



# Parks, Monarchs & Milkweeds

Citizen Science Field Guide



**Parks &  
Recreation**

# Acknowledgments

Thank you to the authors and editors of the sources used to prepare this booklet:

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## **Boise Parks & Recreation**

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Cover Photo: © 2015 Daniel Gonzalez

**P**arks, Monarchs & Milkweeds is a Boise Parks & Recreation citizen science program that engages volunteers in the monitoring of milkweed sites in Boise parks to further work being done on a national level to protect and preserve monarch butterfly habitat.

The monarch butterfly, Idaho's official state insect, is dependent on milkweed for survival. It is the only plant on which the female lays eggs and the sole food source for the rapidly growing larvae.

Parks, Monarchs & Milkweeds gives citizens the opportunity to help this pollinator species by monitoring and recording the presence of monarchs—including eggs, larvae and adults—on milkweeds and to report the activity for inclusion in a national online database.

Thank you for joining us in this important effort.



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## Egg

Every monarch butterfly begins life inside a tiny egg that's no bigger than the head of a pin. Eggs are difficult to see with the unaided eye. A magnifying glass can help an observer determine if what they see is in fact a monarch butterfly egg.

Identifying features of a monarch egg include:

- Off-white color
- Oval shape
- Longitudinal ridges

Monarch eggs hatch 3 to 8 days after they are laid. Warmer temperatures increase the rate of development. Female monarchs usually lay only one egg per milkweed plant, but sometimes clusters of eggs are found on the same plant.



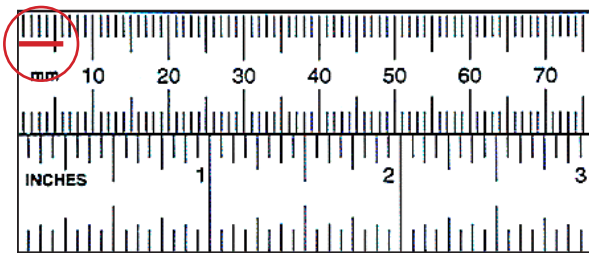
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## First Instar

The egg that the larva emerges from typically becomes its first meal. After the egg has been consumed, the larva turns its attention to the leaves of the host milkweed plant.

First instars are at the beginning stage of a two-week process in which they will become 200 to 300 times bigger and shed their skin five times.

Early first instars are grayish-white with a black head. They have no distinct markings but are covered with tiny hairs, called setae. Later, first instars become a greenish color and develop dark banding. At this stage, the larvae are just 2 to 6 mm long.





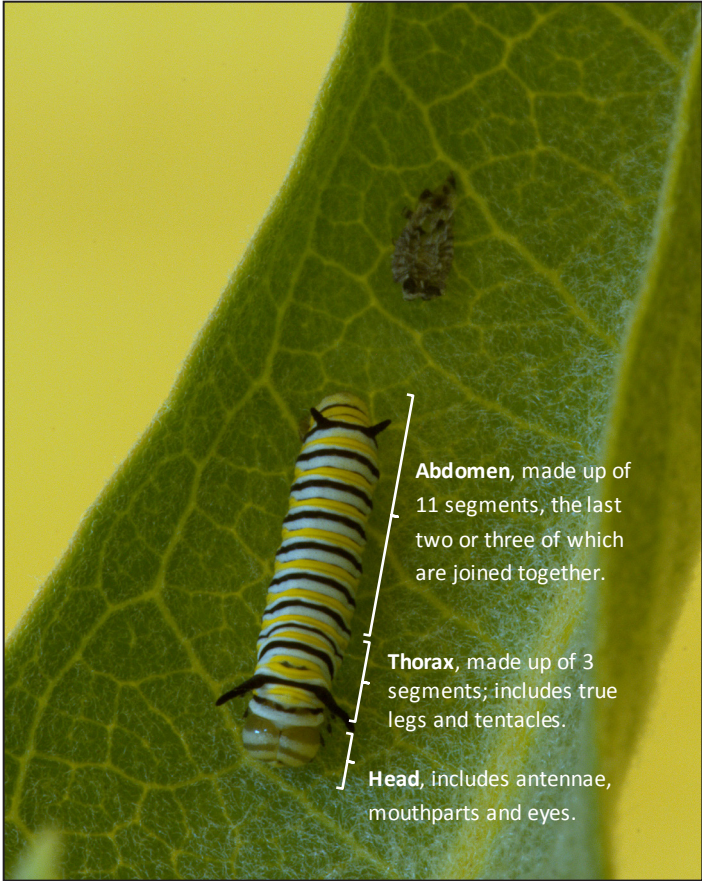
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## Second Instar

One to three days after hatching, the larva has reached the second instar stage and has already shed its skin once. The molted skin becomes a meal for the growing larva, but it is only a temporary change in diet. The larva will continue to consume the leaves of the milkweed plant for the duration of the larval phase.

