

TRAVEL CONSIDERATIONS: DENGUE

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Dengue is a disease caused by infection with one of four different and closely related strains called dengue virus 1, 2, 3 and 4. Most cases in the United States are the result of individuals traveling to areas where dengue is common, and cases contracted in this scenario are referred to as travel cases. Dengue is common in many popular vacation destinations such as the Caribbean and in some states in the continental United States. The yellow fever mosquito and Asian tiger mosquito can transmit dengue virus. Both of these mosquitoes can be found in locations where the dengue virus is not common, so it is important for travelers to find out if the dengue virus is common in the area instead of focusing on the mosquito species. Individuals who travel to or live in areas where dengue is common should be aware of the symptoms of dengue and proactively protect themselves against mosquito bites. Infected individuals should limit exposure to mosquitoes to prevent local transmission of the virus in their communities.

Transmission of Disease Pathogens

Uninfected female mosquitoes can obtain dengue from the blood of infected hosts such as monkeys or humans. The now infected mosquito can transmit the dengue virus to a susceptible person while the infected female mosquito feeds on them. Some mosquito species have demonstrated the ability to directly transmit the virus to their eggs; this is called transovarial transmission. When infected eggs hatch, they remain infected through each developmental stage (egg, larva, pupa and adult), permitting infected adults to immediately transmit dengue after emergence from the pupa. It is thought that in areas where there is low-level transmission among humans that mosquitoes are the reservoir permitting viral amplification. Once a person is infected with the virus, it can amplify in the body; consequently, an uninfected mosquito can acquire the virus from humans for about seven days after the human is infected. This is why it is important for infected individuals to limit their exposure to mosquitoes to prevent local transmission within their community.

Mosquito Life Cycle

The yellow fever mosquito, *Aedes aegypti* (see Figure 1), is the primary vector of dengue virus in humans. Asian tiger mosquitoes, *Aedes albopictus* (see Figure 2), and additional *Aedes* species mosquitoes also can transmit the virus; they are considered secondary vectors. All these species have similar behaviors and are container breeding mosquitoes.

Eggs are laid by the adult female in human-made containers such as tires and planter bottoms. Eggs are laid on the inner wall of the container just above the waterline. The eggs can survive for months to years and successfully hatch even if they dry out. In southern states, winter does not kill these eggs. Shortly after rainfall, eggs will hatch, and if there is sufficient organic matter in the water, the larvae and pupae will develop into adults in one to two weeks.

Adult mosquitoes are active during the day and may be found resting indoors. Both sexes will feed on sugar sources, such as honeysuckle and similar flowers, to gain carbohydrates for flight. Only females blood feed, and they require a blood meal to gain the protein for successful egg production.

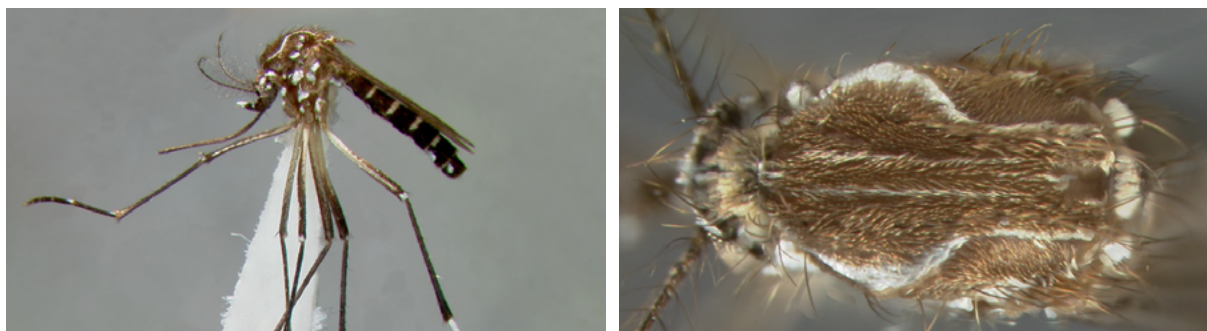


Figure 1. Adult, yellow fever mosquito, *Aedes aegypti* lateral view (left) and dorsal view of scutum (right). (Photo credit Walter Reed Biosystematics Unit (WRBU)).

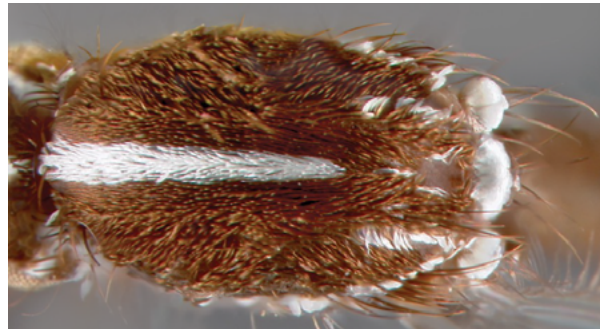


Figure 2. Adult, female tiger mosquito, lateral view (right) and dorsal view of scutum (right). (Photo credit Walter Reed Biosystematics Unit (WRBU)).

