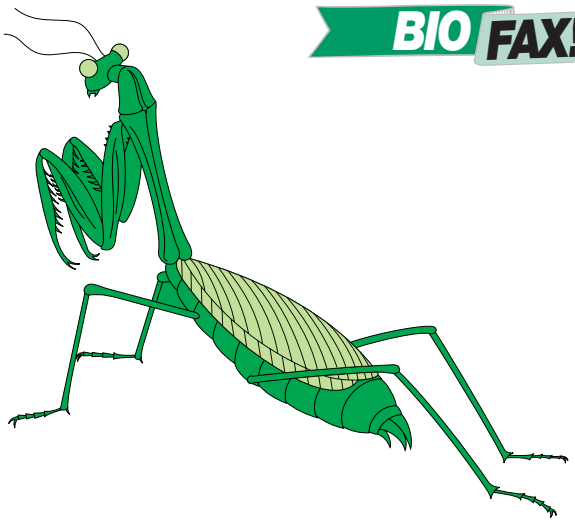
Culturing Praying Mantises

Live Material Care Guide



Background

The praying mantis is easily recognized by most people. This insect undergoes incomplete metamorphosis with the young resembling miniature adults. The young are more properly called nymphs. The nymphs undergo 7–9 molts as they mature. The praying mantis is the only insect that can rotate its head 180 degrees. Mantises also have five eyes—two large compound eyes located on either side of the triangular head and three simple eyes that can be seen in a triangle formation between the antennae in adults.

Flying mantises are able to detect the air vibration caused by bat echolocation. Mantises typically fly at night, making the bat its most likely predator. Grooves on the ventral thorax between the mid and hind legs are the "ear" of the mantis. If the mantis detects the vibrations caused by a hunting bat, it can make evasive moves to avoid capture. This ability was unknown to scientists until the late 1980s.

Housing and Food Requirements

The praying mantises arrive as three egg casings, called oothecae (*singular: ootheca*). Oothecae resemble foamed plastic with a slightly curved shape. Each ootheca can contain up to 200 eggs. Place the oothecae into separate habitats since the nymphs will become cannibalistic as they grow if they become crowded or hungry.

A 5- or 10- gallon aquarium or a similar sized container, with plenty of hiding places, will provide enough space for the growing nymphs. The top must fit securely and should be made of screen. Newly hatched nymphs are small, about an inch long. These small nymphs eat fruit flies. Be sure the mesh size of the screen will not allow anything to escape!

Ensure the culture containers are placed out of direct sunlight so the inside of the container doesn't overheat. Praying mantises do well at room temperature. Temperatures below 20°C and above 35°C may cause death. If the container is glass and additional heat is needed, use a lamp or reptile heating pad, such as Flinn Catalog No. FB0401.

In most areas of the United States humidity must be added to the habitat. A relative humidity of about 50% should be maintained. Typically, misting the habitat every day or two with spring water is sufficient. Use a hygrometer, such as Flinn Catalog No. FB1166, to monitor both the temperature and humidity level. Humidity above 65% may lead to fungal growth in the container while levels below 40% will interfere with hatching and molting.

Carefully cut a piece of double-stick tape to match the flat side of the ootheca. Hatchlings may become stuck in excess tape. Adhere the ootheca to the upper side of the culture container. This will allow the nymphs to emerge and move away from the ootheca into the ground cover.

Provide twigs, bark or plants for the nymphs to climb. A substrate such as coconut shell bedding, Flinn Catalog No. FB1352, not only provides a natural substrate but helps to moderate humidity levels.

Young nymphs will need to be fed daily starting a couple of days after they hatch. Mantises require moving prey. Feed approximately five apterous *Drosophila* per nymph. Apterous *Drosophila* cannot fly and therefore do not need to be anesthetized before they are transferred to the praying mantis habitat. If *Drosophila* that are able to fly are used, anesthetize in the freezer or with carbon dioxide. Do not use a chemical anesthetizer. After the fifth molt the juvenile mantises are ready for larger prey. Cricket nymphs or house flies are appropriate for this size mantis. Remove any partially consumed prey and deceased nymphs from the habitat daily.

