

Science Background

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- 2. Mosquito Vectors of Disease**
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6. Using the app for the first time

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Aedes, Culex & Anopheles

**Mosquito Vectors of
Human Disease**





**Mosquitoes are the
world's most deadly
animal!**



Why?



- Every year, more than a billion people worldwide (roughly one in every seven people) become ill and 500,000-750,000 die as a result of mosquito bites.

Anopheles



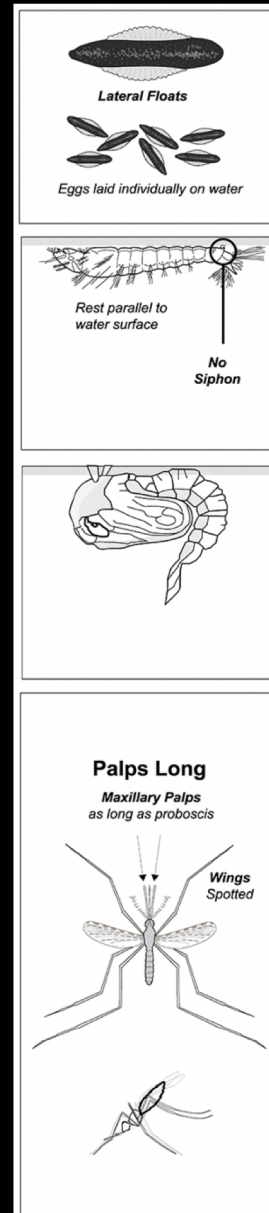
Anopheles gambiae

Credit: James Gathany

Source: CDC

- Found in open water pools with little vegetation
- Most like clean, clear water, but some breed in eutrophic or polluted water.

Anopheles



- Malaria is a disease caused by parasites that are transmitted to humans by the *Anopheles* mosquito.
- Malaria causes more deaths per year than any other mosquito-transmitted disease. Malaria is preventable and curable with drugs and medical attention.

Anopheles



- Not all *Anopheles* mosquitoes transmit malaria- about 10% of approx. 400 species
- You can find out which species are important vectors for disease transmission in your region in the next slide.

Anopheles



Anopheles

- | | | | |
|-------------------------|-------------------------|---------------------------------------|--------------------|
| No vector | funestus and arabiensis | melas | pulcherrimus |
| albimanus | barbirostris | funestus, arabiensis and gambiae s.s. | messeae |
| annularis | cubicifacies | funestus and gambiae s.s. | minimus |
| anthropophagus | dirus | gambiae s.s. | multicolor |
| arabiensis | farauti | gambiae s.s. and funestus | nunez-tovari |
| arabiensis and funestus | flavivirostris | labranchiae | punctulatus group |
| aquasalis | fluvialis | maculatus | pharoensis |
| atroparvus | freeborni | darlingi and marajoara | pseudopunctipennis |
| | | | superpictus |

Culex



Culex quinquefasciatus

Credit: Jim Gathany

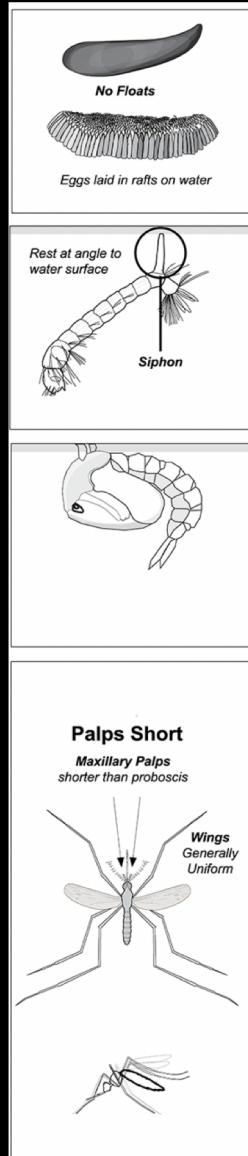
Source: CDC

***Culex* mosquitoes breed in stagnant water: places such as rainwater barrels, drainage systems, septic tanks, and containers (tires, buckets and rain barrels).**



**open habitats: surface water
habitats that become
stagnant and enriched with
organic matter (swamps,
marshes, bogs, rice fields,
pastures).**

