



Rearing Monarchs

REARING MONARCHS

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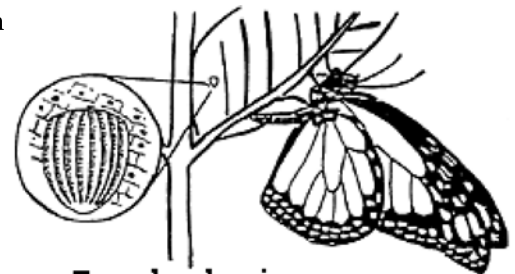
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This section contains practical tips on successfully rearing Monarchs, and ways in which you can increase your chances of observing the changes that occur during their metamorphosis. There are many ways to rear larvae; feel free to make modifications that work for you. If you plan on rearing large numbers, or more than one generation, you may have trouble with disease. To prevent this, sterilize all rearing containers between generations with a 10% bleach solution, and do not keep larvae in crowded conditions.

Please clean their containers often - it is not good for them to live in their own waste.

The Egg

Monarch butterfly eggs are somewhat difficult to find in the wild. Since it only takes 3-5 days for eggs to hatch, timing is crucial. The best sign is to watch for adult Monarchs stopping at milkweed plants. A female will usually lay only one egg per milkweed plant to ensure enough food for each larva. The egg is usually laid on the underside of the leaf, and females prefer young plants. If you do find an egg, it is best to collect the entire plant, and put its stem in water as soon as possible. If necessary, you can just take the leaf on which it is resting. If Monarchs are reared in captivity, females will lay dozens of eggs on a single plant.



Female laying an egg

Keep the plant stem in water. It may last longer if you cut the end of the stem just before putting it in water. If you have just taken the leaf, keep it on a moist paper towel or filter paper in a petri dish or any other clean container. Keep the container covered to maintain modest moisture. Check each day and add water a drop at a time to the filter paper if necessary.

The top of the egg will look dark before the larva is ready to emerge. Be sure to have a fresh milkweed leaf in the container for the new larva, if its old leaf is dry.

The Larva (Caterpillar)

Once the larvae emerge, they will need fresh milkweed leaves. They won't eat any other plants, although they do eat many different species, or kinds, of milkweed. If the original plant is still fresh, it is easiest to just leave the larvae on this for a few days. They rarely crawl far during this time, and do not need to be put in a container until they are about four days old. If you are keeping larvae in individual containers, be sure to replace leaves when they turn dry, every one to two days. Leaves will keep longer if the stem is wrapped in a moist paper towel and then wrapped in tin foil or plastic wrap. Containers should be emptied of frass (larva waste) every one to two days.

For more information on finding and growing milkweed, see our [Milkweed Guide](#). If kept in a closed plastic bag in the refrigerator, milkweed will stay fresh for several days. You will need to save a lot of leaves to keep rearing larvae, but some teachers have reared continuous generations of Monarchs using this method.



Larva just after molting, with head capsule in front

Larvae can be handled safely with fingers after they are about three to four days old, but it is best to handle them as little as possible until they are over an inch long. If necessary, a moistened artist brush can be used to transfer younger larvae without hurting them. Larvae of any size should not be handled when they are molting. They are getting ready to molt when they remain very still, often on the side or top of their container, and when you can see their black head capsule about to come off. Just after they

have molted, their tentacles will look droopy, and you may see the old skin behind the larva. They will usually eat this skin!



Caterpillar cage examples

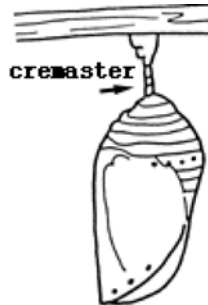
As larvae grow, so will their appetites. Be sure to check their leaf supply regularly. If you started with a small container, you will need to move the larvae to a larger one for adequate food supply and with enough room for the adult butterflies to emerge from the chrysalis. This should be done during the fourth instar, when the larvae are about an inch long. Be sure the upper surface is flat for easy attachment for pupating. Many types of containers can be used; clear or screen sides make it easier for students to see the Monarchs. Examples of good rearing

containers include jars or cups with lids with holes, or covered with netting held on with a rubber-band. Ice cream buckets with a net rubber-banded over the top also work well, as do aquaria with screen tops. Feel free to use your imagination! [\[More elaborate cages\]](#)

There is some mortality in the larval stage. One bacterial disease causes the larvae to turn very dark, and then die. Others may simply stop eating and growing, and then die after for several days. While this may be difficult for the students to accept, you can assure them that as long as they have been keeping the containers clean, it is not their fault. Remove dead larvae and clean their containers well to prevent the spread of disease.