The photograph on page 6 shows the alternating dark, yellow and white banding that becomes more prominent as the caterpillar grows. It is also at the beginning of the second instar stage that the tentacles—both front and back—become visible to the unaided eye.

Second instar larvae are 6 to 9 mm long. They will molt again in one to three days, depending on temperature.



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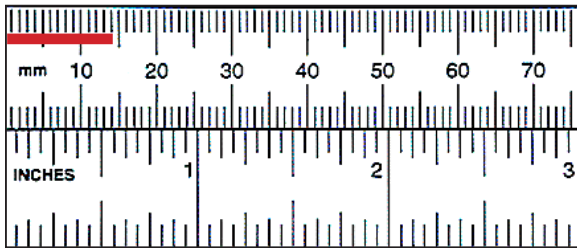
## Third Instar

The third instar larva has distinct, clearly visible tentacles; the front tentacles are about twice as long as the rear.

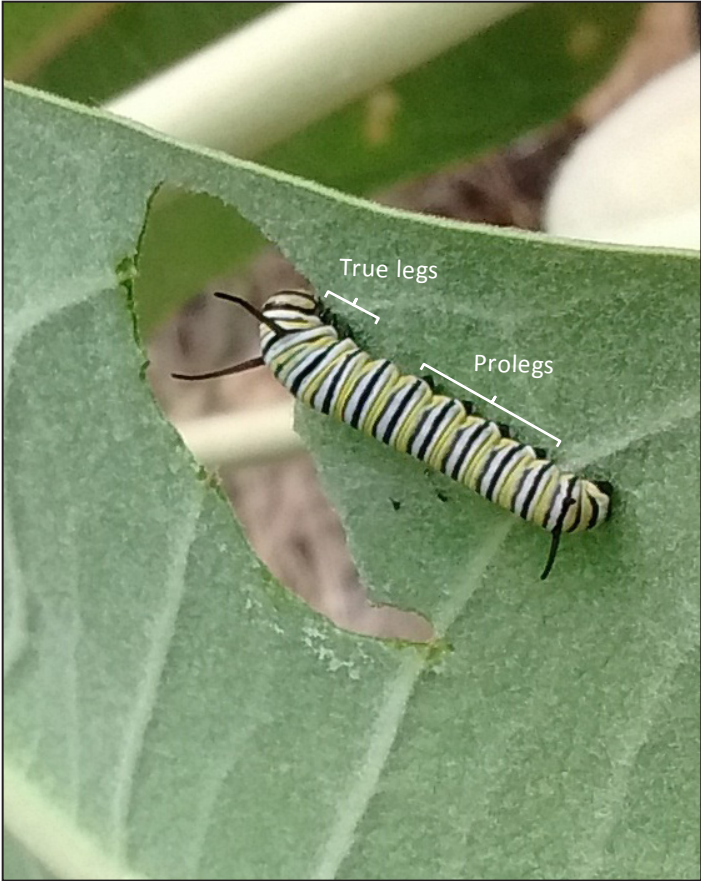
The banding on the abdomen is thick and distinct, but still less so on the thorax. Yellow stripes on the head have become more visible.

The photograph on page 8 shows a newly molted third instar before it turns around to consume its shed skin.

Instars at this stage are about 10 to 14 mm long.







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## Fourth Instar

Size is not always a reliable way to determine larval stage. A fourth-stage larva can be anywhere from 13 to 25 mm long—almost twice the length at the end of this stage as it was at the beginning.

A better indicator of developmental stage is the length of the front and rear tentacles. Rear tentacles are about the same length as the front tentacles of the stage that preceded it. A third instar's front tentacles are about the same length as a fourth instar's rear tentacles, and a fourth's fronts about the same as a fifth's rears.