Culex



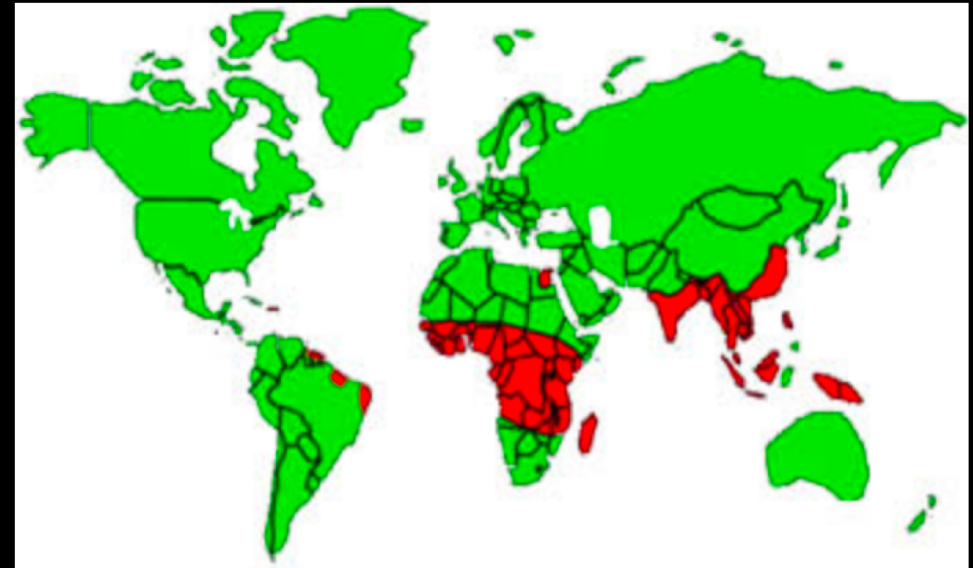
- *Culex* is a vector of several human and animal diseases
- Lymphatic filariasis
- Encephalitis
- West Nile Virus
- Rift Valley fever (also *Aedes vexans*)

Culex

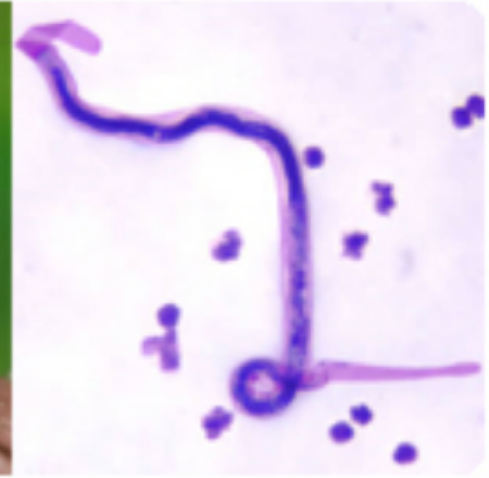


Lymphatic filariasis

South America: *Culex quinquefasciatus*
Asia: *Aedes*, *Mansonia*
Africa: *Anopheles*



Culex



Lymphatic filariasis is a parasitic disease caused by microscopic, thread-like nematodes. The adult worms only live in the human lymph system. Transmitted by mosquito bites.

Aedes



***Aedes aegypti* and *Aedes albopictus* are container breeding mosquitoes. They lay eggs in artificial containers that contain water. The females lay the eggs singly just above the water level. When the water level rises, it moistens the eggs, and they then begin to develop.**

Aedes



Aedes aegypti strongly prefer artificial containers.



Aedes albopictus will use both artificial and natural containers. Both mosquitoes are well adapted to human habitats.

Aedes



Other *Aedes* mosquitoes breed in floodplains after rain events, in irrigation ditches, in woodland pools, brackish swamps and salt marshes.

Aedes



Aedes aegypti and *Aedes albopictus* are two species that potentially transmit pathogens to humans that can cause the following diseases:

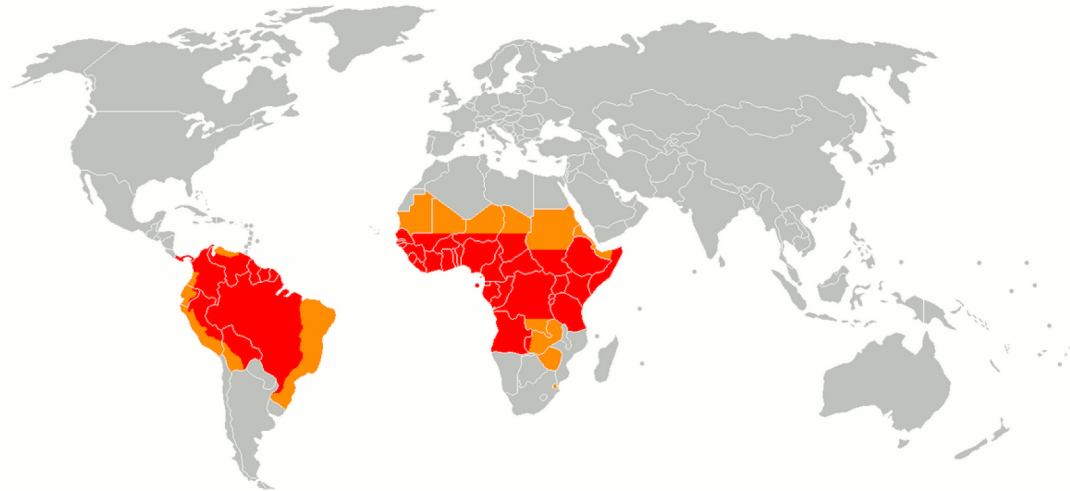
- yellow fever
- dengue fever
- chikungunya
- Zika virus
- lymphatic filariasis
- equine encephalitis
- Rift valley fever