When the nymphs are preparing to molt, they stop eating for a few days. Newly molted nymphs are very fragile and can be injured by larger prey. Male and female praying mantises molt at slightly different rates. If the habitat becomes overcrowded as the nymphs grow, move only nymphs who have not recently molted or, if necessary, move the entire twig or plant. It is easy to damage the exoskeleton of a newly molted nymph. Unfortunately the injured insect doesn't typically survive.

Provide one or more water dishes for the nymphs. Petri dishes containing cotton balls saturated with spring water work well. The water dishes and cotton balls should be changed daily. Simply rinse the dishes and wipe dry. Do not use soap, cleaners, or bleach on any item within the habitat.

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Adult mantises should be separated. Adults may become cannibalistic when in enclosed containers. By the seventh molt the mantises are likely large enough to eat adult crickets, caterpillars, moths, or other larger insects.

Breeding

Praying mantises show sexual dimorphism as adults. In general, male mantises are smaller than females. The most accurate method to sex the mantises is by counting abdominal segments. Begin just posterior to the hind legs, count each segment of the abdomen. Females have six segments between the hind legs and anus. Males have eight segments.

Choose mantises that have been mature for at least two weeks. Depending upon the species, females may molt two more times than males so males and females from the same ootheca will complete maturation at different times.

Before attempting to mate a breeding pair, move the male into a very large habitat. Feed both mantises daily for a week. Feed them again just prior to introducing them for breeding purposes. Move the female mantis into the male's habitat. Ensure he sees her but she is facing away from him and observe. It is extremely difficult to stop an attack, but if any aggressive behavior is observed, immediately remove one of them from the habitat. Try feeding them again before attempting the introduction once more. If possible move the female and her prey into the male's habitat while she is eating.

The pair may not mate right away and they should be observed while together in the habitat. In nature, the male is able to fly away once copulation is complete and cannibalism is rare. In captivity, the male has a limited area in which to escape, so cannibalism is more common. Even after landing on the back of the female, the male may not copulate immediately. Observe the pair closely since it is difficult to tell if they mated without direct observation. Once mated, the female contains enough sperm to fertilize all of the oothecae she will produce.

In nature the female produces several oothecae in the fall. She perishes a short time after laying her last ootheca. The oothecae are able to overwinter but adults perish as the temperature cools in winter. In captivity the nymphs emerge in 3–8 weeks.

Safety Precautions

Always treat live organisms with respect and proper care. Wash hands thoroughly before leaving the lab. Follow all laboratory safety guidelines.

Tips

- Be prepared to separate the nymphs into numerous habitats as they grow or they will become cannibalistic.
- Praying mantises will eat almost any insect smaller than they are, however, some insects contain a lot of fat and should rarely be fed to the mantises. Mealworms and wax worms are examples of "high fat" insects.
- Rearing mantises requires culturing their prey. *Drosophila* and cricket culture guides are available from Flinn Scientific. Request Culturing Crickets, Flinn Publication No. 10582 and *Drosophila melanogaster* Care Guide, Flinn Publication No. 11029 for more information.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding. Organisms raised in the classroom should not be released into the wild. Deceased animals may be disposed of according to Flinn suggested Biological Waste Disposal Method Type IV.

Materials for *Culturing Praying Mantises* are available from Flinn Scientific, Inc.

Catalog No.	Description
LM1166	Praying Mantis Eggs, package of 3 clusters
LM1119	Drosophila, apterous
LM1164	Crickets, package of 50
FB0401	Reptile heating pad
FB1166	Digital Hygro-thermometer clock
AP5338	Bottle, spray mist dispenser
FB0211	Aquarium, 10-gallon
FB0283	Aquarium screen cover, 20″ × 10″ with door

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.