

# Zika Virus

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*An Emergent Disease Threatens the Americas*

Aedes aegypti  
Aedes albopictus

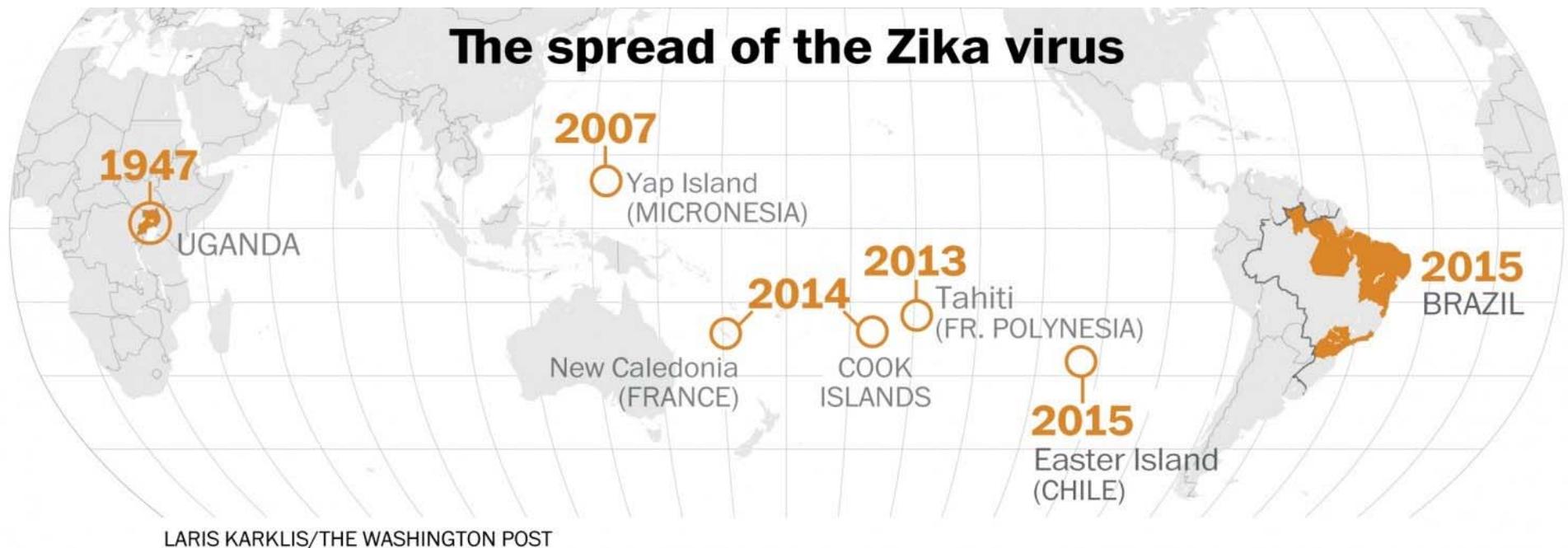


Zika Virus



Rhesus Monkeys

Presentation by Professor Cliff Belleau



The Zika virus seems to have come out of nowhere, but health officials now worry the disease could infect as many as 4 million people worldwide in 2016 alone.

The World Health Organization says the disease is “spreading explosively.”

Where did Zika come from?

How did it spread so fast?



## **1947 - Zika detected in a Ugandan monkey**

One day in late April, a caged rhesus monkey on a tree platform on the shores of Lake Victoria in Uganda developed a fever. Within two weeks, researchers isolated the virus that had struck it.

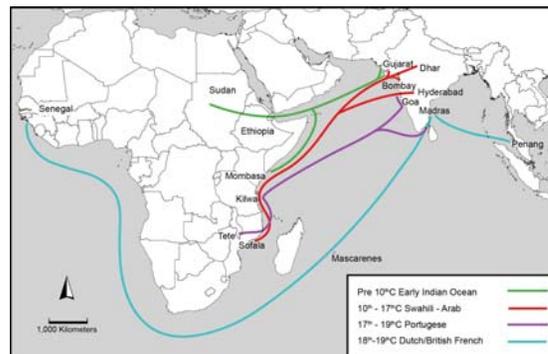
The illness, which had never been detected before, was dubbed the Zika virus, after the Zika Forest, where the monkey lived. They soon discovered that the virus was mosquito-borne, and that it could infect people as well as monkeys.

