich country. In 2005 and 2006, the virus caused a massive outbreak on La Réunion, an island twice the size of New York City 700 kilometers east of Madagascar—and a French département. Almost 40% of the population of 785,000 fell ill. In response, the French government mounted a broad research program. A recent meeting here showed that scientists have learned as much about chikungunya in the past 2 years as in the previous 2 decades.

They have learned that the virus can kill, for instance, that it can be transmitted from mother to child around childbirth, and that a single-point mutation may have caused it to explode here. They set up the largest screening effort ever to look for animal hosts. And already a once-abandoned vaccine is being prepared for new clinical trials, and new drugs are under study.

To date, French researchers and institutes have published the majority of many dozens of new chikungunya papers, as several speakers proudly noted. (One non-French researcher said he smelled a whiff of scientific chauvinism.) But other countries are paying close attention as well, as they, too, may be at risk. The big surprise of the outbreak at La Réunion was that the infamous Asian tiger mosquito, which is spreading fast across Europe and the United States, proved an excellent vector. This summer, Italy had a small chikungunya outbreak, the first ever in Europe. There’s no reason why the same couldn’t happen elsewhere in Europe or in the United States, says Ann Powers, a chikungunya expert at the U.S. Centers for Disease Control and Prevention (CDC) in Fort Collins, Colorado.

Surprise attack

Chikungunya—or “chik,” as some scientists call it—belongs to the alphaviruses, a group that includes the Ross River virus in Australia and the viruses that cause eastern and western equine encephalitis, two serious diseases occurring in the United States. First isolated from a patient in Tanzania in 1953, the chik virus has surfaced occasionally since in countries across Africa, South Asia, and Southeast Asia. It causes high fevers, rash—sometimes with massive blisters—and excruciatingly painful swelling of the joints in fingers, wrists, and ankles.

The outbreak that hit La Réunion appears to have started in Kenya in 2004. It wasn’t reported at the time, but in a paper published in 2007, researchers noted that the epidemic started in the coastal towns of Lamu and Mombasa, Kenya. Later, the virus appears to have gone on an island-hopping tour of the Indian Ocean, landing in Madagascar, the Comoro Islands, Mayotte—a much smaller French territory west of Madagascar—Mauritius, and the Seychelles (see map). It reached India, where it hadn’t been seen for 32 years, in December 2005, infecting an estimated 1.4 million people so far, Brij Kishore Tyagi of the Centre for Research in Medical Entomology in Madurai, India, reported at the meeting.

La Réunion inhabitants have complained bitterly that mainland France initially appeared to take little interest. Chikungunya first caused a small wave of a few thousand cases between March and July 2005. Then it all but disappeared, only to come roaring back in December. By late January 2006, 47,000 new cases were reported in a single week. Only then was a chikungunya task force set up, led by epidemiologist Antoine Flahault, dean of the French School of Public Health in Rennes and Paris.

La Réunion’s location—the flight from Paris takes 11 hours—

* Chikungunya et Autres Arboviroses Emergentes en Milieu Tropical, 3–4 December.
Chikungunya has disappeared from La Réunion, and with 38% of the population now immune, it may not return for a long time. Scientists say the outbreak was a unique chance to focus attention—and money—on a tropical pathogen that, unfortunately, may well have a future in temperate regions.

That’s worrisome, because Ae. albopictus, originally from eastern Asia, has been spreading across the globe during the past 2 decades. The outbreak this summer in Italy—where Ae. albopictus is rampant—got started when a chikungunya patient from India traveled to a small village in the province of Ravenna. Such “imported” cases happen all the time: Mainland France had almost 800 in 2005 and 2006, and the United States 38. It’s a matter of time before a patient kicks off a new outbreak in an unexpected place, Higgs says.

If that happens, controlling mosquitoes is the only way to halt the spread of the virus, but Ae. albopictus is notoriously difficult to fight. At La Réunion, government agencies sprayed massive amounts of insecticides; the outbreak ended, but opinions differ on how much spraying contributed. The epidemic may just have run its course.

The Italian government is planning to fight Ae. albopictus by releasing massive numbers of sterile males, a technique that has been successfully used to drive down populations of agricultural pests (Science, 20 July, p. 312). France is interested in the approach as well, says entomologist Didier Fontenille of the Institute of Research for Development in Montpellier, but it would likely start with Anopheles arabiensis, a species that can transmit malaria. Several new, less environmentally disruptive insecticides are under study as well.

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