Aedes albopictus 简体中文 正體中文 **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Arthropoda	Insecta	Diptera	Culicidae

Common name mosquito tigre (Spanish), forest day mosquito (English), Asian tiger mosquito (English), moustique tigre (French), tiger mosquito (English), tigermücke (German), zanzara tigre (Italian)

Synonym *Culex albopictus* , Skuse, 1895
Culex albopictus , Skuse,1895

Similar species *Aedes aegypti*

Summary The Asian tiger mosquito is spread via the international tire trade (due to the rainwater retained in the tires when stored outside). In order to control its spread such trading routes must be highlighted for the introduction of sterilisation or quarantine measures. The tiger mosquito is associated with the transmission of many human diseases, including the viruses: Dengue, West Nile and Japanese Encephalitis.

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Species Description
Adults are known as tiger mosquitoes due to their conspicuous patterns of very black bodies with white stripes. Also, there is a distinctive single white band (stripe) down the length of the back. The body length is about 3/16-inch long. Like all mosquitoes, Asian tiger mosquitoes are small, fragile insects with slender bodies, one pair of narrow wings, and three pairs of long, slender legs. They have an elongate proboscis with which the female bites and feeds on blood.

Lifecycle Stages
The mosquito has four distinct life stages, which consist of egg, larva, pupa and adult. The first three stages occur in water. The adult is the freeflying insect that feeds on humans, other animals and the juice of plants (Lutz 2002).

Habitat Description
Aedes albopictus is a treehole mosquito, and so its breeding places in nature are small, restricted, shaded bodies of water surrounded by vegetation. It inhabits densely vegetated rural areas. However, its ecological flexibility allows it to colonize many types of man-made sites and urban regions. It may reproduce in cemetery flower pots, bird baths, soda cans and abandoned containers and water recipients. Tires are particularly useful for mosquito reproduction as they are often stored outdoors and effectively collect and retain rain water for a long time. The addition of decaying leaves from the neighboring trees produces chemical conditions similar to tree holes, which provides an excellent substrate for breeding. *Ae. albopictus* can also establish and survive throughout non-urbanized areas lacking any artificial containers, raising additional public health concerns for rural areas (Moore 1999, in Eritja *et al*. 2005).

Reproduction
The females lay desiccation-resistant eggs above the surface of the water in treeholes, tires or other water-holding containers. Their ability to breed in artificial containers facilitated their passive spread in the last decades through main transportation routes (Lounibos 2002 in Vezzani and Carbajo, 2008)They rely on rainfall to raise the water level and inundate the eggs for hatching. 150 to 250 eggs are laid per ovipostion. There are 1 to 4 ovipositions per female (ISSG 2004). The active reproductive period occurs in Japan and southwestern US from late Spring to early fall (Alto and Juliano 2001, in Eritja *et al*. 2005). In Rome, larvae are found from March to November, but some females are active until December (Di Luca *et al*. 2001, in Eritja *et al*. 2005). The eggs from strains colonizing temperate regions resist lower temperatures than those from tropical areas (Hanson and Craig 1995, in Eritja *et al*. 2005). Additionally, in these strains, the combination of short photoperiods and low temperatures can induce the females to lay diapausing eggs which can hibernate (Hanson and Craig 1995, in Eritja *et al*. 2005). This feature of diapause, which most other tropical mosquitoes lack may be one of the keys to the success of *Ae. albopictus* (Enserink, 2008). Overwintering is necessary north of the +10°C January isotherm (Mitchell 1995, Knudsen *et al*. 1996, in Eritja *et al*. 2005).

Nutrition
Obtains energy by feeding on plant nectar. Females require blood to produce eggs. Although primarily a mammalian feeder, will accept blood from a wide variety of hosts.

