



MONARCH JOINT VENTURE

Partnering across the U.S. to conserve the monarch migration

www.monarchjointventure.org

The Monarch Joint Venture is a partnership of federal and state agencies, non-governmental organizations, and academic programs that are working together to protect the monarch migration across the lower 48 United States.

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Rearing Monarchs:

A guide to raising monarchs in your home or classroom



Finding Monarchs

Monarch caterpillars require milkweed to grow and develop into butterflies, and they feed on many of the over 100 species of milkweed native to North America. These plants, key to monarch survival, are found along roads and highways; in yards, parks, and gardens; in old fields; and in pristine native prairies and other natural habitats.

Look for monarch eggs or caterpillars on the undersides of milkweed leaves. They can sometimes be found amongst the buds or flowers at the top of the plant. When you find an egg or caterpillar that you'd like to rear inside, remove the entire leaf that you find it on and transfer it to your rearing container. Include a label with the stage, date, and location that you found it. Now you're ready to watch it grow!

Finding Milkweed

Once you have your caterpillars at home or in a classroom, you'll need a reliable source of milkweed. When collecting milkweed, it is very important to avoid plants that have been treated with insecticides. If you don't know whether or not milkweed has been treated, try to find another source, or if possible, use the milkweed on which you found the caterpillar(s) feeding. When you collect milkweed, you can pick the entire plant if you want to save collecting time (check to make sure you aren't taking any unexpected insects home). Rinse leaves before feeding them to

your caterpillars, blotting off extra water, and keep any extra leaves in a plastic bag in your refrigerator. If you save leaves, you can place damp pieces of paper toweling between them to keep them moist. If you have milkweed handy in your yard, you can pick a leaf or two at a time, rinse it off, and give it to the caterpillar.

Precaution: Latex from milkweed plants is painful and can even cause corneal damage if it is rubbed into eyes. Avoid touching your eyes and wash your hands thoroughly after handling milkweed.

Rearing Cages or Containers

Monarch caterpillars can be kept in an aquarium, large jar, ice cream bucket, bug cage, or another container. The container should be easy to open, since you need to clean it every day. It

should have a screen covering or holes for air flow and should allow you to see the caterpillar inside. Unless you plan to move the chrysalis, the cage should be large enough for the adult to expand its wings when it emerges. Keep the cage out of the sun or other hot places (like inside a vehicle during summer). High temperatures can kill caterpillars.

If you plan to submit your observations to a citizen science project, like the Monarch Larva Monitoring Project (www.mlmp.org), it is best to use a rearing set-up that allows you to track individual caterpillars accurately, since you'll want to know the stage at which they were collected.

Top Three Rules for Raising Healthy Monarchs

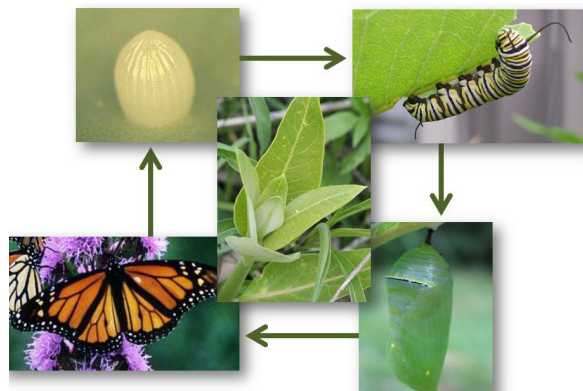
1. **Keep the cage clean.** Rearing containers need to be cleaned of frass and dried or old milkweed daily. Mold will grow if this is not done.
2. **Keep milkweed fresh.** Add fresh milkweed every day to ensure monarch larvae have quality food.
3. **Avoid extreme temperature and moisture conditions.** Keep rearing containers out of direct sunlight and make sure that there is not too much moisture (paper towel should be moist, but not dripping wet). Temperatures that are too cold will delay monarch development. If the container is in direct sun, it will act like a greenhouse, and heat up to potentially lethal temperatures.



Egg (1-5 days)

Do not leave eggs or caterpillars in direct sunlight or other hot places. To keep the milkweed from drying out, keep eggs (on the milkweed on which you collected them) in a container lined with a moist paper towel.

