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UNIVERSITY OF FLORIDA
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ENY-220

Mosquitoes and Other Biting Flies[1]

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Mosquitoes

Mosquitoes can be an annoying, serious problem in man's domain throughout Florida. They interfere with work and spoil hours of leisure time. Their attacks on farm animals can cause loss of weight and decreased milk production. Some mosquitoes are capable of transmitting diseases such as malaria, yellow fever, and dengue to man, encephalitis to man and horses, and heartworm to dogs.

Mosquitoes are insects with long slender bodies, narrow wings with a fringe of scales on the edge of the wing and along the veins, and long, thin legs. The females have firm mouthparts, usually well-adapted for piercing skin and sucking blood. The males cannot suck blood but both sexes feed on nectar of various plants.

The life cycle (Figure 1) of a mosquito consists of four stages: egg, larva, pupa, and adult. The eggs may be laid singly or in rafts, deposited in water, on the sides of containers where water will soon cover, or on damp soil where they can hatch when flooded by rainwater or high tides.

Around the home suitable places for egg-laying are the sides of containers, such as old tin cans or old tires, or in tree holes to await flooding by rain. The

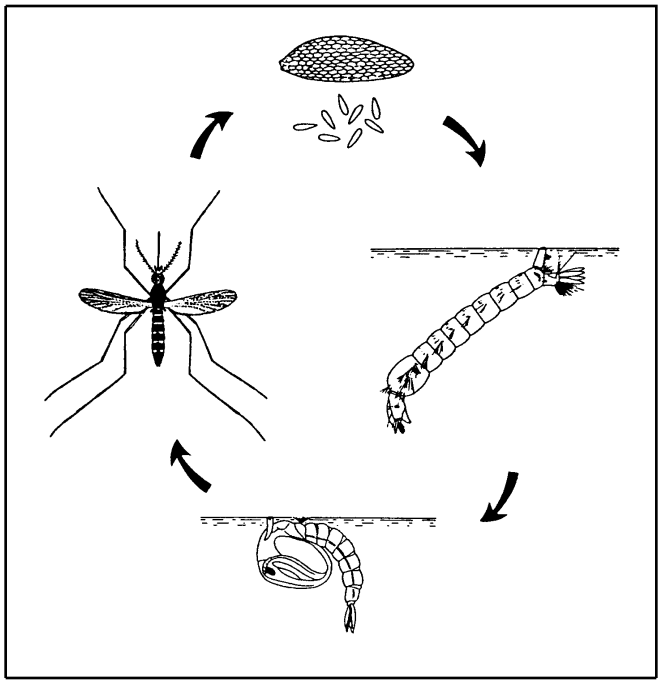

Figure 1. *Aedes aegypti* mosquito life cycle (eggs-top, larva-right, pupa-bottom, adult-left).

eggs of some flood-water and salt-marsh mosquitoes may dry out for more than a year and still hatch when flooded.

Regardless of the mosquito species, water is essential for breeding. Mosquito larvae (Figure 2) are not adapted to life in moving waters. The larvae normally occur in quiet water. Since nearly half the

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total land area of Florida is subject to flooding, mosquitoes breed in large numbers throughout the state. Contrary to popular opinion, mosquitoes do not breed in the heavy undergrowth of weeds, bushes, or shrubs. Although these places provide excellent refuge for adults, they do not provide a suitable habitat for mosquito larvae.