Geographical Areas Where Dengue Can Be Acquired

Most reported dengue cases in the continental U.S. are from individuals who acquired the virus during travel (See Table 1). Dengue risk is higher in locations where it is endemic; the pathogen is commonly found in both people and mosquitoes making it widespread through the area.

Table 1: Risk of acquiring dengue when living or traveling to general and specific locations. (Information from The Centers of Disease Control and Prevention (CDC)).

Dengue Risk	General Location	Specific Location
Limited local - Dengue can be contracted in specific cities or counties not widespread throughout the area.	United States (US)	Florida, Texas, Arizona, California, and Hawaii
Local - Dengue can be contracted throughout the country and/or region.	US Territories	American Samoa, US Virgin Islands, Puerto Rico, and freely associated states including Republic of Palau, Republic of Marshall Islands and the Federated States of Micronesia
	Outside of US	Central and South America, Pacific Islands, Southeast Asia and Caribbean

Within the continental U.S., Florida has the most reported limited local dengue cases every year. Most cases are from individuals living in or traveling to areas below the Florida panhandle. However, when traveling for play or work to Florida, consider checking the Florida Department of Health Mosquito Borne Disease Surveillance website for additional information on dengue cases acquired in Florida as well as other arboviruses (disease pathogens transmitted by vectors such as mosquitoes). Additional resources for travelers include the Centers for Diseases Control and Prevention (CDC), World Health Organization (WHO) and/or state/country websites for travel advisories and the current number of dengue cases.

Signs and Symptoms of Dengue

People with dengue virus infection can be asymptomatic (no symptoms) or have a range of symptoms like influenza or the common cold. Most infected individuals recover without long-lasting complications. Typical symptoms include nausea, vomiting, aches and pains in muscles and joints which may be focused behind the eyes, and/or a rash. However, in some severe cases dengue hemorrhagic fever and dengue shock syndrome can occur. These two severe forms of dengue typically occur in children and may be fatal. Symptoms of these severe infections include a blotchy rash, bleeding from the nose and/or gums, organ failure and shock.

Medical Testing and Treatment of Dengue

People living in or traveling to areas where dengue is endemic are at the greatest risk for dengue. If a person develops dengue infection symptoms after spending time in a region with known dengue transmission, it is important to inform healthcare providers of recent travel history to a dengue-endemic area. Dengue is a nationally reportable illness, and medical providers must report suspected cases to the state health departments. Reporting dengue allows state and federal health officials to keep track of cases and identify areas where additional support and resources are needed to prevent additional dengue spread.

There are no specific treatments for dengue as it is caused by a virus; however, the symptoms can be treated with rest, drinking fluids and taking over-the-counter medications (OTCs) for pain and/or fever. In more severe cases with bleeding, rash and high fever which cannot be reduced with OTCs, visiting a medical provider for additional treatment strategies and/or hospitalization is necessary. A blood test may be ordered to confirm or rule out dengue. Vaccination records may be needed as part of the discussion with the medical provider.

If you are infected, it is important to remain indoors and avoid mosquito bites to prevent the spread of the virus to members of your family and others in the community.

Steps to Prevent Mosquito Bites

There are no readily available preventative medical treatments for dengue. Thus, it is necessary to prevent mosquito bites which can reduce your potential for acquiring dengue. The longer the amount of time spent outdoors without protective clothing or use of repellents the higher your risk of acquiring dengue. Since mosquitoes may fly indoors and rest on interior walls, it also is important to prevent them from entering the home or business.

- Maintain intact screens on windows and doors
- Avoid known activity areas when mosquitoes are active
- Wear protective clothing such as long-sleeved shirts and long pants when outdoors
- Use EPA approved repellent and reapply if necessary (<https://www.epa.gov/insect-repellents/find-repellent-right-you>)

Control Measures for Mosquitoes

The first and most important step for reducing exposure to mosquitoes is to remove habitats where they lay eggs and develop as larvae. This is achieved by removing standing water around the home or business. Individuals living in areas with these mosquitoes should be aware of standing water sites and take steps to prevent mosquito bites. Additional information can be found in Extension publication W1293: Container Mosquitoes.

Travelers should be aware of their surroundings and if they observe standing water with mosquitoes consider notifying the business or homeowner that there is a potential mosquito development site on the property.

References and Online Resources

Centers for Disease Control and Prevention (CDC). Areas with Risk of Dengue. [cdc.gov/dengue/areas-with-risk/index.html](https://www.cdc.gov/dengue/areas-with-risk/index.html).

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Florida Department of Health, Mosquito Borne Disease Surveillance, [floridahealth.gov/diseases-and-conditions/mosquito-borne-diseases/surveillance.html](https://www.floridahealth.gov/diseases-and-conditions/mosquito-borne-diseases/surveillance.html))

U.S. Environmental Protection Agency, Find the Repellent That Is Right for You, [epa.gov/insect-repellents/find-repellent-right-you](https://www.epa.gov/insect-repellents/find-repellent-right-you)



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