The Pupa (Chrysalis)

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

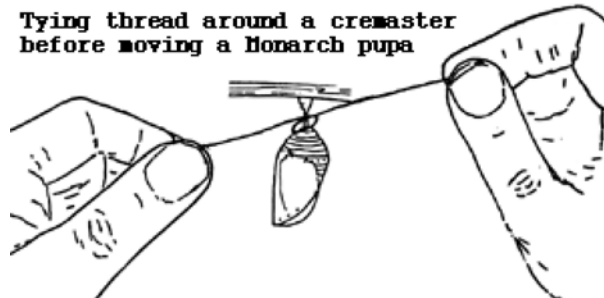


A Monarch pupa

If desired, you can move the pupa after it has formed. Wait until it is hard and dry (several hours or longer). Tie a piece of thread around the cremaster and with a needle or pin carefully tease away the silk that is holding the pupa to the surface. Leave the silk attached so the thread does not slip off (see figure below). If the pupa has fallen and there is very little silk remaining, add a drop of glue to the thread where it surrounds the cremaster. The loose ends of thread can then be tied through a hole in the container cover or through a space in the netting. Clothes pins can also be used to hold the loose end of the thread to a ring stand or other similar object. It is alright to handle the pupa carefully and even set it on a table for a minute. The pupa must hang, however, for the butterfly to form properly. If you have been weighing the larva, it is interesting to weigh the pupa too.

The adult will emerge in 10-14 days. When it is ready to emerge, the adult wings will be visible through the pupa covering.

Tying thread around a cremaster before moving a monarch pupa



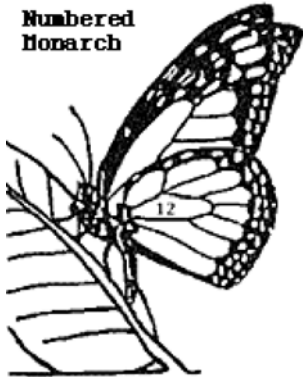
The Adult Butterfly

Adults usually emerge in the mid-morning. When the pupa is very dark and the orange and black wings are visible, check it often to increase your chances of observing this amazing event. Some Monarchs die in the pupa stage. If your pupa has been very dark for over 48 hours, it is probably dead. Allow the newly emerged adult plenty of time to inflate its wings and for the wings to dry before handling (3-4 hours). To hold a butterfly, always hold all 4 wings at once in their vertical position. For record keeping, adults can be marked with a permanent very fine felt tip pen (like a fine point Sharpie) by writing a number on the hind wings. Despite what you may have heard, it is alright to handle Monarchs, even touching their wings, if you do it carefully. Because they live a long time, and many of them withstand a rigorous migratory flight, they are relatively sturdy. A few scales may come off during handling, but this will not hurt the butterfly. Many other butterflies and moths are much more fragile.



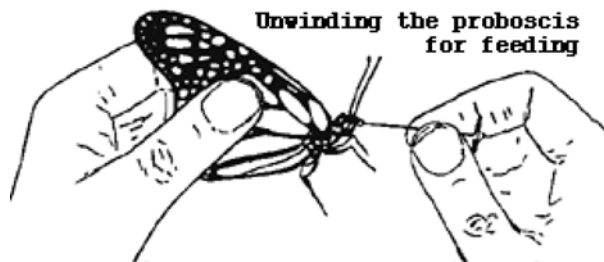
Holding a butterfly

Numbered Monarch



You may either set your Monarchs free soon after they emerge, or keep them in your classroom for students to observe and study. If you release them, wait for the wings to dry. Monarchs that emerge in the morning can be released at the end of the day, or kept until the following day without needing to be fed. Those emerging in the afternoon should be released the next day. It is best if they are released on a warm sunny day, near flowers if possible. If it is colder than 60° F, they often cannot fly.

If you keep the adults, they should have a cage large enough to allow flight. Hanging or wooden frame cages are [examples of cages](#) that work well for adults. Adults do not need to be fed until the day after they emerge. After this they should be fed daily. They can be fed in a variety of ways. Fresh cut flowers can be placed in containers and put in the cage, a small dish or jar lid containing a sponge saturated with a 20% honey/water solution can be set in the cage, or fresh fruit such as watermelons, honeydew or cantaloupe melons can be cut and set in the cage. These should be changed daily to prevent fermentation. "Juicy-Juice" purchased from a grocery store can substitute for the honey water solution. We also have a non-fermenting [artificial nectar](#) mix available. To encourage feeding in any of the above methods, place the front feet into the solution and the butterfly will sometimes unwind the proboscis and start feeding. If the butterfly does not unwind its proboscis after several tries, place a probe or pin in the loop of the proboscis and pull the pin away from the head so the proboscis is extended and touches the honey solution. Once the proboscis is in the nectar solution, the butterfly is feeding.



Unwinding the proboscis for feeding

Adult mass can be measured using a triple beam balance (nearest 0.1g) or an electronic balance (nearest 0.01 g or 0.001 g). In both cases the butterfly should be placed in an envelope while it is being weighed. Be sure to subtract the mass of the envelope. The length of the forewings can also be measured; measure to the nearest millimeter from where the wing attaches to the thorax to its tip, or apex. It is interesting to measure both the right and left forewings and to note the degree of asymmetry (how different the two wings are on each butterfly). See [Size and Mass](#) for more info.

www.MonarchWatch.org
monarch@ku.edu

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Monarch Watch (888) TAGGING - or - (785) 864-4441
monarch@ku.edu