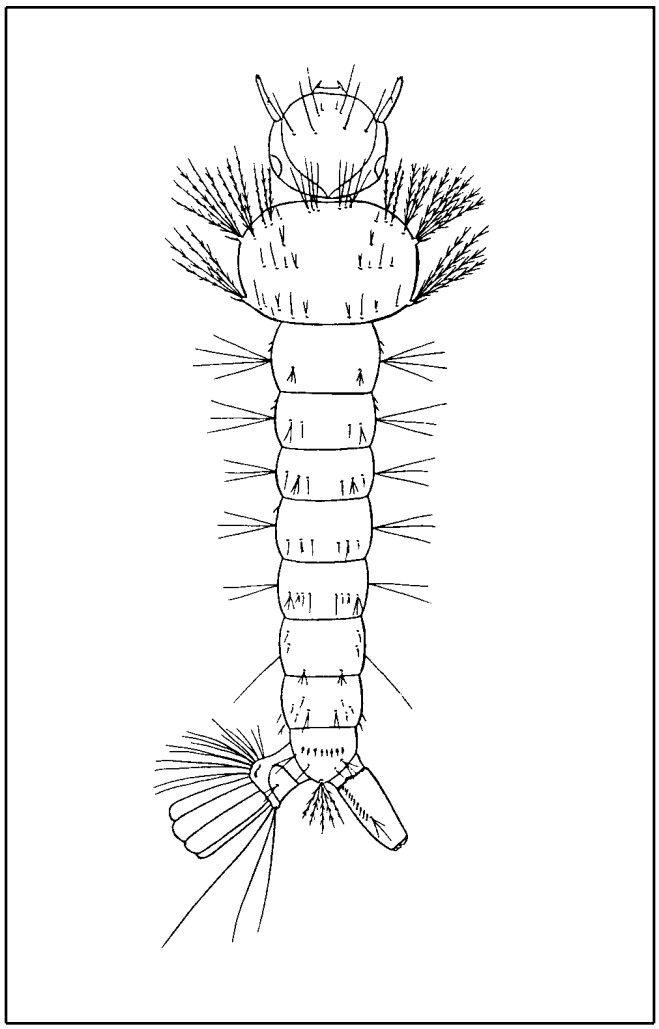

Figure 2. *Aedes aegypti* mosquito larva.

The elongated eggs, about 1/40 inch long, are laid in batches of 50 to 200 and one female may lay several batches. In warm water, the eggs of most species hatch in two or three days. Some eggs require a drying period, remaining dormant for months, they hatch soon after water contacts them.

The larvae or "wigglers" feed on tiny bits of organic matter in the water. Many species breathe air through an elongated air tube which they extend through the water surface. Larvae change into comma-shaped pupae, often called tumblers, in about a week.

The pupae transform into adults (Figure 3) in about two days. Male mosquitoes feed on nectar of flowers and do not bite. Female mosquitoes also feed on nectar; however, a blood meal is usually necessary to mature the eggs.

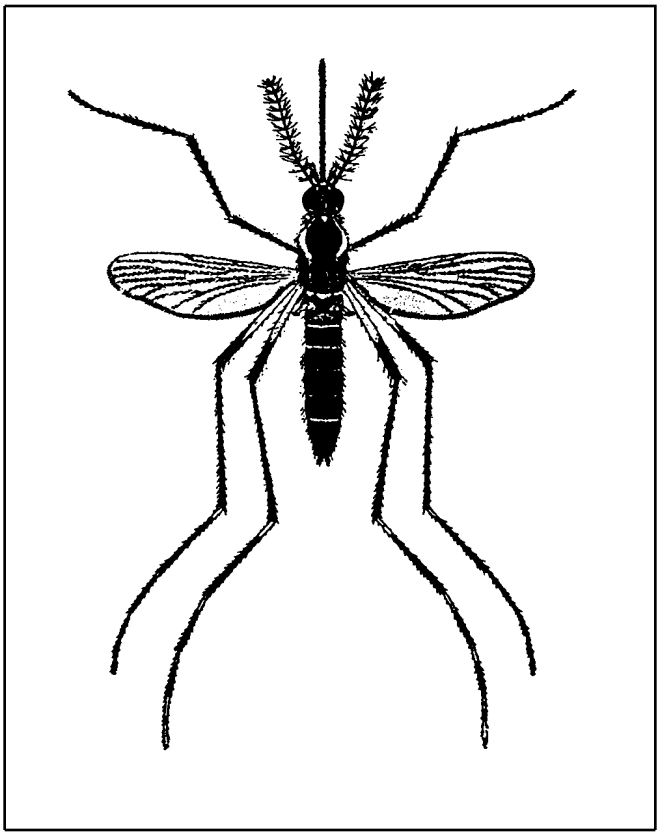

Figure 3. *Aedes aegypti* adult.

