

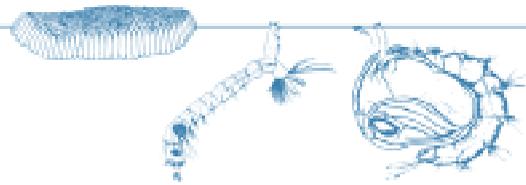
## Meet the mosquito

Mosquitoes are flying, biting insects that develop in water during their immature stages. Some of the many species found in New York are considered pests and can transmit diseases to humans. The three most important mosquito groups are the *Anopheles* (carrier of malaria), *Culex* (carrier of viral encephalitis), and *Aedes* (pronounced “AY-dees”; carrier of yellow fever, dengue, and encephalitis). All are less than 0.5-inch (1.3 cm) long as adults.

Although mosquitoes are usually a nuisance and sometimes dangerous to public health, most specialists agree that eradication is unrealistic. A more reasonable goal is population reduction and management below problem levels. *This goal relies greatly on public education and awareness.*

## A mosquito’s life: from water to air

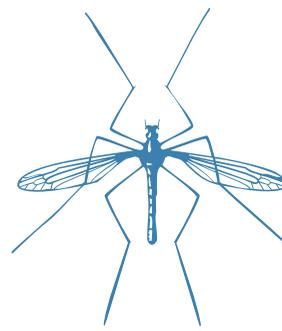
Mosquitoes have four life stages: the egg, larva, pupa, and adult. Eggs are laid on the surface of water (*Culex* and *Anopheles* types) or damp soil that is soon to flood (*Aedes* type). Most eggs hatch within 48 hours. The larvae live in water and breathe at the surface through tubes. Larvae, or wrigglers, feed on organic debris and microorganisms in the water, then molt into pupae, a resting stage that remains in the water. During this time the mosquito develops into an adult. After two days the pupal skin splits and the adult emerges. The length of this life cycle varies by species from 4–30 days.



Mosquito life stages in water: egg raft, larvae with air tubes, and pupa. Larvae are commonly called “wrigglers” because of the way they squirm through water when disturbed or when seeking food.



Only the **female mosquito** has piercing mouthparts and feeds on blood. The mosquito is often confused with...



... the harmless **crane fly**, which is more than twice the size of the mosquito and does not bite.

An adult female mosquito usually must take a blood meal before laying eggs. Females have elongated piercing-sucking mouthparts used to penetrate your skin and ingest blood from the host. A component of mosquito saliva prevents blood clotting and causes itching and swelling. Saliva is the means for disease movement into the host. Blood protein is used to produce and mature the eggs. Male mosquitoes feed on nectar, *not* on blood. Their mouthparts are not designed for piercing.

## Public health concerns

Mosquito-borne illnesses have plagued humans throughout history. Modern vector control and monitoring programs have greatly reduced the incidence of yellow fever, malaria, and encephalitis viruses. Eastern equine encephalitis (EEE), St. Louis encephalitis (SLE), and West Nile encephalitis (WNE) remain significant diseases that have recently afflicted people in New York. Management includes intense surveillance for mosquito outbreaks and routine monitoring for diseases.

County-based vector control programs aim to use prevention to limit mosquito breeding. If encephalitis does break out in a community, outdoor activities must be restricted. The goal is to reduce the threat of disease *and* minimize pesticide applications for mosquito control.

An unusual outbreak of West Nile encephalitis in New York during 1999 has refocused our attention on vector-borne diseases. This and other encephalitis viruses not only endanger humans but can infect and kill horses. Birds that are in-

fectured can help spread the disease and may also die. The emergence of exotic diseases such as this may be linked to increased human travel and transport of goods throughout the world. New disease outbreaks are unpredictable and illustrate the need for public education and involvement.

## Common mosquitoes

Three mosquitoes are mentioned here, but this brochure focuses on *Culex* and how to manage it.

***Culex pipiens***—Common house mosquito.

*Culex* mosquitoes are persistent biters that feed at dusk, night, and dawn. *Culex* mosquitoes prefer birds as hosts, but because they are frequently found in homes, they bite humans and can transmit encephalitis. These mosquitoes breed in small pools of stagnant water containing organic debris and do not move far from breeding sites. *Culex pipiens* is the most important mosquito pest in urban and suburban areas. It matures from egg to adult in 7 days; adults generally live 10–60 days.



## *Culex pipiens* is the most important mosquito pest in urban and suburban areas.

***Aedes sollicitans***—Salt marsh mosquito, found at the coast. *Aedes* mosquitoes are aggressive and painful biters that feed during daylight and prefer humans. *Aedes* will fly several miles from breeding sites (areas that flood) but usually do not enter buildings. Because these mosquitoes are associated with naturally occurring floodwaters, residents need only to be aware of outbreaks, then take measures to avoid being bitten. Counties on the coast have programs that manage salt marsh mosquitoes.