## 1951-2006 // Zika pops up across Africa and South Asia

Over the next half-century, researchers identified the Zika virus in humans just 14 times. Those cases were scattered across west and central Africa and Southeast Asia. This scarcity of recorded cases doesn't mean the virus was sitting still:

While there were no large-scale outbreaks observed in this period, researchers frequently found the antibody to the Zika virus in the bloodstreams of humans across about two dozen countries in Africa and South Asia. Those antibodies serve as evidence that someone was once infected with the disease, even if they are no longer contagious.

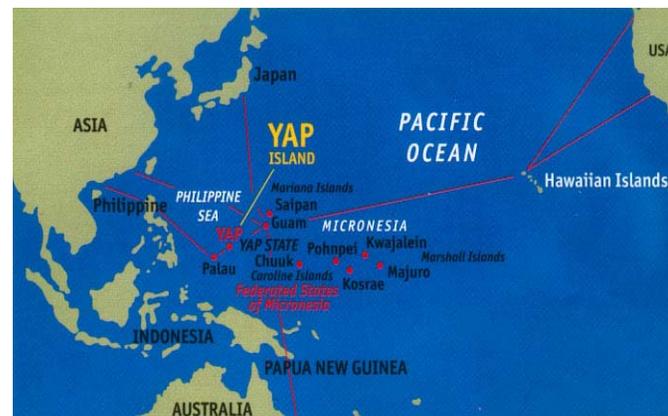
Not everyone with the antibody gets sick: Only one-fifth of people infected with Zika ever become symptomatic. Those who are symptomatic usually suffer from a rash, a fever, a headache, and achiness for several days — conditions easily confused with other ailments, such as the flu or an allergic reaction.



## 2007 - A major outbreak on Yap

In April 2007, doctors on Yap, an island of less than 10,000 people in the Western Pacific, saw an influx of patients with flu-like symptoms accompanied by rashes. Researchers from the Centers for Disease Control and Prevention who arrived several weeks later went house to house taking blood samples. They came to the conclusion that about 73 percent of the population ages 3 and older had been infected with the Zika virus.

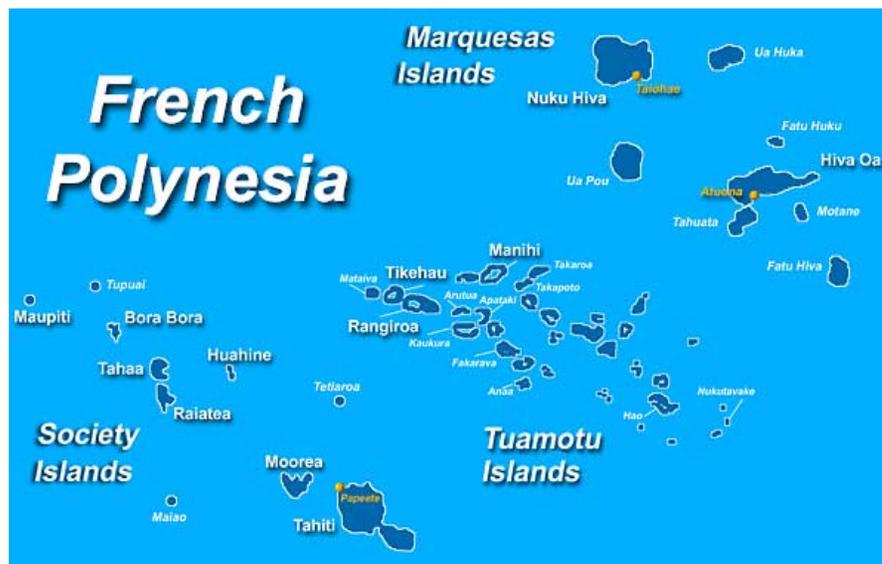
The outbreak marked the first time that Zika was observed infecting an entire population — and one that had *no conceivable monkey carriers*. Until the Yap outbreak, the disease was believed to primarily infect primate populations, and only occasionally cross over into humans. It's unclear if Zika had been causing large outbreaks in human populations all along and no one ever noticed, or if a mutation in the virus's genome somehow made the disease more infectious.



## 2013 – Next Stop the French Polynesia and beyond

For the second time in six years, an island was hit with an epidemic of Zika. This time, doctors noticed a strange correlation: Right after Zika hit, there was a spike in cases of Guillain Barré syndrome, a rare and mysterious autoimmune disease that often temporarily paralyzes those who suffer from it.

