



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 Responsibly:

A conservationist's guide to raising monarchs for science and education

Rearing and Conservation

In the face of monarch population declines, passionate conservationists are fighting to save this winged icon. Conserving, enhancing, and restoring monarch breeding, migration, and overwintering habitat is essential in reversing this downward trend. Providing high quality and abundant milkweed and nectar sources throughout the monarch range will help to ensure successful reproduction and survival of monarch butterflies and other important pollinators.

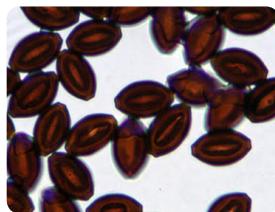
Many people also help monarchs by collecting and raising them indoors. We do not recommend captive breeding or purchasing commercially reared monarchs for release as a means to supplement the natural monarch population. Indoor rearing is likely to save wild-caught individuals from voracious predators, can have positive educational outcomes, and can contribute to our understanding of monarchs through citizen science or other research. Raising monarchs is a captivating experience that can encourage conservation actions. However, indoor rearing can actually harm monarchs if proper procedures are not followed.

Disease Concerns

Monarchs did not evolve under gregarious (high density) conditions, and thus larvae reared in close proximity to one another are highly susceptible to disease transmission. Keep rearing containers clean and sterilize often using a 20% bleach solution. Containers should be rinsed with water before new larvae are introduced. Additionally, always test reared adult monarchs for the OE parasite (*Ophryocystis elektroscirrha*). Adult monarchs can spread dormant spores of OE to milkweed plants and to their eggs. When a caterpillar consumes these spores, they become infected with the parasite. To reduce risk of spreading this parasite, do not keep untested adults in the same container as larvae and do not allow adults to emerge in a container in which larvae are feeding.

Genetic Concerns

Species bred in captivity often adapt to their captive settings in just a few generations. Frankham (2008) suggests that these genetic adaptations are overwhelmingly deleterious when individuals that have resulted from multiple generations of captive breeding are returned to wild environments. Thus, we do not recommend captive breeding for release as a means to supplement the natural monarch population.



From left: OE parasite spores, dead/diseased monarch larva, individual sized rearing container, fresh milkweed

References

Frankham, R. 2008. Genetic adaptation to captivity in species conservation programs. *Molecular Ecology*, 17: 325–333. doi:10.1111/j.1365294X.2007.03399.x

Monarch Larva Monitoring Project (www.mlmp.org) - Report wild-caught monarchs that you raise
Project Monarch Health (www.monarchparasites.org) - Sample adults for OE parasites

Find Monarchs and Milkweed

Monarch caterpillars require milkweed to grow and develop. With over 100 species of milkweed in North America, these plants are critical to monarch survival. Look for monarch eggs or caterpillars on the undersides of milkweed leaves. They can also be found amongst buds or flowers at the top of the plant. When you find a caterpillar, remove the whole leaf on which you find it and transfer it to your rearing container.

Once you have your caterpillar at home or in a classroom, you will need a reliable source of milkweed. When collecting milkweed, be sure to avoid plants that have been treated with insecticides. If you don't know, try to find another source.

We recommend that you rinse leaves before feeding them to your caterpillars. This will both clean the leaves, and keep them fresher for longer. You should blot off extra water, and can keep any extra leaves in a plastic bag in your refrigerator. Precaution: Latex from milkweed 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.

Monarch caterpillars can be kept in an aquarium, large jar, bug cage, or another clear container. It should have a screen covering allowing for plenty of air and a view of the caterpillar. The cage should be large enough for the adult to expand its wings when it emerges. Make sure to keep the cage out of the sun; high temperatures can kill caterpillars. If you plan to submit your observations to a citizen science project, like the Monarch Larva Monitoring Project, it is best to use a rearing set-up that allows you to track individual caterpillars accurately.

Egg (1-5 days)

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.

Larva/Caterpillar (10-14 days)

Continue to keep a damp (NOT dripping wet) paper towel at the bottom of the container, and replace it often. We recommend keeping the caterpillars singly in small containers, but some people have high success rates when caterpillars are kept together; it's up to you, but remember that you won't be able to keep track of each individual if they're together. When moving monarchs, handle them as little as possible to avoid hurting them or spreading disease. 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.

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.

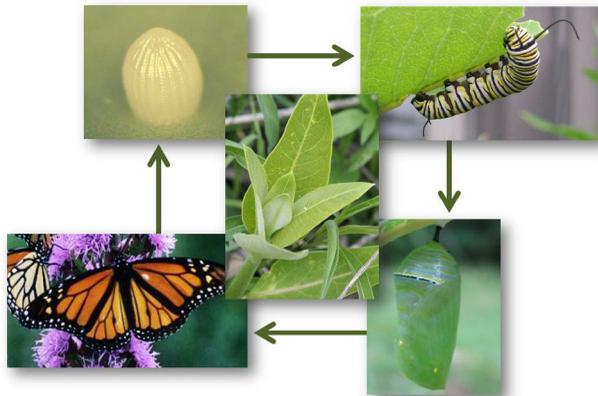
Pupa/Chrysalis (9-14 days)

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 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.

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 (or fed). 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.



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. Clean containers often with a 20% bleach solution.
- 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.
- 4. 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. Rinse with water before next use.



Photo credits: Tom Collins, Sonia Altizer, Diane Rock, Kaitlyn Creasey, Michelle Solensky, Denny Brooks, Mary Holland, Dave Astin, Wendy Caldwell