Mosquitoes show considerable variation in their preferred hosts. Some species feed on cattle, horses, or other domestic animals while others prefer man. A few species feed only on cold-blooded animals and some live entirely on nectar or plant juices. Some are active at night and others only during the daytime.

Control

Mosquito control can be divided into two areas of responsibility: individual and public. Individuals are responsible to find and eliminate breeding places on their premises. Receptacles such as old tires, junk automobiles, tin cans, rain barrels, and various plants hold enough water to create mosquito breeding. These can be reduced or eliminated by individuals. To keep mosquitoes from being a problem inside the

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house, screens should be kept tight fitting and in good repair.

Chemical control of mosquitoes around the home may be accomplished with the use of repellents or space sprays. Repellents are substances that make a mosquito avoid biting people. Several repellents are effective against mosquitoes. All insect repellents must have the active ingredient appear on the label. Check the label before buying.

Repellent is popular for individual protection because it will repel mosquitoes as well as ticks, fleas, chiggers, sand flies, and black flies. DEET is the most commonly used repellent. It is available in the form of a liquid, aerosol, lotion, and cream. When applied properly to the neck, face, arms, ankles, and other exposed skin surfaces, most repellents will provide protection from mosquito bites for 2 hours up to 12 hours. If desired, old clothing may be sprayed with repellent to provide added protection. Care should be taken not to apply any repellent to eyes, lips, or other mucous membranes.

Oil of citronella is another type of mosquito repellent for space repelling. Oil of citronella is the active ingredient in many of the candles, torches, or coils which may be burned to produce a smoke which repels mosquitoes. These smokes are useful outdoors only under windless conditions. Their effectiveness is somewhat less than repellents applied to the body or clothing.

Space sprays may be used to kill mosquitoes present at the time of treatment. The major advantage of space treatment is immediate knockdown, quick application, and relatively small amounts of materials required for treatment. Space sprays are most effective indoors. Outdoors the insecticide particles disperse rapidly and may not kill many mosquitoes. The major disadvantage of space spraying is that it will not control insects for long periods of time.

Mosquitoes can be killed inside the house by using a household aerosol space spray. Only insecticides labeled for flying insect control should be sprayed into the air. Best results are obtained if doors and windows are kept closed during spraying and for 5-10 minutes after spraying. Follow label directions on the container.

Homeowners may use hand-held foggers or fogging attachments on tractors or lawn mowers for temporary relief from flying mosquitoes. Follow instructions on fogging attachments for application procedure.

Most of the mosquitoes that trouble homeowners and visitors cannot be eliminated through individual efforts, but instead, must be controlled through an organized effort. Florida has over 50 organized mosquito control organizations that specialize in area mosquito control. These control measures include permanent and temporary measures. Permanent measures include impounding water and ditching and draining swampy mosquito breeding areas. Temporary measures include treating breeding areas to kill larvae and space spraying to kill adults.

If you live within an organized mosquito control district, support your organization in their control efforts. Organized control can accomplish much more than individual efforts. If you are not sure about whether your community has a district, contact the local Division of Health officials.

Sand Flies

Often called "punkies," "no-see'ums," or biting midges (Figure 4), the sand flies are vicious where they occur. They are often more troublesome than mosquitoes because they can easily enter dwellings through ordinary 16-mesh window screen. The presence of these insects can decrease property values and severely hamper use of recreational areas. Vacationers and campers literally have been driven away from areas by these tiny biters. Sand flies can also cause loss to cattlemen in terms of annoyance to cattle and transmission of various nematode diseases.