From French Polynesia, the virus began island-hopping. French Polynesians visiting Easter Island — also known as Rapa Nui — for the island's annual *Tapati Festival*, likely brought the virus with them, and mosquitos then spread it to others. Soon, the virus made its way across the South Pacific to New Caledonia, Cook Islands, Solomon Islands, Vanuatu, Fiji and Samoa.





## 2014 - Microcephaly link suspected in Brazil

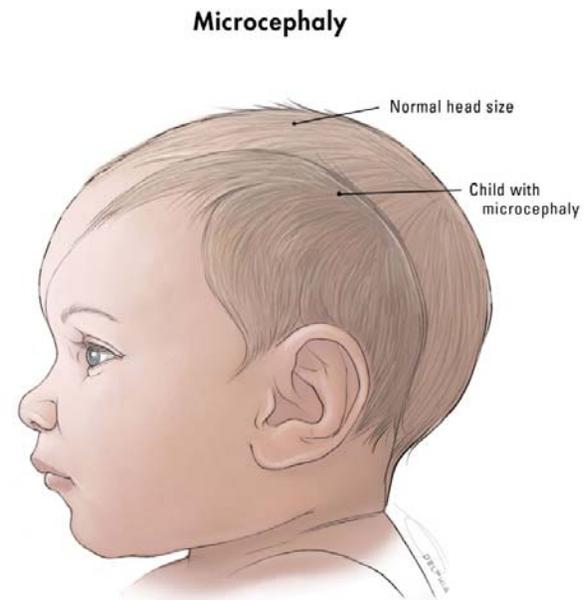
Some have said the Zika virus made the leap from the Pacific to Brazil during the 2014 World Cup of Soccer, but at least one researcher says it's more likely to have occurred during the August 2014 Va'a World Sprint Championship canoe race, which was held in Rio de Janeiro, and which was competed in by people from French Polynesia, New Caledonia, Cook Islands and Easter Island.

By February 2015, the mysterious illness had spread to six of the nation's 26 states and the country's public health ministry began investigating the outbreak. In May, the ministry finally confirmed it was Zika. The world's health leaders issued advisories, but did little initially to investigate or fight the epidemic.

By October, the outbreak took on a new urgency when doctors noticed an epidemic of babies born with severe defects; within weeks researchers began linking the birth defects to the Zika virus. The babies were born with **microcephaly**, a condition where babies have smaller than expected heads, usually accompanied by underdeveloped brains and intellectual disabilities.

## 2014 - Microcephaly link suspected in Brazil

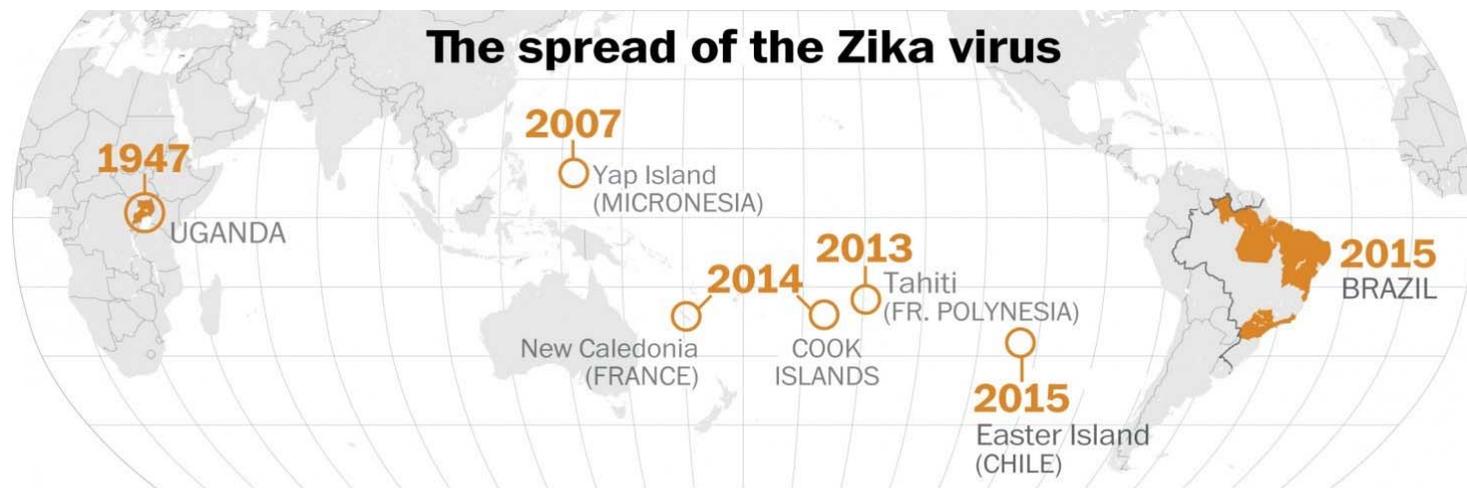
By the end of 2015, public health officials believed the virus had infected more than 1 million people in the Americas. By the end of the year, the Brazilian government was investigating microcephaly in nearly 3,000 babies.



