

## *Ochlerotatus japonicus japonicus*

**System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Diptera	Culicidae

**Common name** Asian bush mosquito (English)

**Synonym** *Aedes japonicus* , (Reinert, 2000)

**Similar species** *Ochlerotatus atropalpus*, *Ochlerotatus triseriatus*

**Summary** *Ochlerotatus japonicus japonicus* is a mosquito native to Japan, Korea and eastern China. It has the potential to be an enzootic or epizootic vector of at least three kinds of encephalitis and may serve as a bridge vector for West Nile Virus. It breeds natural rockpools and a range of artificial containers, and is thought to have been introduced to the United States in infested automobile tyres. It is rapidly expanding its range and is now present in at least 32 states including Hawaii and two Canadian provinces.



[view this species on IUCN Red List](#)

### Species Description

*Ochlerotatus j. japonicus* has multiple upper and lower head hairs which are arranged in a straight line. Antenna are much shorter than the head with multiple, short tufts inserted into the middle of the shaft. There are two hairs on each of abdominal sections 3 through 8. *Oc. j. japonicus* has patch comb scales, a siphon with an index of 2.5 and a tuft of 4 to 6 which is inserted within the pecten row; the pecten is detached. The saddle is an incomplete ring, highly spiculated at the distal margin with 2 precratal tufts (Scott & Crans, 2004). Larvae are distinguishable from all other North American mosquitoes by it's highly spiculated anal saddle, and the upper and lower head hairs which are multiple (tufts) and arranged in a straight line (Scott, 2010).

### Notes

A previously accepted name, *Aedes (Finlaya) japonicus* is used by some authors in literature.

### Lifecycle Stages

The lifecycle of *Ochlerotatus j. japonicus* is similar to that of *Aedes triseriatus* and is multivoltine (Scott & Crans, 2004). In general, *Oc. j. japonicus* has a longer active period during the warm season than most container breeding species and is more fecund (Oliver & Howard 2005). *Oc. j. japonicus* produces freeze and desiccation resistant eggs that can tolerate a wide range of temperature extremes (Andreadis & Wolfe, 2010). The species is very cold tolerant and in the north-eastern US larval development takes place from early March through November.

## Habitat Description

Adult *Ochlerotatus j. japonicus* are commonly found in forested habitats, often at high elevations. Larvae of *Oc. j. japonicus* are commonly found in artificial and natural containers such as discarded tires, bird baths, plastic drink containers, toys, vinyl tarpaulins covering swimming pools and wood piles, rock pools, tree holes, catch basins, and rain pools. (Andreadis *et al.*, 2001; Kim *et al.*, 2005)

A study of larval abundance in rock pool and tyre habitats in Connecticut found that the only pools where *Oc. j. japonicus* did not predominate were those with water temperatures above 30°C from June to September, indicating a temperature barrier may exist for this species. Thus *Oc. j. japonicus* may not be able to survive in regions of the United States with relatively high summer temperatures. This is consistent with distribution of the mosquito in its native range of Japan (Andreadis & Wolfe, 2010).

## Reproduction

In the United States, larvae of *Ochlerotatus j. japonicus* have been found at a wide range of altitudes within the Appalachian mountains, up to 1500 meters above sea level where winter temperatures can reach -18 degrees Celsius and with a wide range of other mosquito species (Bevins, 2007). In a laboratory study, *Oc. j. japonicus* readily oviposited an average of 115 eggs on Styrofoam blocks, with a maximum of 289 and a minimum of 3. Fecundity of *Oc. j. japonicus* is equal to that of *Ochlerotatus atropalpus* and exceeds that of *Ochlerotatus triseriatus* (Oliver & Howard 2005).

## Nutrition

*Ochlerotatus j. japonicus* is a species of mosquito with an aggressive opportunistic feeding habit, taking bloodmeals from avian and mammalian hosts, including humans. Adults reared from containers with more organic debris had a larger average body size, growth, and longer wing length (Bevins, 2007).

## General Impacts

*Ochlerotatus j. japonicus* is a species of mosquito with an aggressive opportunistic feeding habit, taking bloodmeals from avian and mammalian hosts, with a preference for human blood (Molaei *et al.*, 2009). Laboratory studies have shown *Oc. j. japonicus* to be an efficient vector of [West Nile Virus \(WNV\)](#) but its role in the natural transmission of the virus is unknown (Scott, 2010; Molaei *et al.*, 2009). Furthermore WNV has been detected in field-collected *Oc. j. japonicus* is at least nine different states. It is thus very likely that this species could serve as a bridge vector of the WNV to humans.