The banding on the fourth instar's thorax is more defined than it was in the third stage, and the true legs and prolegs are clearly visible to the unaided eye.

The photograph on page 10 shows the feeding pattern of later-stage instars.



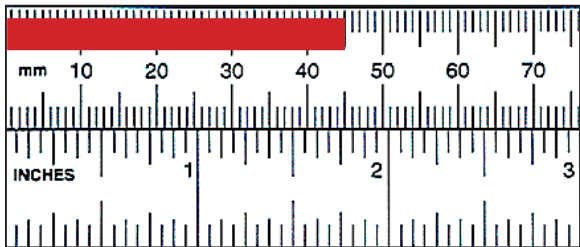
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## Fifth Instar

The black, yellow and white banding of the fifth instar is vivid and distinct. The caterpillar is plump at the final stage of development, particularly just prior to pupating.

The fifth instar can cover a lot of ground and will begin looking for a good place to pupate. The fifth instar stage lasts longer than the previous ones—about 3 to 5 days. At the end of the fifth stage, development from egg to adult is about halfway complete.

Fifth instars are about 25 to 45 mm long. Newly molted fifth instars will nearly double in length before the fifth stage is complete.





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## Pupa

The next distinct phase of development is the pupa stage, which also lasts approximately two weeks.

The picture on page 14 shows the white silk pad that a fifth instar placed on the underside of a milkweed leaf using the spinneret located on its head. The monarch's spinneret contains silk glands.

After the silk pad is placed, the caterpillar stabs its black cremaster—an appendage at its rear—into it to anchor itself, hanging upside down. Once this stage is complete, development of the chrysalis can begin.

The fifth instar sheds its skin for the last time and transforms in the process, creating a chamber in which it will complete metamorphosis.



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## Pupa, Late Stage

Just before the adult monarch emerges from its chrysalis—a process called eclosure—the distinct orange, black and white patterning of the butterfly’s wings is visible through the transparent pupa casing. Until this time, the pigmentation of the wing scales is not developed.

Adult butterflies typically emerge from their pupa casings in the morning. The wings will be crumpled upon eclosure. For the first few minutes after emerging, the butterfly pumps hemolymph (arthropod equivalent of blood in vertebrates) into its wings to expand and ready them for flight. The butterfly hangs by its legs with its head up during this process, allowing gravity to assist.

The monarch butterfly emerges from the pupa full-grown and will remain the same size for the duration of its life. It will immediately begin seeking nectar, which will make up the large majority of its food.



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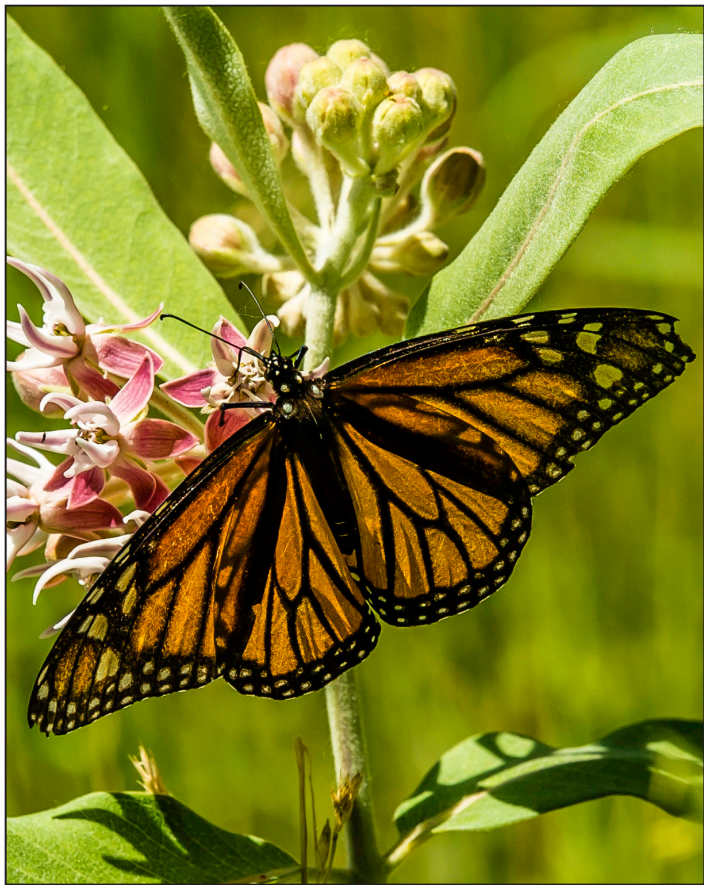


## Adult Male

All butterflies have four wings: two forewings and two hindwings. The distinctive coloration of the monarch butterfly includes black veins on both sets of wings and white-spotted wing edges.