Yellow Fever



- **Symptoms:** fever, headache (mild) to organ failure (severe)
- **Prevention:** Vaccine is available



Map of Yellow Fever Virus. This global map represents endemic areas of Yellow Fever Virus (red) and areas where the virus may be present (orange). Source: https://commons.wikimedia.org/wiki/File:Fievre_jaune.png

Dengue



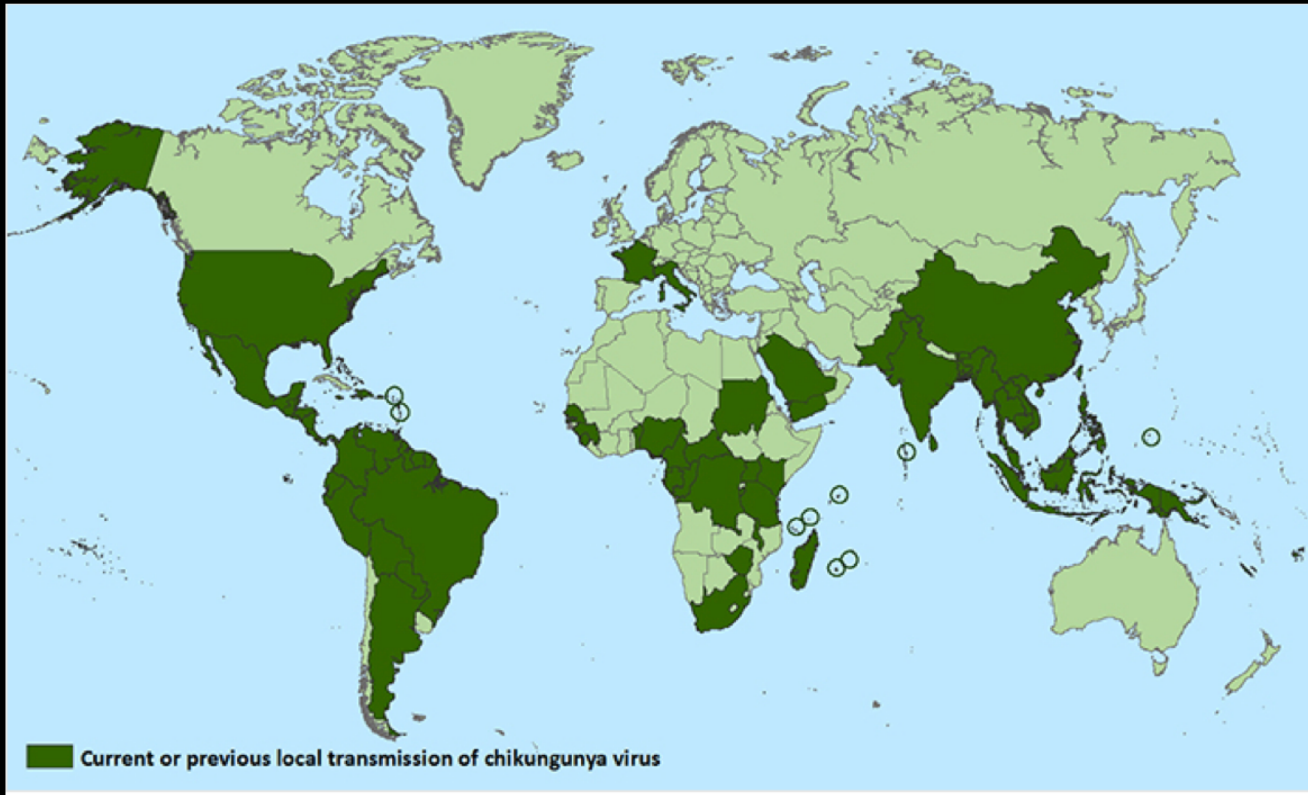
- 40% of the world's populations lives in areas where there is a risk of dengue transmission.

