



# MOSQUITOES



In Hawai'i, mosquitoes are generally regarded as nuisance pests and their bites mainly irritants. However, elsewhere in the world, they are the vectors of pathogens that cause many serious diseases and death. The diseases transmitted by the bite of infected female mosquitoes include dengue fever, encephalitis, filariasis, malaria, West Nile virus, and yellow fever. Although none of these human diseases are currently present in Hawai'i, dogs acquire heartworms (filariasis) from the bite of infected mosquitoes, native birds often die from bird malaria and bird pox in lowland areas where the mosquito vectors are prevalent, and a dengue fever outbreak has occurred in Hawai'i's recent past. Importantly, there is a high potential for the introduction of a mosquito borne disease or new mosquito vector due to the large volume of travel and shipping in Hawai'i.

## Mosquitoes in Hawai'i

There are six biting species of mosquitoes in Hawaii and they are divided into two general types based on their feeding habits. Day-biting mosquitoes feed primarily during the day and somewhat during dawn and dusk, while night-biting mosquitoes primarily feed during dusk and into the night.

**Day-Biting Mosquitoes.** There are four species of day-biting mosquitoes in Hawai'i, *Aedes albopictus* (Asian tiger mosquito), *Aedes aegypti* (yellow fever mosquito), *Aedes (Ochlerotatus) japonicus* (Japanese or rockpool mosquito) and *Wyeomyia mitchellii* (bromeliad or pineapple lily mosquito). They all have a short flight range of only 100-150 yards which means that their presence at your home usually indicates a nearby breeding source. Day-biting mosquitoes breed in relatively clean water found in tree holes, plants, rock holes and various types of man-made containers. *Aedes* mosquitoes are particularly attracted to discarded tires and have been transported from place to place in old tires shipped for recycling. They do not normally breed in ground pools or in water that contains soil, but will do so if the water remains undisturbed and clean. *Wyeomyia mitchellii* breeds almost exclusively in clean water accumulated in the leaf axils of bromeliad plants (pineapple lilies). *Aedes albopictus*, *Aedes aegypti* and *Aedes japonicus* are black mosquitoes with white markings. *Wyeomyia mitchellii* is a brown mosquito with an abdomen that is cream to white on the lower half. *Aedes albopictus* is the most common day-biting mosquito and is also known as the forest day mosquito due to its prevalence in forested areas. Currently, *Aedes aegypti* and *Aedes japonicus* are found only on the Big Island of Hawai'i.



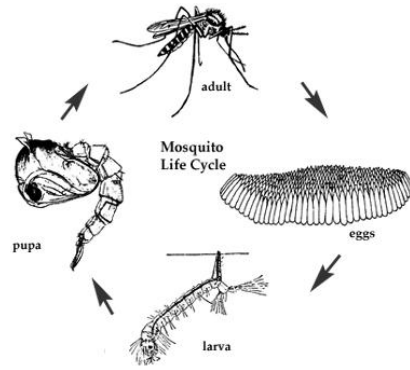
*Aedes albopictus*, photo by James Gathany, Centers for Disease Control and Prevention.

**Night-Biting Mosquitoes.** Hawai'i has two species of night-biting mosquitoes, *Culex quinquefasciatus* (southern house mosquito) and *Aedes vexans nocturnus* (inland floodwater mosquito). They have a flight range of several miles up to 20 miles for *Aedes vexans nocturnus* and, as a result, their presence at your home may not indicate a nearby breeding site. *Culex quinquefasciatus* will breed in all types of human-made containers of stagnant water, but prefers ground water high in decomposing organic matter. *Aedes vexans nocturnus* breeds exclusively in flood waters. Its eggs, laid in dry, lowland soil, remain dormant until flooding stimulates them to hatch. Both *Culex quinquefasciatus* and *Aedes vexans nocturnus* are brown mosquitoes, but only *Aedes vexans nocturnus* is distinguished by white stripes around its leg joints and a pointed abdomen. *Culex quinquefasciatus* is the most common night-biting mosquito in Hawai'i and is found on all of the islands.



*Culex quinquefasciatus*, photo by James Gathany, Centers for Disease Control and Prevention.

**Life Cycle.** Mosquitoes go through a 4-staged life cycle known as complete metamorphosis. They begin as eggs deposited singly or glued together in rafts by females after taking a blood meal. The eggs hatch into a larval stage, commonly known as “wrigglers”, and live in water while passing through 4 larval stages or instars. This is followed by the pupal stage, commonly known as “tumblers”, which also live in water. The mature mosquitoes then emerge from their pupal cases into the adult stage. Female mosquitoes require a blood meal to produce eggs while males feed on flower nectars or other similar food sources in nature.



**Mosquito Life Cycle**, illustration by Ohio State University Extension Service, Department of Entomology, Ohio State University.

## Control Methods

**Finding Breeding Sites.** Heavy mosquito nuisance activity usually indicates a nearby breeding source. Conduct a systematic and thorough inspection around your home for any standing water. Common breeding sites are in water found in plant pot drain pans, buckets, clogged roof gutters, cans, bottles, old tires, unused swimming pools, unused fish ponds, pineapple lilies, spider lilies, hollow bamboo stumps, uncapped hollow tile walls, uncapped fence pipes and ground pools.

### Permanent Control.

1. Empty, remove, repair, cover or fill-in everything that could contain water and become breeding sites for mosquitoes on your premises.
2. Place mosquito-eating fish such as guppies in fish ponds, unused swimming pools, lily ponds or other large containers that cannot be removed or emptied. Don't release these fish into streams, lakes or other natural water sources as they may become invasive and threaten native species.
3. Install or repair window screens and doors to exclude mosquitoes from your home. Window screens are one of your best protections against mosquito nuisance activity in the home.

### Temporary Control.

1. Eliminate adult mosquitoes with aerosol insecticides labeled for flying insects.
2. Use insecticides specifically labeled for controlling mosquito larvae such as products containing *B.t.i. (Bacillus thuringiensis subspecies israelensis)* in breeding sites that cannot be emptied or removed. Consult with your DPW Entomologist, TAMC Entomologist, garden shop or product information on the internet for available insecticides.
3. For personnel protection, use insect repellents containing DEET (N, N- diethyl-m-toluamide) at 30 to 33% for adults and 7.5% for children under 12 years old. DEET should not be used on babies less than 2 years of age. Another active ingredient, picaridin at 7%, is recommended by the Centers for Disease Control as well. Natural, organic insect repellents are also available. When outside where mosquitoes are active, wear a long sleeve shirt and long trousers to help prevent being bitten.

**CAUTION:** *Certain pesticides and their solvents may cause respiratory irritation. Persons with respiratory diseases should consult their physicians before using any pesticide. IT IS A VIOLATION OF FEDERAL LAW IF PESTICIDES ARE NOT APPLIED EXACTLY AS THE LABEL DIRECTS.*

**For further information and assistance, please contact:**

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**Reference:** Mosquitoes. Vector Control Branch Bulletin. Hawaii Department of Health, Honolulu.