Sand flies are members of the insect order Diptera and undergo a complete development with egg, larva, pupa, and adult forms. The adults are less than 1/16 inch long, dark gray to black in color and have one pair of wings which are spotted. The sand flies breed predominantly in salt marshes; however, some species that are found inland breed in fresh water areas and tree holes.

Larvae of sand flies are found in mud, sand, and debris around the edges of ponds, springs, lakes,

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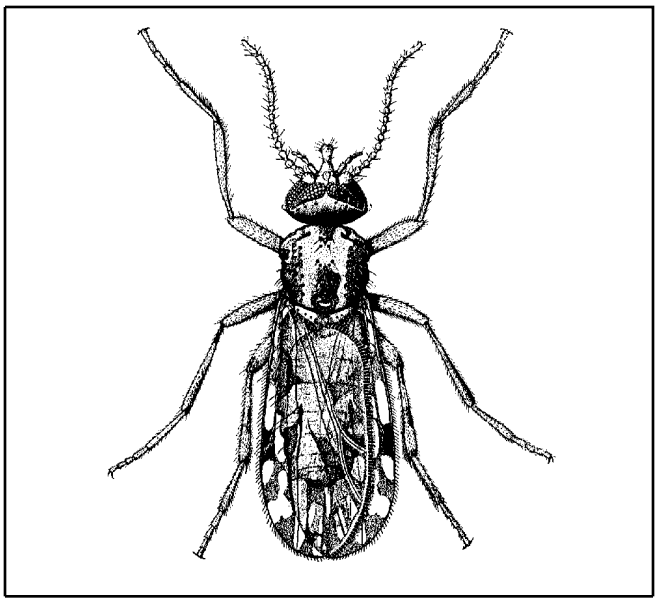

Figure 4. Sand fly.

creeks, and in tree holes or on slime-covered bark. In the water they are free swimmers and are commonly found on floating twigs or leaf trash. The larvae pupate on floating debris or at the water's edge. The adult females, like mosquitoes, require blood to mature the eggs. Males do not bite. Sand fly larvae can be found in marshes the year-round; however, the period of greatest adult activity is June to August.

Sand fly activity is associated with air movement. Adults of most species seldom bite when there is air movement. Sand flies are also sensitive to temperature. Animals having a high body temperature are attractive to great numbers of female sand flies. Persons performing hard labor out-of-doors frequently are severely annoyed by these insects.

Control

Control of adult sand flies with insecticide sprays is mediocre at best and temporary in nature due to the continual emergence of these flies. The larval habitats are so extensive that control of the larvae is not possible. Mosquito Control Districts in Florida are not funded to provide control of sand flies.

On the east coast of Florida, large areas of swamp in several counties have been impounded, that is, surrounded by dikes and kept flooded with water. This is an environmental biting fly control method, that involves changing the breeding habitat of the sand flies. Females no longer lay their eggs and larvae no longer develop in the flooded mud.

Bite Prevention Recommendations

- Avoid outdoor activity during pak biting times.
- If outdoor activity can not be avoided during biting times, apply repellents labeled for sand flies/biting midges according to label directions.
- Increase air movement in screened porches by using high velocity fans.
- Screens can be treated with barrier sprays or portable foggers accoring to label directions for temporary reductions in small backyard situations.

Black Flies

Black flies (Simuliidae) (Figure 5) are small, dark, stout-bodied flies with a humpbacked appearance. The adult females suck blood mainly during daylight hours and are not host specific. The black fly is a potential disease vector in Florida. It hovers about the eyes, ears, and nostrils of man and animals, often alighting and puncturing the skin with an irritating bite. Black flies are not considered to be major pests of homeowners in Florida.