***Anopheles* species**—These mosquitoes are associated with permanent fresh waters with vegetation; eggs are laid on the surface of calm water. This mosquito is the only one that carries malaria. Although malaria does not normally occur in New York, several cases have been reported in recent years.

## What can you do?

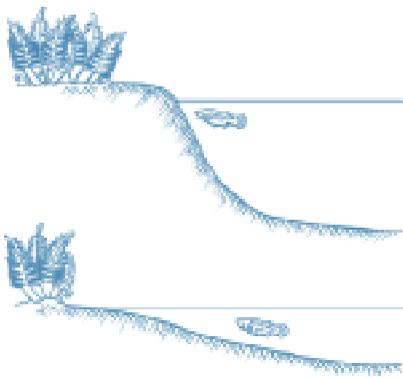
*Culex pipiens*, the most common mosquito around the home and around the world, is the primary carrier of encephalitis viruses. It has a very small home range and usually does not fly more than 300 feet from a breeding site. Because this mosquito breeds in small pools of standing water containing leaves or other debris, backyards can be the perfect habitat! Rain gutters, cups, cans, and birdbaths are “home, sweet home.” When given a breeding site, mosquitoes will stay in the area. *To reduce *Culex* mosquito populations and the need for pesticides, you must regularly inspect your surroundings for potential breeding areas and disrupt these sites.*

## Ways to “fight the bite”

Before you even consider spraying insecticides over your entire yard, take a preventative approach. Insecticides should be a last resort.

## Prevent mosquito breeding

- Dump out standing water from containers in the yard, including recycling bins with bottle caps and cans, tires, boats, and tarps.
- Clean debris from rain gutters early in spring and check them regularly. If you are unable to clean them, ask your landscaper or pest control technician. A huge number of mosquitoes can result from clogged gutters.
- Clean, filter, and treat pools. Empty children’s pools and turn them over when not in use. Keep pool covers clean by propping them up to drain water.
- Encourage natural enemies. For example, stock ornamental ponds with goldfish. Mosquitofish (a type of minnow, also known as *Gambusia*) devour mosquito larvae. Dragonflies and damselflies are mosquito predators.
- Construct goldfish ponds properly. Large goldfish are unable to reach sloping edges of ponds where mosquitoes breed, so be sure your pond has *vertical* sides. A pond fountain will also reduce mosquito breeding.



Sides of goldfish ponds should be steep (top). Gradual, sloping sides provide places for mosquitos to breed that large goldfish cannot reach (bottom).

- Change the water in birdbaths and fountains twice a week.

#### Protect yourself against Culex mosquitoes

- Cover up with loose-fitting, lightweight clothing from dusk to dawn.
- Use insect repellents properly, especially on children (never on their skin). Read the label and follow precautions.
- Keep household screens in good repair and do not prop open windows or doors.

#### Stay informed

- Attend public forums and educate yourself.
- Remember that electric insect “zappers” do not help to prevent mosquito problems. These devices generally kill more beneficial insects than pests.
- Recognize that light traps and carbon dioxide traps used by mosquito control programs are for monitoring purposes and cannot be used to reduce mosquito numbers.

These steps will help protect you from mosquitoes, disease, and risks associated with pesticides. *With greater public participation (i.e., you!), mosquito numbers can be reduced.*

Potential breeding sites shown in the cover illustration: rain gutter, rain barrel, umbrella, lawn chairs, kiddie pool, pool toys, recycling bin with cans, bird bath, potted plant saucer, dog bowl, watering can, and garden pond.