Dengue



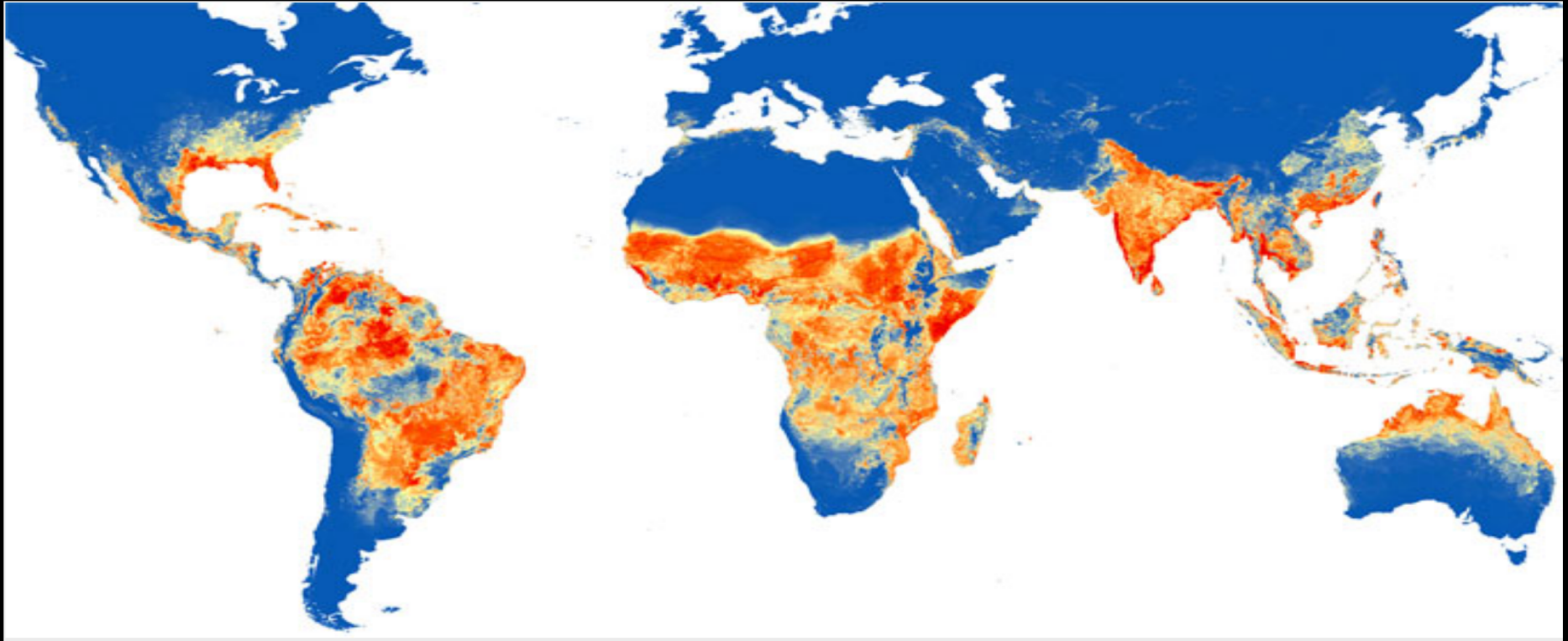
- Number of cases per year: ~400 million (CDC).
- Symptoms: fever, headache, joint pain, rash, jaundice, hemorrhagic dengue... can be fatal
- Prevention: vaccine is in phase 3 trials

Chikungunya



Symptoms: fever,
headache, joint pain, rash,
no vaccine available

Zika



- Global map of the predicted distribution of *Ae. aegypti*. The map depicts the probability of occurrence (from 0 blue to 1 red).



Zika



- Can be sexually transmitted through fluids (blood transfusion)
- Symptoms similar to dengue and chikungunya
- **Up to 80% of cases are asymptomatic**
- Can cause birth defects of fetus



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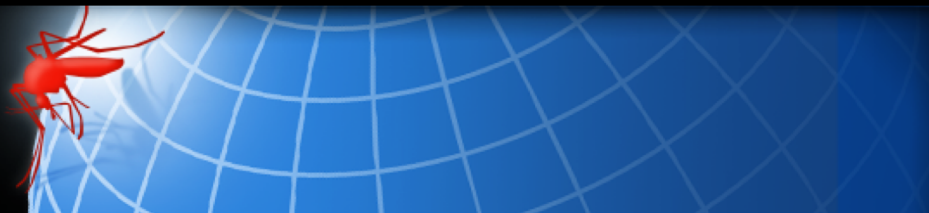
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