## January 2016 - Zika on the move

By late January, more than 20 countries and territories in the Americas had reported active Zika transmission, meaning mosquito populations in those countries were believed to be spreading the disease. The CDC advised pregnant women to avoid traveling to Zika-infected areas, and to be tested for the virus if they have symptoms. In a handful of countries — like El Salvador, Colombia, Honduras and Jamaica — government officials advised women not to get pregnant for the time being.

In the mainland United States, dozens of Zika cases were diagnosed — but those cases were limited to travelers infected with the disease while abroad. However, the U.S. is home to the same mosquitos believed to carry Zika, and health officials warned that the disease could become endemic within the mosquito population.



## **February, 2016 - Zika Virus Sexually Transmitted**

It was recently reported that the Zika virus was isolated in the sperm of a Texas man. Other reports support the evidence that the Zika virus is both transmitted by mosquitoes and sexual intercourse.

Recent reports suggest virus still “active” after 30 days in male reproductive system.

## 2016 - The Olympics and Zika

Brazil is preparing for the 2016 Summer Olympics in Rio de Janeiro, where athletes and fans from around the world will be convening to celebrate the games. Public health officials worry those people may become unwitting vectors of the Zika pandemic, flying it back to their home countries where mosquitos will then spread it further.

*Correction: An earlier version of this story stated that by the end of 2015, "Roughly 3,000 babies had been born with microcephaly" in Brazil. The post has been updated to show that the figure refers to suspected cases of the condition.*



# Symptoms

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- Similar to the influenza virus // fever, muscle pain, joint pain
- Zika virus also causes a rash.



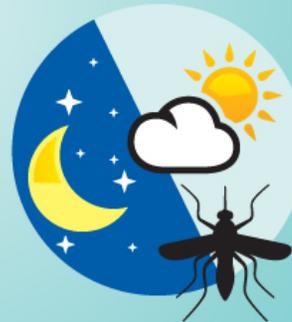
# GOING TO THE AMERICAN TROPICS?

**MOSQUITOES** spread **DENGUE,**  
**CHIKUNGUNYA,**  
**ZIKA,** and  
**other diseases**



Mosquitoes bite day and night.  
Prevent mosquito bites:

- Use insect repellent
- Use air conditioning or window/door screens
- Wear long-sleeved shirts and long pants



## DON'T LET MOSQUITOES RUIN YOUR TRIP

For more information, visit [www.cdc.gov/travel](http://www.cdc.gov/travel)



U.S. Department of  
Health and Human Services  
Centers for Disease  
Control and Prevention

# RECENTLY IN THE AMERICAN TROPICS?

**MOSQUITOES** spread **DENGUE, CHIKUNGUNYA, ZIKA,** and other diseases



2 WEEKS						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4



Watch for fever with joint, muscle, or eye pain, or a rash in the next 2 weeks.



If you get sick, see a doctor.  
Tell the doctor where you traveled.



For more information, visit [www.cdc.gov/travel](http://www.cdc.gov/travel).



U.S. Department of  
Health and Human Services  
Centers for Disease  
Control and Prevention

# Mosquito Bite Prevention (United States)



Not all mosquitoes are the same. Different mosquitoes spread different viruses and bite at different times of the day.

Type of Mosquito	Viruses spread	Biting habits
 <p><i>Aedes aegypti</i>, <i>Aedes albopictus</i></p>	<p>Chikungunya, Dengue, Zika</p>	<p>Daytime</p>
 <p><i>Culex</i> species</p>	<p>West Nile</p>	<p>Dusk (evening) to dawn (morning)</p>

## Protect yourself and your family from mosquito bites

### Use insect repellent

Use an Environmental Protection Agency (EPA)-registered insect repellent with one of the following active ingredients. All EPA-registered insect repellents are evaluated for safety and effectiveness.