Male monarchs have an additional trait that helps differentiate them from females: a black spot along one of the veins of each hindwing. These spots, called alar pockets, are located on the upper surface of the wing and produce pheromones. Males also typically have narrower veining than females.

Like females, males can see ultraviolet light that humans can't. They search for food sources by sight, use their antennae to smell, and receptors on their feet to taste the sweetness of nectar, which they drink using the proboscis.



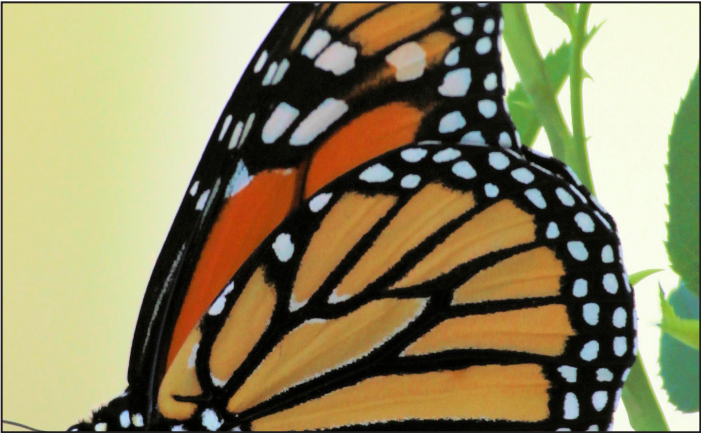
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## Adult Female

The female monarch uses her legs to find appropriate host plants for her eggs. She drums each of her six legs on a milkweed leaf, causing it to emit juices which are then detected by receptors on her legs. From the information gathered, she determines whether the plant will provide the nutrients needed by her offspring.

Females and males mate several times during their lives. Females begin laying eggs immediately after mating, typically one per host plant. She can lay hundreds of eggs over the course of her adult life.

Non-migrating monarch butterflies live two to six weeks. Migrating butterflies—those that emerge in late summer or early fall—live up to nine months. Monarchs that emerge in Idaho migrate south to Southern California or Mexico, where they spend the winter in insulating groups until the weather allows them to return and reproduce.



Top photo: © 2015 Virginia Rivers; bottom photo: © 2015 Daniel Gonzalez

## Viceroy: A Monarch Impostor

Which of the photos at left is a viceroy butterfly and which is a monarch? Viceroy butterflies bear a striking resemblance to monarchs, but there are differences.

One of the easiest ways to tell them apart is to look for the black line that crosses the hindwing of the viceroy. This line can be viewed from the side, as shown on page 22, and from above when the butterfly's wings are spread.

One of the benefits to the viceroy of being nearly identical to the monarch is that it is also often mistaken by predators as poisonous. Due to their early diet of toxic milkweed, monarchs are often avoided by birds and other predators that become sick after eating them.

Another species that resembles monarchs is the painted lady, but painted ladies are smaller than monarchs and their wings include brown coloration along the body.



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## Vegetative Showy Milkweed

There are over 140 known species of milkweed plant. The vegetative—plants without buds, flowers or pods—milkweed pictured on page 24 is Showy Milkweed (*Asclepias speciosa*), the most common and widespread of Idaho’s six native milkweeds. The photograph on page 24 was taken in mid-July at Boise’s Kathryn Albertson Park.

The fibrous stems of the milkweed plant have been used by indigenous people of North America to make string and rope; the stem and other parts of the plant have been used for food and medicine.\* The floss of the milkweed seed pod is currently being used commercially in pillows and bedding.

Perhaps milkweed’s best-known use is as an essential food source for monarch larvae. It is also a nectar source for a variety of pollinators, including butterflies, hoverflies, bees, and wasps.

