SAFETY IN MIMICRY

The best defenses insects have against being eaten are chemical (toxins in the body) or physical (spines or spikes). Insects without such defenses sometimes mimic the appearance of insects that do have them so predators will leave them alone. Since insects don't see as much detail as humans, having nearly the same color and markings as a toxic, stinging, or spiky insect is often enough for the mimic to avoid becoming a predator's meal.

There are two types of mimicry:

- **Batesian mimicry—**When the insect pretender isn't harmful.
- **Mullerian mimicry—**When the insect pretender and the insect it resembles are both dangerous to predators.

One of the best-known examples of Batesian mimicry *used* to be the viceroy butterfly's imitation of the monarch butterfly. The two butterflies look very similar—both are bright orange with black markings—but the viceroy is smaller than the monarch and has a black vein across its hind wings.

Monarchs are toxic to birds because of a substance in the milkweeds they eat. Scientists used to believe that viceroys were tasty to birds and therefore mimicked the toxic monarchs to escape becoming a bird entree. In recent years, though, scientists have discovered that viceroys are toxic to birds, too. So now, viceroys and monarchs are one of the best-known examples of Mullerian mimicry.

This lesson will profile some other great pretenders: flower flies (family Syrphidae, genus *Toxomerus*), which are also called hover flies. Flowers flies go to great lengths to mimic the appearance and behavior of stinging insects like bees and wasps. The adults (Photo 5-1) have colors and markings like bees and wasps, and they visit flowers and collect nectar the way bees and wasps do.

Photo 5-1. This adult flower fly (*Toxomerus marginatus*) is one of the common flower fly species in Michigan. Flower flies mimic bees and wasps while they collect pollen and nectar from flowers. (Photo by David Cappaert, Bugwood.org)

BUSY AS A...FLOWER FLY?!

In the summer, tens or hundreds of flower flies may be active in a garden. In fact, a study of home gardens in Chicago found that almost 25% of flower-visiting insects were flower flies (Lowenstein et al., 2015).

Toxomerus have adapted to many environments (urban, swamp, forest, and agricultural), and they almost certainly live in or visit your garden, too. Several species of flower flies are found in Michigan.

Flower flies lay their eggs on plants. Multiple generations of flower flies are hatched in each growing season. During the final generation of a growing season, the larvae pupate and remain inactive in plant debris or in the soil until the next June or July.

Flower flies don't sting and are harmless to garden plants. In fact, they are beneficial to plants at two life stages. As larvae (Photo 5-2), flower flies feed on aphids and other

Photo 5-2. Flower fly larvae like this one are 0.33 in. to 0.5 in. long. (Photo by David Cappaert, Bugwood.org)

small-bodied pests that damage garden plants. A single larva can eat up to 400 aphids as it develops (Gu, 2024).

As adults, flower flies visit flowers in search of nectar and pollen. Unfortunately, the lack of branched hairs on their bodies makes them less effective pollinators than bees. Their short tongues also keep them from reaching the nectar at the bottom of long, tubular flowers.

Their flattened abdomens, which are unique to *Toxomerus*, and hovering flight pattern make them easy to spot. They fly so fast, though, that it's hard to distinguish between the different species' abdomen color patterns and sizes. If you're up for the challenge of identifying these fast-flying species, the iNaturalist website and app (https://www.inaturalist.org/) profiles the three most common *Toxomerus* species in the Eastern United States. (Insects in a closely related genus of flower flies, *Syrphus*, have similar behaviors to but are slightly wider and longer than *Toxomerus*.)

An insect that pollinates flowers and attacks garden pests is a rare bright spot among the many insect species that just want to munch on garden plants.

NOTABLE MIMICS OF BEES & WASPS

Many other Syrphids are also excellent mimics of wasps, bumble bees, and honey bees. For example, the drone fly (*Eristalis tenax*) has a hairy body and an orange abdomen that makes it easily confused with a honey bee. A closer look, though, would reveal that drone flies lack a second pair of wings and have shorter antennae than honey bees (Photo 5-3).

Drone fly larvae live in moist areas and tolerate degraded sites like drainage ditches and areas with stagnant water.

Some bumble bee mimics, like the hover fly (*Volucella* sp.) in Photo 5-4, match the color pattern of each bumble bee abdominal segment.

MSU Extension's Smart Gardening: Know the Insects That Look Like Bees fact sheet describes how to use physical traits like the number of wings and the antennae length to tell flies apart from bees.

Photo 5-3. The adult drone fly on the left is a lookalike of the honey bee on the right. (Photos by Joseph Berger, Bugwood.org, left; and Nate Walton, MSU Extension, right)

Photo 5-4. The pattern of the black and white hairs on the thorax and abdomen of the hover fly (*Volucella* sp.) on the left make it an excellent mimic of the bumble bee on the right. (Photo by Ken Potter, left; and Nate Walton, MSU Extension, right)

WHAT'S NEXT

Next week we'll wrap up this series with a discussion of how to attract and keep beneficial insects in your landscape and garden.

FIND OUT MORE: REFERENCES & RESOURCES

Calles-Torrez, V., McGinnis, E., Beauzay, P., Walton, N., Landis, J., & Knodel, J. J. (2019). *Smart gardening: Know the insects that look like bees* [Fact sheet]. https://www.canr.msu.edu/resources/smart-gardening-know-the-insects-that-look-like-bees

Gu, A. (2024). Syrphid flies. In A. Shelton (Ed.), *Biological control: A guide to natural enemies in North America*. Cornell University, College of Agriculture and Life Sciences. https://biocontrol.entomology.cornell.edu/predators/syrphids.php

iNaturalist.org. (n.d.). *Identifying* Toxemerus *hoverflies*. https://www.inaturalist.org/posts/14985-identifying-toxomerus-hoverflies

Lowenstein, D. M, Matteson, K. C., & Minor E. S. (2015). Diversity of wild bees supports pollination services in an urbanized landscape. *Oecologia*, *179*, 811–821. https://doi.org/10.1007/s00442-015-3389-0

MICHIGAN STATE UNIVERSITY | Extension