Active ingredient	Some brand name examples*
Higher percentages of active ingredient provide longer protection	
<b>DEET</b>	Off!, Cutter, Sawyer, Ultrathon
<b>Picaridin</b> , also known as <b>KBR 3023</b> , <b>Bayrepel</b> , and <b>icaridin</b>	Cutter Advanced, Skin So Soft Bug Guard Plus, Autan (outside the United States)
<b>Oil of lemon eucalyptus (OLE)</b> or <b>para-menthane-diol (PMD)</b>	Repel
<b>IR3535</b>	Skin So Soft Bug Guard Plus Expedition, SkinSmart



\* Insect repellent brand names are provided for your information only. The Centers for Disease Control and Prevention and the U.S. Department of Health and Human Services cannot recommend or endorse any name brand products.



## Protect yourself and your family from mosquito bites *(continued)*



- ◆ Always follow the product label instructions.
- ◆ Reapply insect repellent every few hours, depending on which product and strength you choose.
  - » Do not spray repellent on the skin under clothing.
  - » If you are also using sunscreen, apply sunscreen first and insect repellent second.

### Natural insect repellents (repellents not registered with EPA)

- ◆ EPA has not evaluated natural insect repellents for effectiveness.
  - » Examples of ingredients used in unregistered insect repellents include: citronella oil, cedar oil, geranium oil, peppermint oil, or soybean oil.

## If you have a baby or child



- ◆ Always follow instructions when applying insect repellent to children.
- ◆ Do not use insect repellent on babies younger than 2 months of age.
- ◆ Dress your child in clothing that covers arms and legs, or
  - ◆ Cover crib, stroller, and baby carrier with mosquito netting.
  - ◆ Do not apply insect repellent onto a child's hands, eyes, mouth, and cut or irritated skin.
    - » Adults: Spray insect repellent onto your hands and then apply to a child's face.

## Treat clothing and gear



- ◆ Treat items such as boots, pants, socks, and tents with permethrin or purchase permethrin-treated clothing and gear.
  - » Permethrin-treated clothing will protect you after multiple washings. See product information to find out how long the protection will last.
  - » If treating items yourself, follow the product instructions.
  - » Do not use permethrin products directly on skin.

## Mosquito-proof your home



- ◆ Use screens on windows and doors. Repair holes in screens to keep mosquitoes outside.
- ◆ Use air conditioning when available.
- ◆ Keep mosquitoes from laying eggs in and near standing water.
  - » Once a week, empty and scrub, turn over, cover, or throw out items that hold water, such as tires, buckets, planters, toys, pools, birdbaths, flowerpots, or trash containers. Check inside and outside your home.

## Help Control Mosquitoes that Spread Dengue, Chikungunya, and Zika Viruses

# Bzzzz.



Aside from being itchy and annoying, the bite of an infected female mosquito (*Aedes aegypti* or *Aedes albopictus*) can spread dengue, chikungunya, or Zika viruses. People become infected with dengue, chikungunya, or Zika after being bitten by an infected mosquito.

- Female mosquitoes lay several hundred eggs on the walls of water-filled containers. Eggs stick to containers like glue and remain attached until they are scrubbed off. When water covers the eggs, they hatch and become adults in about a week.
- Adult mosquitoes live inside and outside.
- They prefer to bite during the day.
- A few infected mosquitoes can produce large outbreaks in a community and put your family at risk of becoming sick.

### Protect Yourself, Your Family, and Community from Mosquitoes

# 1.

#### Eliminate standing water in and around your home:

- **Once a week**, empty and scrub, turn over, cover, or throw out items that hold water, such as tires, buckets, planters, toys, pools, birdbaths, flowerpots, or trash containers. Check inside and outside your home.
- Tightly cover water storage containers (buckets, cisterns, rain barrels) so that mosquitoes cannot get inside to lay eggs.
- For containers without lids, use wire mesh with holes smaller than an adult mosquito.

# 2.

#### If you have a septic tank, follow these steps:

- Repair cracks or gaps.
- Cover open vent or plumbing pipes. Use wire mesh with holes smaller than an adult mosquito.

# 3.

#### Keep mosquitoes out of your home:

- Use screens on windows and doors.
- Repair holes in screens.
- Use air conditioning when available.



Put plants in soil, not in water.



Drain water from pools when not in use.



Recycle used tires or keep them protected from rain.



Drain & dump any standing water.



Weekly, scrub vases & containers to remove mosquito eggs.

# 4.

## Prevent mosquito bites:

- Use an Environmental Protection Agency (EPA)-registered insect repellent with one of the following active ingredients. All EPA-registered insect repellents are evaluated to make sure they are safe and effective.