*\* Milkweed is toxic. Do not ingest without sufficient preparation.*





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## Flowering Showy Milkweed

Showy Milkweed is characterized by its height—typically 1.5 to 3 feet tall but reaching 6 feet in favorable conditions—and showy flower clusters, most commonly pink but also purple and red.

All species of milkweed contain a white, toxic sap that serves as a natural defense against foragers, such as deer and livestock. Consumption of large quantities can result in death, but such consumption is rare due to its bitter taste.

As the only food eaten by monarch larvae, the protection extends to them as well. The toxic cardiac glycosides build up in monarchs over time, making them undesirable to birds and other predators that learn to avoid eating insects that make them sick. (However, not all birds are affected by the toxic cardiac glycosides.)

Showy Milkweed occurs naturally in 28 Idaho counties.

The photograph on page 26 was taken in early June at Boise's Ann Morrison Park.



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## Immature Seed Pods

The fruit of the Showy Milkweed plant is a spiky seed pod that contains dozens of seeds that are dispersed when the pod splits open in the late summer to early fall.

The pods in the photograph on page 28, taken in early July at Boise's Ann Morrison Park, contain immature seeds that would not be viable if dispersed at this stage. The tough, spiky shell of the pod provides protection for the seeds inside, enabling them to mature before they drop to the ground or are carried by wind to a new location.



## Mature Seed Pods

At maturity, Showy Milkweed seed pods turn a whitish-tan and split open along one seam, releasing the viable, brown seeds inside.

The photograph on page 30, taken in late August at Boise's Ann Morrison Park, shows mature seeds attached to the hair-like floss that aids in dispersal. As the pod dries out, the floss fibers expand and push out of their casing, forming a "puffball" that is easy to identify in the fall (see page 32).



## Seed Dispersal

Mature Showy Milkweed seeds are attached to fine floss strands that, when dry, are easily carried and dispersed by wind.

The seeds of most milkweed species are dormant in the fall and begin germinating in late winter or early spring, depending on temperature. These seeds germinate at a higher rate when they are subject to stratification—exposure to cold, damp conditions—during dormancy.

The photograph on page 32 was taken in early September along the Boise River Greenbelt's Bethine Church River Trail.





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## Other Milkweeds Native to Idaho

Milkweed is a perennial in the Dogbane family and an important nectar source for pollinator species, including butterflies, bees and wasps.

In Idaho, milkweed blooms from May through September and propagates by seed.

In addition to Showy Milkweed, Idaho native species are:

- *Asclepias asperula*: Antelope Horn or Spider Milkweed
- *Asclepias cryptoceras*: Pallid Milkweed
- *Asclepias fascicularis*: Narrow-leaf Milkweed
- *Asclepias incarnata*: Swamp Milkweed
- *Asclepias subverticillata*: Poison Milkweed

The photograph on page 34 is of Swamp Milkweed.



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## Dogbane: A Milkweed Look-Alike

Milkweed is a close relative of *Apocynum cannabinum*, known commonly as dogbane, which is similar in appearance and, like milkweed, has a toxic milky sap.

Despite these similarities, there are tell-tale differences. Dogbane's stems are reddish and typically darker than those of milkweed. Dogbane stems and leaves are smooth, whereas those of milkweed are hairy.

Often called hemp dogbane, the plant is known for the historic use of its stems to make cordage. Dogbane grows throughout the United States and in southern Canada.

The photograph on page 36 was taken in mid-July at Boise's Kathryn Albertson Park.