General Impacts
The tiger mosquito is an aggressive outdoor day biter that has a very broad host range and attacks humans, livestock, amphibians, reptiles and birds (Eritja *et al*. 2005). In one survey of biting rates a level of 30 to 48 bites per hour was recorded (Cancrini *et al*. 2003).
Mosquitoes are vectors of many relevant human diseases from Malaria to filariasis (caused by *Dirofilaria immitis* (Naya and Knight 1999, in Eritja *et al*. 2005)). *Ae. albopictus* may be a matter of particular concern as a bridge vector for the West Nile virus because it inhabits rural areas and has a wide host range including birds, so that it can readily pass enzootic cycles to humans.
There are a total of four Flaviviruses, ten Bunyaviruses and seven Alphaviruses that *Ae. albopictus* is known to be receptive to in laboratory conditions. These include Yellow Fever, Rift Valley Fever, Chikungunya and Sindbis (all of which are present in the Mediterranean). Of these *Ae. albopictus* is known to be receptive in field conditions to three Flaviviruses (Dengue, West Nile and Japanese Encephalitis), six Bunyaviruses (Jamestown Canyon, Keystone, LaCrosse, Potosi, Cache Valley and Tensaw) and one Alphavirus (EEE). Other circulating viruses in the Mediterranean that are pathogenic to humans (but which the receptivity of *Ae. albopictus* has not been observed or tested in the laboratory) include Israel Turkey virus, Tahyna and Batai. However the extent to which *Ae. albopictus* can transmit diseases in the real world is unclear and depends on many factors including numbers, whether it bites humans, whether it takes blood meals from multiple people and how effectively the virus makes it from the mosquito’s gut to its salivary glands. Currently there is solid evidence for the tiger mosquito’s role in the transmission of only two diseases: Dengue and Chikungunya (Enserink, 2008). However, the recent outbreak Chikungunya virus in the Indian Ocean vectored by *Ae. albopictus* has been shown to be caused by a single nucleotide mutation in the virus that allowed it to more effectively use the tiger mosquito as a vector. Similar scenarios could happen with Dengue and other viruses that the mosquito was shown to transmit in the lab (Enserink, 2008).
Ae. albopictus has been demonstrated to have a competitive advantage over a number of other mosquito species including *Ae. Aegypti* (O’Meara *et al*. 1995; Juliano, 1998; Lounibos, 2002; Braks *et al*. 2004 in Vezzani and Carbajo, 2008). *Ae. aegypti* is an even more important vector of diseases than *Ae. albopictus*. This is largely because *Ae. albopictus* has such as wide host range compared to *Ae. aegypti* which feeds almost exclusively on humans (Enserink, 2008). Because diseases like Dengue affect only primates, if *Ae. albopictus* feeds on a lizard or bird after a human, the disease is not transmitted. Thus the actual consequence of the potential displacement of *Ae. aegypti* by *Ae. albopictus* in terms of diseases transmission remains unknown in many regions. Professor Gubler predicts that the spread of *Ae. albopictus* will actually result in a net gain for public health because in many places, it is displacing *Ae. aegypti* populations (Enserink, 2008). Indeed there are many studies that report *Ae. albopictus* outcompeting mosquito larvae of other species such as *Ochlerotatus triseriatus*, a vector for La Crosse Virus (Bevins, 2008) and *Ae. japonicas* (Armistead *et al*. 2008). However Didier Fontenille of the Institute of Research for Development in Montpellier, France disagrees with Gubler citing outbreaks of Chikungunya in the Indian Ocean Islands, La Reunion island and Italy as evidence of the tiger mosquito’s potential devastating impacts (Enserink, 2008).

