

## THE MEALWORM

The mealworm is not a worm; it is a larva. Any similarity to a true worm is incidental. Mealworm larvae are golden yellow and have thirteen segments—a head, three thoracic segments, and nine abdominal segments. Mealworm larvae are the counterpart of the familiar caterpillar in the butterfly story. They pull themselves around on six stubby legs, one pair on each thoracic segment.

Mealworms are the larval stage of Darkling Beetles, *Tenebrio molitor*. Beetles, along with all their other insect kin (true bugs, flies, bees, wasps, ants, *etc.*), are members of the phylum (a rank in the classification of organisms) Arthropoda, a word meaning jointed legs. Like all members of their phylum, insects wear their skeleton on the outside like a suit of armour. This is practical when they are under attack, but very inconvenient when they are trying to grow. Arthropods solved this problem by moulting this outer shell-like cuticle periodically. Immediately following the moult, the soft white larva expands before the new larger cuticle hardens. For mealworms this process repeats five times over a two month period, after which the larva is about 3cm long. The final larval moult reveals the next stage, the pupa.

**Life cycle.** Mealworm beetles follow a life history known as complete metamorphosis. Like butterflies and moths, they go through four distinct stages during their life cycle. A female beetle lays eggs, as many as 500 in her brief lifetime of a month or two. The eggs are about the size of a full stop. After a couple of weeks the equally tiny larvae emerge from the eggs. The larvae are golden yellow and have twelve body segments. They are the counterpart of the familiar caterpillar in the butterfly story. The larvae seem to have just two purposes in life: eat and grow.

The pupae don't eat and they don't move except for a twitch or two when disturbed. Inside, however, the mealworm is turning into a beetle, much the same as a caterpillar turns into a butterfly while sequestered inside the chrysalis. In two or three weeks the pupa splits open and out walks a beetle, white at first, but soon turning to brown and finally black after a day. The beetles mate and lay eggs, and the cycle repeats.

Mealworms should be kept in large, relatively flat containers. They seem to thrive best when the colony has a large surface area. Keep the bran about 2 or 3cm ( $\pm 1$ " ) deep in a box, cat litter tray or similar. If the container sides are steep and smooth, it is not necessary to keep the container covered. However, care must be taken to exclude ants and other potential predators. Adults and larvae seem to prefer hiding under bits of paper or cloth; the pupae give no indication that they care.

The mealworm's preferred environment is very dry, moderately warm, and dark. A regular supply of carrot or apple provides essential moisture for the mealworms and seems to stimulate rapid growth. However, potato can encourage an outbreak of fodder mite which will soon kill off the mealworms. As the temperature increases, so does the rate at which mealworms advance through their life cycle. Under ideal conditions the complete life cycle can take place in as little as three months, but more likely it will take four. Cold slows the process almost to the point of suspended animation. Mealworms can be put into the refrigerator (not the freezer) for periods of time to stop metamorphosis.

**Food and Water.** Mealworms can go through their complete life cycle without any added water, as they are very efficient at extracting water from their food. Failure to supply sufficient food will cause the larvae and adults to attack each other in search of additional moisture. If carrot is used as the moisture source, the frass (the droppings or excrement of insects) will be orange, evidence that the granules in the culture are waste rather than eggs.

### THE MEALWORM LIFE CYCLE

STAGE	HOW LONG?	FOOD	MOISTURE	OTHER INFO.
EGG	7—14 days	-	-	-
LAVA	30—90 days	Bran	Carrot & Apple	Five moults
PUPA	10—20 days	-	-	-
ADULT	5—10 days	Bran	Carrot & Apple	Death: ± 30 days
EGG	The cycle continues			

Reference: Lawrence Hall of Science, University of California