The eggs should hatch within 1-5 days if kept at room temperature. After hatching, the 1st instar caterpillar will eat its chorion, or eggshell, before beginning to eat milkweed.



Adult Butterfly

Butterflies shouldn't be handled for the first 4-5 hours after they emerge, and can be kept in the cage for up to a day before being released. If you keep a butterfly longer than one day after it emerges, you will need to provide nectar. If flowers are not available, you can offer the butterfly a clean sponge or cotton ball saturated with a 20% honey or sugar water solution. A warm sunny day is an ideal day to release them. Hold

the butterflies carefully with their wings closed when you release them, or simply open the cage to let them fly out.

Larva/Caterpillar (10-14 days)

Keep the paper towel at the bottom of the container moist, but not dripping wet, and replace it often. If it is too wet, mold may grow.

You can keep 2-5 caterpillars together in small containers until they are about 1-2cm long. After this, move them to bigger containers or keep them singly in small containers. When moving monarchs, handle them as little as possible to avoid hurting them or spreading disease. You can remove old leaves from the container once the caterpillar has crawled to fresh milkweed. Caterpillars that are motionless on the side or top of the cage (not feeding) are especially vulnerable to injury because they are probably preparing or recovering from a molt. Be careful not to disturb or move them during these periods of apparent inactivity. Before a caterpillar is ready to form its chrysalis, make sure that it is in a container tall enough for the adult to emerge in.

You will probably have some mortality. This may be caused by a virus or bacterial infection, or by contaminated milkweed. Remove dead or unhealthy caterpillars from the rearing containers as soon as you see them.

When ready to pupate, larvae will crawl to the top of their cage, attach themselves with silken thread, and form a pre-pupal "J" before shedding their skin for the last time. This process is fun to watch, but it happens quickly. You can tell they will shed their larval skin soon when their tentacles hang very limply and their bodies straighten out a little.

Pupa/Chrysalis (9-14 days)

Chrysalis is the term for a butterfly pupa; cocoon is a term for the silk (or other material) covering around many moth pupae. A monarch pupa is called a chrysalis, not a cocoon. The pupa stage is immobile and lasts for 9-14 days in monarchs.

Monarchs rarely pupate on milkweed, but sometimes they do! The day before a butterfly emerges, the pupa becomes dark and the wings become visible through the pupal skin. The butterflies usually emerge in the morning; their wings will be soft, flexible, and wet when they first emerge. If they fall, carefully pick them up by holding the thorax (body segment which the legs are attached to), and place them on the top or side of the cage. They need to hang with their wings pointed down. A pupa that has been very dark for more than a few days is likely dead.

Rearing Tips and Precautions

- **Be conscious of disease.** Viral and bacterial infections spread very quickly from one caterpillar to another, so keep containers clean and sterilize them often. A 20% bleach solution works well to sterilize rearing containers.
- **Test for the protozoan parasite, OE.** Monarch adults can spread dormant spores of a protozoan parasite, *Ophryocystis elektroscirrha*, to milkweed plants and to their eggs. When a caterpillar consumes these spores, from their eggshell or the milkweed plant, they become infected with the parasite. To reduce risk of spreading this disease, do not keep untested adults in the same container as larvae and sterilize containers often. For more information on testing for OE, visit the Project Monarch Health website: www.monarchparasites.org
- **Clean cage, fresh milkweed, avoid extreme conditions.** Keep the three rules of successful monarch rearing in mind at all times. Monarchs become stressed in poor conditions, which can cause mortality.

Monarch Rearing and Conservation

By providing abundant milkweed for monarchs throughout their breeding range, and nectar sources throughout their migratory flyway, we are improving monarchs' chance of survival. While collecting and raising monarchs may save individuals from natural predators in the wild, the population as a whole will benefit more greatly from humans doing everything that we can to conserve their breeding, migrating, and overwintering habitats.

Raising monarchs has conservation benefits, mostly through education and increasing awareness. Raising a monarch from egg to adult can have a lasting impact on students and adults. Once they are introduced to these incredible insects, people will focus more time and energy on protecting monarchs and other pollinators by creating and conserving habitat that will attract them!

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