Management Info
Preventative measures: Starting in 1992, several countries in South America (Venezuela, Chile, Bermuda, Costa Rica, Argentina and Brazil) have dictated embargoes on used tire importations, in an attempt to prevent mosquito and dengue introduction into areas where a potential vector, *A. aegypti*, is already present (Eritja *et al*. 2005).
Source reduction strategies (such as larval or adult control within tire dumps) have proven to be difficult and relatively inefficient due to the shape and abundance of the water surfaces (Eritja *et al*. 2005).
Quarantine and inspection measures in Australia have allowed detection of larval introductions of the tiger mosquito (Eritja *et al*. 2005). As immediate control measures have been applied, *Ae. albopictus* has not as of yet become established on the continent (R. Russell, pers. comm., in Eritja *et al*. 2005).
In the Netherlands horticultural companies have taken steps to reduce the risk, for instance, by treating shipments before they leave China (Enserink, 2008).
Predicting the potential spread of the tiger mosquito may be important in alerting the appropriate authorities to take preventative action. Areas at risk in Europe would have mean winter temperatures higher than 0°, at least 500mm rainfall per year and a warm month mean temperature of 20°. It is believed that less than 300mm rainfall per year would make establishment extremely unlikely. (Eritja *et al*. 2005).
Physical Control: *Ae. albopictus* is not readily captured by most traps, even those that catch other mosquito species. However, recently there are new traps being developed: BG-SentinelTM and the Collapsible Mosquito Trap (CMT-20TM). These traps use ammonia, fatty acids and lactic acids to produce a smell similar to that of a human body in an upward air current. The addition of carbon dioxide greatly improves the number of mosquitoes captured. When carbon dioxide is added these traps collect about 33 times more than standard light traps (Meeraus *et al*. 2008).
Biological Control: Bioengineering is a major focus of research in agricultural and public health entomology. Oxford Insect Technologies (http://www.oxitec.com/) have created a strain of *Ae. aegypti* with a dominant tetracycline-repressible gene. The aim is to release transgenic males in the field; the progeny of matings with wild females will die. Ultimately we will select a sex-linked strain that will kill only female progeny, providing a “driver” for the lethal gene in the field. Current research is studying the ‘fitness’ of such transgenic strains and will also attempt to engineer strains of *Ae. albopictus* (Insects and Infectious Diseases, 2006).
Another form of biological control that is currently being investigated is use of an entomopathogenic fungus *Metarhizium anisoplia*. Results from laboratory studies showed that longevity of M. anisopliae-infected *Ae. aegypti* and *Ae. albopictus* is significantly lower than that of uninfected mosquitoes. The challenge is to find and apply an effective methodology that will result in reduced vectorial capacity of mosquitoes in the field (Scholte *et al*. 2008).
Integrated Management: In Switzerland, monitoring systems consisted of over 300 strategically positioned oviposition traps along main traffic axes, including parking lots within industrial complexes, border crossings and shopping centres.. Bi-weekly control visits to all traps were conducted between April and November 2007. As soon as eggs were detected, the surrounding vegetation within a perimeter of about 100 metres was sprayed with permethrin against adult mosquitoes. Stagnant water was treated with *Bacillus thuringiensis* and in some cases with diflubenzuron to control the larval stages (Wymann *et al*. 2008).

Pathway
During the summer of 2001, containerised shipments from China of the plant known as Lucky Bamboo (*Dracaena* spp.) were found to contain *A. albopictus* on inspection by quarantine officers on arrival at Los Angeles, USA (Linthicum 2001, in Eritja *et al*. 2005). This route of spread became an issue only after traders swapped from dry freight to low cost shipping routes (which required the plants to be shipped in standing water to preserve them for the longer voyage).Movement of moist vegetation, wet tyres or water containers that can hold eggs or larvae.Movement of moist vegetation, wet tires or water containers that hold eggs or larvae.The adult flight range is quite short. Therefore, most medium and long range colonization is the result of passive transportation by humans. This may occur, for example, in the movement of used tires in trucks (Eritja *et al*. 2005).

Principal source:

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG)
Updates on management information with support from the Overseas Territories Environmental Programme (OTEP) project XOT603, a joint project with the Cayman Islands Government - Department of Environment

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ALIEN RANGE

[1] AFRICA
[1] ALBANIA
[1] ARGENTINA
[3] AUSTRALIA
[1] BARBADOS
[1] BELGIUM
[1] BERMUDA
[1] BOLIVIA
[1] BOSNIA AND HERZEGOVINA
[2] BRAZIL
[1] CAMEROON
[1] CAYMAN ISLANDS
[1] CHILE
[1] CHINA
[1] COLOMBIA
[1] COSTA RICA
[1] CROATIA
[1] CUBA
[1] DOMINICAN REPUBLIC
[1] EL SALVADOR
[1] EQUATORIAL GUINEA
[1] FIJI
[1] FRANCE
[1] GABON
[1] GREECE
[1] GUATEMALA
[1] HONDURAS
[1] ISRAEL
[4] ITALY
[1] LEBANON
[1] MADAGASCAR
[1] MEXICO
[1] MONTENEGRO
[1] NETHERLANDS
[5] NEW ZEALAND
[1] NICARAGUA
[1] NIGERIA
[1] PANAMA
[1] PARAGUAY
[1] REUNION
[1] SERBIA
[1] SLOVENIA
[1] SOLOMON ISLANDS
[1] SOUTH AFRICA
[1] SPAIN
[1] SWITZERLAND
[1] SYRIAN ARAB REPUBLIC
[1] TAIWAN
[1] THAILAND
[1] TRINIDAD AND TOBAGO
[11] UNITED STATES
[1] VENEZUELA

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Summary: Discusses the mosquito as a vector for diseases and the probable spread of them throughout the United States.

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Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.
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