*Oc. j. japonicus* is also a highly efficient vector of St. Louis encephalitis virus and a moderately efficient vector of eastern equine encephalitis and La Crosse viruses in laboratory tests. It has also been known to transmit Japanese B encephalitis to humans (Molaei *et al.*, 2009; Andreadis *et al.*, 2001; Sardelis *et al.*, 2003; Sardelis *et al.*, 2002).

Larvae of *Oc. j. japonicus* are highly effective competitors and can reduce populations of native mosquito populations significantly through interspecific competition for limited resources. Surveys in Connecticut in 2005 revealed that *Oc. j. japonicus* was the dominant species collected in all waste tyres and natural rock pool environments. Comparisons with data from previous years indicated significant decline of native species including *Oc. atropalpus*, *Oc. triseriatus* and *Culex restuans*.

## Management Info

**Preventative measures:** It is important for the general public to be informed on preventative steps that can be taken to reduce the risk of contact with mosquitoes. The following are personal protective measures that individuals can carry out to protect themselves from the transmission of disease resulting from mosquito bites: schedule outdoor activity to avoid periods of high mosquito activity (dusk to dawn), use mosquito repellents properly, use mosquito netting on baby carriages and play pens when outdoors, cover as much skin with clothing as much as possible, use and repair screens on windows and doors in homes, remove any standing water from any type of natural or artificial container near homes, and avoid camping near freshwater sources if possible (Massachusetts Department of Public Health, 2007).

Gravid traps placed at a trapping density of 44 square kilometers may be used for seasonal monitoring of *Oc. j. japonicus* (Falco *et al.*, 2002). In order to avoid failure in detecting *Oc. j. japonicus* due to low capture rates from gravid or light traps, larvae collection should be carried out in natural and artificial habitats within the sampling area (Moberly *et al.*, 2005). Blocks of expanded polystyrene (EPS) are a cheap alternative to CDC ovitraps for egg collection devices for container dwelling species like *Oc. j. japonicus* for detection and monitoring purposes (Scott & Crans 2003).

To reduce the risk of introduction of *Oc. j. japonicus* and other vectors, governing bodies can utilize the inspection and treatment of imported used tires and tire collection facilities, the disinfection of airline cargo holds, increase quarantine inspections, and develop sterile corridors around airports and port facilities (Larish & Savage 2005). In a study of CDC gravid trap attractants in New York state, a common lawn sod infusion using Kentucky bluegrass was found to be a better attractant for *Oc. j. japonicus* than that of rabbit chow infusion, both under a seven day infusion period (Lee & Kokas 2004). In a New Jersey study, infusion baited gravid traps were found to be the best method of sampling or monitoring for *Oc. j. japonicus* (Scott *et al.*, 2001). Gravid traps have an increased chance of attracting mosquitos that have had a blood meal, making these traps ideal for arbovirus surveillance studies (Falco *et al.*, 2002).

## Pathway

*Ochlerotatus j. japonicus* was intercepted in New Zealand in a shipment of used tires which is also the believed pathway of invasion into the United States by this species (Andreadis *et al.*, 2001).

## Principal source:

Andreadis, Theodore G.; John F. Anderson, Leonard E. Munstermann, Roger J. Wolfe, and David A. Florin., 2001. Discovery, Distribution, and Abundance of the Newly Introduced Mosquito *Ochlerotatus japonicus* (Diptera: Culicidae) in Connecticut, USA .

Bevins, Sarah N. 2007. Establishment of a Recently Introduced Mosquito Species *Ochlerotatus japonicus* (Diptera: Culicidae) in the Southern Appalachians, USA.

Scott, Jamesina J.; Crans, Wayne J., 2003. Expanded polystyrene (EPS) floats for surveillance of *Ochlerotatus japonicus*.

[Scott, Jamesina J. 2010. \*Ochlerotatus japonicus\* \(Theobald\). Rutgers University Entomology/Placer Mosquito. New Jersey Mosquito Control Association Incorporated.](#)

**Compiler:** National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

**Review:** Theodore G. Andreadis, Center for Vector Biology & Zoonotic Diseases, The Connecticut Agricultural Experiment Station

**Publication date:** 2010-06-23

## ALIEN RANGE

[1] BELGIUM

[1] FRANCE

[2] CANADA

[1] GERMANY

[1] NEW ZEALAND  
[26] UNITED STATES

[1] SWITZERLAND

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