#### For more information

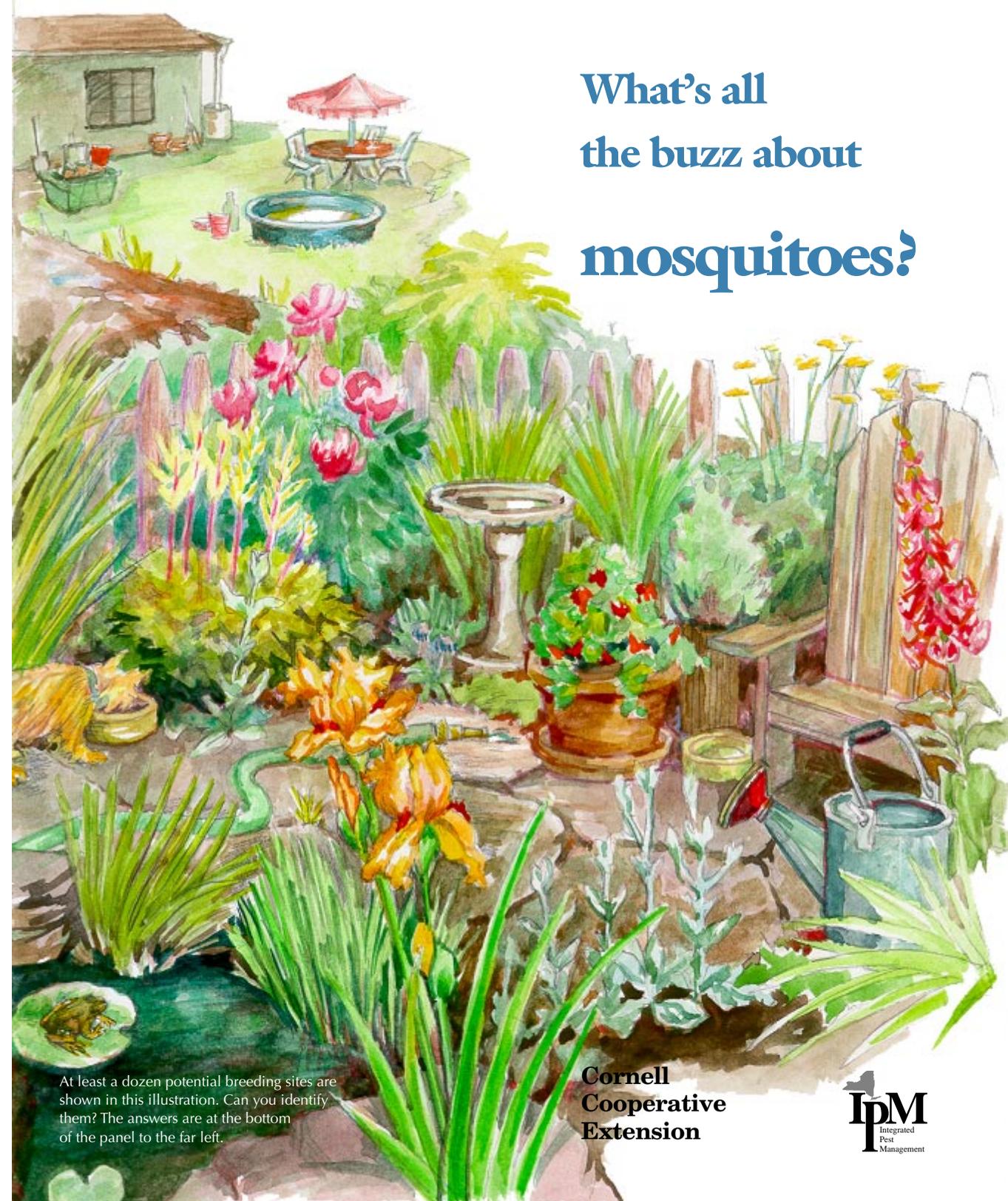
Your local Cornell Cooperative Extension office  
 Department of Health (New York State or your County)  
 American Mosquito Control Association:  
<http://www.mosquito.org>  
 Center for the Environment (Risk Analysis), Cornell  
[www.cfe.cornell.edu/risk](http://www.cfe.cornell.edu/risk)  
 Centers for Disease Control: (Vector-borne Illnesses Information): <http://www.cdc.gov>  
 Mosquito Integrated Pest Management:  
<http://www-rci.rutgers.edu/~insects/ipm.htm>  
 New York City Department of Health  
<http://www.ci.nyc.ny.us/html/doh/home.html>  
 Pesticide Information—Cornell University  
<http://pmep.cce.cornell.edu>  
 Olkowski, W., S. Daar, and H. Olkowski. 1991. *Common-Sense Pest Control*. Taunton Press, Newtown, CT.

#### The New York State IPM Program

We encourage people to adopt a sustainable approach to managing pests, using methods that minimize environmental, economic, and health risks. For more information: NYS Integrated Pest Management Program; 1-800-635-8356; NYSAES, Geneva, NY 14456; [www.nysaes.cornell.edu/ipmnet/ny](http://www.nysaes.cornell.edu/ipmnet/ny)

For additional copies of this brochure (IPM No. 606), contact your local Cornell Cooperative Extension office or the NYS IPM Program.

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# What's all the buzz about mosquitoes?

At least a dozen potential breeding sites are shown in this illustration. Can you identify them? The answers are at the bottom of the panel to the far left.

**Cornell Cooperative Extension**

