Common Name: **Mosquitoes**
Scientific Name: **see below**

MOSQUITOES

Introduction. Mosquitoes are well known by most people because of their annoying biting habit. Of greater concern, they are very important as vectors of numerous human diseases such as malaria, yellow fever, filariasis, dengue, encephalitis, and West Nile virus. There are about 60 species of mosquitoes in Ohio. A dozen or so of these species are problematic to Ohioans, domestic animals and livestock. Only female mosquitoes are known to bite (take blood meals on) humans and other host animals. The short-lived males feed exclusively on nectar from blossoms.

Recognition. Adult mosquitoes are about 1/4 to 3/8 inch long. Mosquito color patterns are due to the wings, body and legs being covered with scales. Color combinations include brown, gray, black, white and silver.

Similar Insects. (1) Midges (*Chironomidae*) are attracted in great numbers to lights at night, around ponds and lakes in which they breed. These midges do not bite. (2) Crane flies (*Tipulidae*) have slender bodies and long legs. Crane flies do not bite but are often mistaken for "giant mosquitoes." They are attracted to light as well.

Representative Species.

1. The **Asian tiger** or **forest day mosquito** (*Aedes albopictus*) is charcoal to black with silvery white markings. Its identifying marks include a single median silver-white stripe on top of the thorax, tarsal (lower leg) segments ringed with white, and the abdominal segments narrowly and singly banded on top with white. This

imported species breeds in artificial containers and is found sporadically in Ohio. It is an aggressive biter and can transmit LaCrosse encephalitis and dog heartworm.

2. The **eastern treehole mosquito** (*Ochlerotatus triseriatus*) is black with silvery-white scales at the sides of the thorax. It breeds mainly in tree holes, tires and other artificial containers. The bites are painful making this mosquito very troublesome in woods. This species is the principal vector of LaCrosse encephalitis in Ohio.

3. The **floodwater mosquito**, (*Ochlerotatus trivittatus*) is dark with two white stripes on top of the thorax. It is a fierce biter and can be extremely annoying when present in large numbers. Larvae occur mostly in floodwater pools and temporary rain pools. Adults rest among shaded grasses and other vegetation during the daytime but bite if disturbed. This species bites mainly in the evening.

4. The **vexans** or **inland floodwater mosquito** (*Aedes vexans*) is brown with white to light gray markings. Its identifying marks include narrow rings of white scales on the lower leg (tarsal) segments of the hind legs. The tops of the abdominal segments have white, "V"-notched crossbands. This species breeds in temporary rain pools and roadside puddles. It is very abundant and a vicious biter, being especially active at dusk and after dark. It is considered the principle pest mosquito in Ohio.

5. The **common malaria mosquito** (*Anopheles quadrimaculatus*) is dark brown with solid-colored legs. There are 4 dark spots near the center of each wing. When feeding on a host, the body and proboscis lie in one plane/axis. It breeds in permanent freshwater sites that contain aquatic vegetation such as swamps, ponds and small lakes. This species remains inactive during the daytime in cool, damp, dark, protected sites. Feeding occurs at night.

6. The **northern house mosquito**, *Culex pipiens* is brown with white or gray markings. Its identifying marks include charcoal to black legs, except for a cream-colored area on the upper leg (femur). The abdominal segments each have a broad white crossband on top that is widest along the midline and broadly jointed to lateral patches. It breeds in artificial containers, ditches, storm sewer catch basins, and polluted water. Adults are active only at night and can be found resting during the day in and around structures close to their breeding sites. This mosquito and a similar species, *Culex restuans*, transmits West Nile virus to birds, horses and humans. The latter species is more common in parts of Ohio.

7. The **cattail mosquito** (*Coquillettidia perterbans*) has scales on its wings which give the wings a peppered appearance. It has white bands on the lower legs (tarsi) and proboscis. The larvae are found in marshes and

ponds with emergent plants. This mosquito is common in Ohio and can transmit California group encephalitis viruses and dog heartworm.

8. The **gallinipper mosquito** (*Psorophora ciliata*) is golden brown with shaggy legs. It is Ohio's largest biting mosquito, reaching 1/2 inch in length. This is a floodwater mosquito, the larvae of which preys on small aquatic insects including other mosquito larvae. Gallinippers are vicious biters and attack during the daytime.