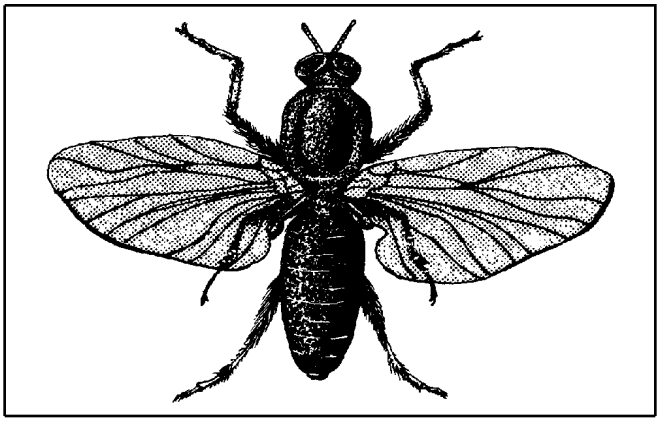

Figure 5. Black fly.

The black fly life cycle begins with eggs being deposited on logs, rocks, or solid surfaces in swiftly flowing streams. Larvae attach themselves to rocks or vegetation with a posterior sucker. The length of the larval period is quite variable depending on the

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species and the larval environment. The adults which emerge after pupation are strong fliers and may fly 7 to 10 miles from their breeding sites.

Control

See mosquito control recommendations for black fly control.

Stable Fly

The stable fly (Figure 6), also known as the dog fly or biting house fly, is a blood-sucking fly which closely resembles the house fly. It is similar to the house fly in size and color, but may be recognized by its sharp, piercing mouthparts which project forward from the head. Unlike many flies, both sexes of the stable fly are vicious biters.

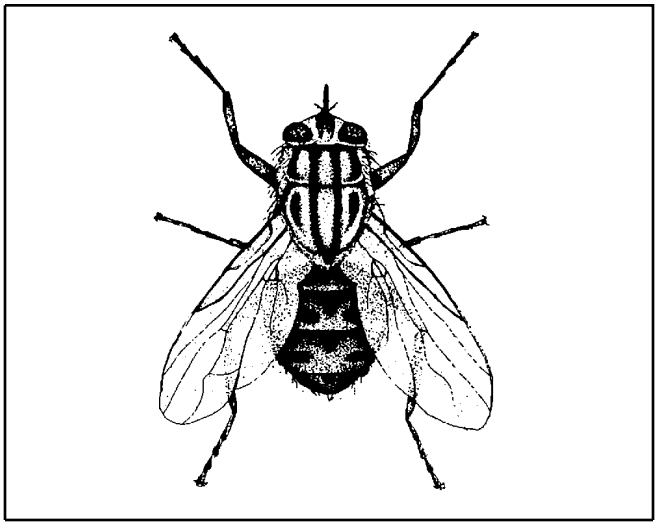

Figure 6. Stable fly.

The fly is a common pest of man and animals throughout the world. In Florida -- especially western Florida -- stable flies are a serious pest of man and have been a severe threat to the tourist industry.

Stable flies are very persistent when searching for a blood meal and may be easily interrupted in feeding. They may be mechanical vectors of animal diseases but are not considered effective in spreading human disease.

Stable flies breed in soggy hay, grain or feed, piles of moist fermenting weed or grass clippings, seaweed deposits along beaches, and manure. When depositing eggs, the female will often crawl into loose material, placing the eggs in little inner pockets. Each female may lay a total of 500 to 600 eggs in four separate layings. The eggs will hatch in 2 or 5 days, and the newly hatched larvae bury themselves, begin to feed, and mature in 14 to 26 days. While the average life cycle is 28 days, this period will vary from 22 to 58 days, depending on weather conditions. The adults are strong fliers and range many miles from the breeding sites.

Control

Stable fly control is most successfully approached with cultural control measures. Since the larvae require moist breeding media, all breeding sources such as grass clippings should be spread to allow drying.

Homeowners may use fogging attachments on lawn mowers or tractors to provide temporary relief from stable flies. Follow directions on fogging attachments for application procedure.