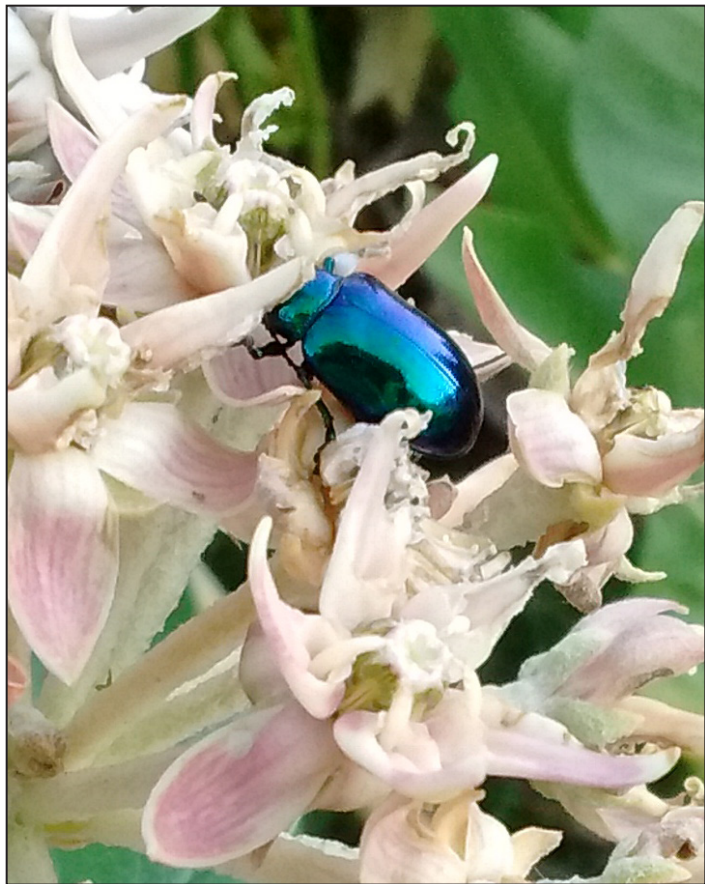
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## Milkweed Longhorn Beetle

The milkweed longhorn beetle finds both food and shelter among milkweeds. Like monarch larvae, longhorn beetles store the poisonous sap of milkweeds in their bodies, making them bitter and undesirable to predators. Their bright-red color acts as a warning sign to anything that might consider eating them.

The milkweed longhorn beetle, aptly named for its long antennae, eats only milkweeds and related plants. Many of the dozen or so species of milkweed longhorn beetles in the United States are attracted to a particular species of milkweed plant. The milkweed longhorn beetles pictured on page 38 are specific to Showy Milkweed.

The beetles' dependence on milkweed is beneficial to the plant, which relies on insects to spread its pollen. Beetles are just one of several species that provide this courier service.



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## Cobalt Milkweed Beetle

The cobalt milkweed beetle (*Chrysochus cobaltinus*) is named for the iridescent blue-green coloration of its exoskeleton. A member of the leaf beetle family (*Chrysomelidae*), cobalt milkweed beetles feed on the leaves and flowers of the dogbane family of plants, which includes milkweed.

Both larvae and adults feed on milkweed and can cause considerable damage when they are present in large numbers. This damage can cause the plant to go dormant until the following season. Like other milkweed-eating insects, the leaf beetle is not deterred by the plant's toxicity. Instead, it bites through the leaf veins, allowing the poisonous sap to drain out before feeding on the outer side of the cuts.





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## Aphids

Aphids are commonly found on milkweed, feeding on the plant's fluids and excreting a sticky substance that can coat the leaves and damage the plant.

The aphids pictured on page 42 are oleander aphids (*Aphis nerii*), easily identified by their bright yellow color, which can serve as a warning to potential predators that they store milkweed toxins in their body.

Despite their toxicity, aphids are food for many insects, including ladybugs. The cluster of yellow eggs on the bottom center of the photograph are ladybug eggs, strategically laid on the underside of a leaf where aphids are present. As the ladybugs grow, nearby aphids will provide a ready meal.



A fifth instar eats the leaf of a milkweed plant.

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## Additional Definitions

**Precipitation:** Rain, snow, sleet or hail that falls to the ground (neither fog nor frost are precipitation).

**Trace:** An immeasurable amount; less than 0.01 of an inch. A drop or two of rain on an otherwise dry sidewalk is a trace.

**Flying (migrant):** Subjective—monarch flying out of or over the site in a relatively straight direction and altitude that indicates migratory behavior.

**Flying (foraging):** Subjective—monarch flying near ground-level, flight path non-directional.

**Loafing/Perched:** Monarch perched on a non-flowering plant or other object during daytime.

**Night Roosting:** Monarch perched in a tree, shrub or other sheltered site, just prior to sunset.

**Nectaring:** Monarch actively nectaring from a flower.

**Mating:** Male and female monarchs clasped together.

**Egg Laying:** Female monarch actively laying eggs.

**Eclosing:** Butterfly is emerging from pupal case.

**Other:** None of the above behaviors (note in comments).



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