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<b>Oil of lemon eucalyptus (OLE)</b> or <b>para-menthane-diol (PMD)</b>	Repel

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- Always follow the product label instructions.
- Reapply insect repellent every few hours, depending on which product and strength you choose.
- Do not spray repellent on the skin under clothing.
- If you are also using sunscreen, apply sunscreen first and insect repellent second.
- Treat clothing and gear (such as boots, pants, socks, and tents) with permethrin or purchase permethrin-treated clothing and gear.
  - Treated clothing remains protective after multiple washings. See product information to find out how long the protection will last.
  - If treating items yourself, follow the product instructions carefully.
  - Do **not** use permethrin products, intended to treat clothing, directly on skin.
- Wear long-sleeved shirts and long pants.



Keep rain barrels covered tightly.



Weekly, empty standing water from fountains and bird baths.



Keep septic tanks sealed.



Install or repair window & door screens.

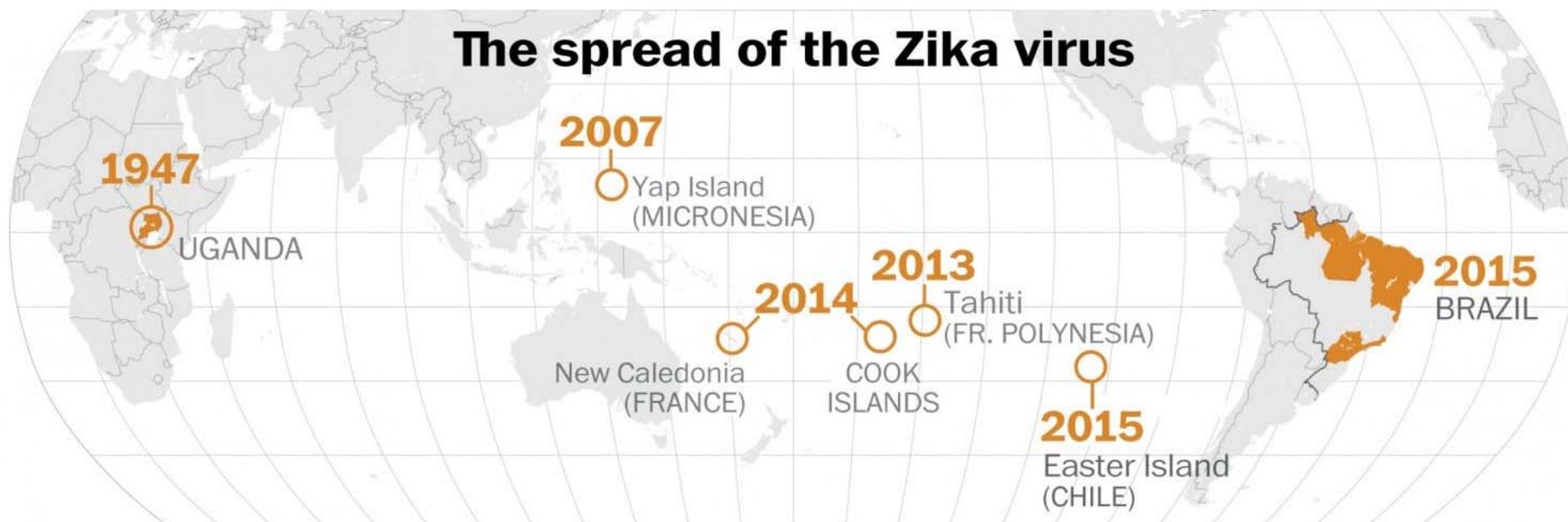
For more information, visit:  
[www.cdc.gov/dengue](http://www.cdc.gov/dengue), [www.cdc.gov/chikungunya](http://www.cdc.gov/chikungunya), [www.cdc.gov/zika](http://www.cdc.gov/zika)

# Other Vector Borne Diseases Spread by Mosquitoes

- Malaria  
Dengue fever  
Yellow fever  
Chikungunya  
St Louis Encephalitis  
West Nile  
Zika Virus
- All are caused by viruses, with the exception of malaria, which is a blood parasite.

Sources: [Centers for Disease Control and Prevention; Emerging Infectious Diseases, 2009](#); [New England Journal of Medicine, 2009](#); [Emerging Infectious Diseases, 2015](#); [European Centre for Disease Prevention and Control, 2015](#).

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LARIS KARKLIS/THE WASHINGTON POST