For personal protection from stable fly bites, repellents may be applied to neck, face, arms, ankles, and other exposed skin surfaces. Most repellents protect for several hours.

If you live within an organized mosquito control district, support your organization in their control efforts. Many of the mosquito control districts have effective programs for stable fly control. Their organized control programs can accomplish much more than individual efforts. If you are not sure about your local district, contact the local Division of Health officials.

Horse Flies and Deer Flies

Horse flies (Figure 7) and deer flies (Figure 8) are closely related insects with similar life cycles. Both horse and deer flies are strong fliers and only the female bites. They are daytime feeders and can easily cut the skin open for a blood meal. While feeding an anticoagulant is injected into the wound and causes the blood to flow freely. Many people are allergic to horse fly and deer fly bites. Also, wounds are excellent sites for secondary infection. Since they are intermittent feeders, horse and deer flies are important transmitters of animal diseases.

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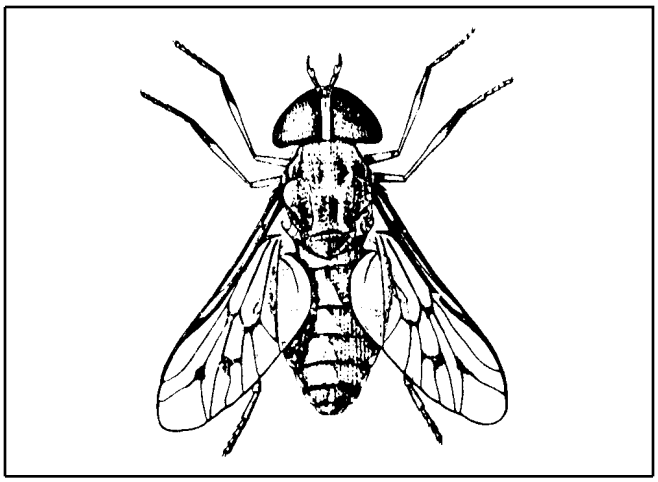

Figure 7. Horse fly.

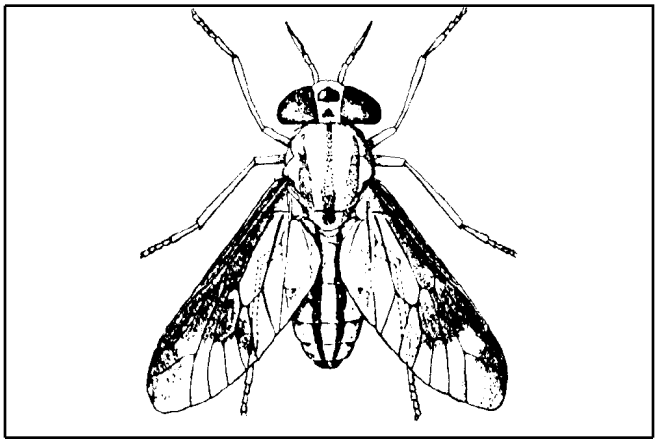

Figure 8. Deer fly.

Most species of horse and deer flies are aquatic or semi-aquatic in the immature stages. Some will also develop in moist earth, leaf mold, or rotting logs. Generally the eggs are deposited in layers on vegetation, objects over water, or moist areas favorable for larval development. The eggs hatch in five to seven days and the larvae fall to the water surface or moist areas where they begin to feed on organic matter.

Many species feed on insect larva, crustacea, snails, and earthworms. When the larvae are ready to pupate, they move into drier earth usually an inch or two below the soil surface. The pupal stage lasts two to three weeks, after which the adults emerge. The life cycle varies considerably within the species, requiring anywhere from 70 days to two years.

Control

There is no effective control of the immature stages of horse flies or deer flies. Individual protection from adults can be obtained by using a repellent on exposed skin and clothing prior to exposure.