Biology. Mosquitoes are commonly separated into 3 groups based on where and how their eggs are laid. After a blood meal, the female will lay:

1) eggs with "floats" singly on water; they usually hatch within a few days (e.g. *Anopheles* species);
2) eggs in rafts on water with up to 100+ eggs per raft; they usually hatch within a few days, (e.g. *Culex species*); and
3) eggs singly in semi-dry places such as moist soil near water; they do not hatch until water has risen and inundated them; these eggs can lie dormant for 3 to 5 years (e.g. *Aedes, Ochlerotatus* and *Psorophora* species).

With water present, eggs hatch in a few days into larvae which are commonly called wigglers because of their jerky movements. All larvae live in water and go through 4 growth stages. Larvae of most species (e.g. *Aedes* and *Culex*) take in air through a breathing tube (siphon) located at the rear which penetrates the water surface while they float at an angle just below the surface. Other species (e.g. *Anopheles*) have a spiracular plate on the last abdominal segment which penetrates the surface while they float parallel to and just below the surface, their buoyancy enhanced by clusters of float hairs (palmate hairs) on some abdominal segments.

With their 4th molt, the larvae become pupae which are commonly called tumblers. The pupae live in water and are very active. The pupae of most species breathe through a pair of respiratory trumpets located on the dorsal thoracic surface which penetrate the water surface while they float just below the surface. At the end of the pupal stage, while at the water's surface, the pupal skin splits open and the adult works its way out and onto the surface of the water, dries briefly and flies away. Development time (egg to adult) is usually about 10 to 14 days: Eggs hatch in 1 to 3 days, although some remain viable for up to 5 years. The larval stage lasts one to several weeks and the pupal stage takes from 2 days to a few weeks. Adult females may live 1 to 2 months while males live about 6 to 7 days in the summer, or up to 6 months if they overwinter.

Mosquitoes serve as vectors of many important diseases affecting humans including malaria, yellow fever, dengue fever, filariasis, encephalitis, and West Nile Virus. Some mosquitoes also transmit dog heartworm.

Habits. Mosquitoes have adapted to almost every kind of aquatic situation such as permanent ponds and marshes, temporary flood waters or woodland pools, drainage ditches, and water contained in tree holes, leaves of plants, or artificial containers. The exceptions are flowing streams and the open waters of large streams, rivers lakes, seas, and oceans. The number of generations per year ranges from 1 where the eggs require cold before hatching (e.g. some *Anopheles*), to dozens in warm climates where most breed continuously.

The larvae of most species feed on small aquatic organisms and organic debris which they strain out of the water. Although quite active, the pupae do not feed. The adult males feed on nectar. Although the adult female also feeds on nectar, females of most species require a blood meal before they can lay fertile eggs. Females require 2+ days to digest a blood meal, lay a batch of eggs, and then seek another blood meal.

The flight range of mosquitoes varies with the species, temperature, wind direction, time of year, and distance to blood meal sources. Normal flight ranges of mosquitoes are in the range of 1/2 mile to 10 miles, depending on species.

The time of day in which biting occurs varies with the species. Most medically important species bite at dusk and dawn (crepuscular) and also during the night (nocturnal) such as the vexans mosquito and the northern house mosquito; whereas, others bite only at dusk and dawn such as the eastern saltmarsh mosquito (*Ochlerotatus sollicitans*). Several species of medical importance bite only during the daytime (diurnal) such as the Asian tiger mosquito. Some species which normally do not bite during daytime will do so if disturbed, such as the floodwater mosquito.

Cultural Control & Preventative Measures. At the household level, relief can be achieved by preventing entry to structures via proper screening and sealing. On the personal level, the use of repellents is quite effective. Weekly emptying, or eliminating completely, containers which hold water on one's own property can be of great help in reducing the number of local mosquitoes. This is especially true for mosquitoes that live in close association with humans and have short flight ranges. Discarded tires, old paint cans, unattended bird baths and children's splash pools, upright wheel barrows, unpatched tree holes, clogged gutters, stagnant drainage ditches and low spots that hold rain water for days at a time are all susceptible and correctible mosquito breeding sites.

Professional Control. Mosquito control begins with an accurate and thorough assessment of the problem through surveys and then choosing the control measures best suited to the situation. Integrated mosquito management involves a combination of techniques: (1) to eliminate mosquito breeding sites via habitat modification (source reduction); (2) to control mosquito larvae by introducing insect growth regulators (IGR's), microbial larvicides (e.g. pathogenic bacteria) and predatory fish; and (3) to control adults via pesticide fog applications and applying appropriately labeled residual insecticides to resting surfaces.

Culex restuans mosquito larva (wiggler)

Culex restuans mosquito pupa (tumbler)