



K-2 Life Science
K-2 Nature and History of Science

Southern Nevada Regional Professional Development Program

Mealworm Observations

INTRODUCTION

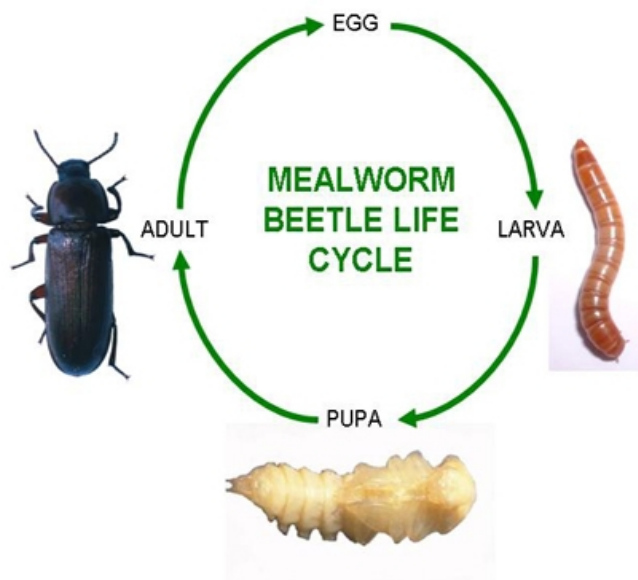
All children are fascinated by nature, especially animals. They are curious to know what animals look like, how they behave, how they grow. They enjoy having hands-on experiences with animals in order to learn more about them. Mealworms are an easy insect to keep in the classroom for observations. They can be purchased for just a few of dollars in the reptile section of most pet stores. The students can watch these insects over time and gain first-hand understanding of the stages of growth that these insects experience.



WHERE'S THE SCIENCE?

Mealworms are actually the **larval** stage of the **darkling beetle**; despite their name, they are not worms. Unlike worms, mealworms have 13 body **segments**, two **antennae** and six tiny, jointed legs. Mealworms are insects that go through a **complete metamorphosis**. This means they will experience four different stages during their life cycle—**egg, larva,**

pupa, adult. They begin life as tiny white, oval eggs which hatch into larvae in less than three weeks. The golden colored larvae—what we call mealworms—spend their time eating **meal**, such as wheat bran or oatmeal, and growing. As they grow, they must **shed (molt)** their **exoskeletons**. The exoskeleton is a shell-like cuticle which covers the outside of the larva's body. This exoskeleton is great protection for the larva, but as the insect's body grows, this exoskeleton must be shed. Mealworms molt, or shed, these outer coverings at least five times in the two to three months they are in this stage. The final larval molt allows for the next stage of metamorphosis to begin; this is called the **pupal** stage. The **pupae** do not eat and only occasionally will they twitch. They start out as a creamy white color, but after a time, they will turn a darker tan color. Inside this structure, the insect is turning into a darkling beetle. After about two or three weeks, the pupa's shell splits open and out walks a beetle. At first the **darkling beetle** is a whitish color, but over a couple of days, it turns to a darker and darker brown and, finally, a black color. Although the beetle has wings, it cannot fly. The beetle's job is to find a mate so the female beetle can lay eggs, as many as 500, before dying. And then, the life cycle begins again.



The above diagram is from <http://www.nyworms.com/mealworms.htm>

MATERIALS

- Mealworms, preferably enough to give two to each student
- Hand lenses, one per student
- Paper plates
- Small slices of apple or potato
- Wheat bran or ground oatmeal
- Clear plastic cups for housing each student's mealworms
- Plastic spoons or index cards for picking up the mealworms
- One large container, such as a plastic shoe box for keeping an extra class supply of mealworms
- Science notebooks, one per student
- Chart paper and markers

PROCEDURES

Lesson 1—Setting up a Mealworm Habitat

Ideally, each student should have his/her own mealworm to observe over time. If this is not possible, pairs of students or small groups of 3-4 students could share one habitat. Be sure to label the containers with the student's names so they always observe the same insect. You should also keep an extra supply of mealworms in a container such as a plastic shoebox in case you need to replace insects that die.

1. Bring the class to the group area and explain that they will be caring for a live animal over the next few weeks. Their first task is to set up a habitat for their animal. Ask them what any animal needs in order to survive. Lead them to realize that all living animals need: food, water or moisture, space, shelter, air.
2. Give each person one clear plastic cup, about two tablespoons of wheat bran or ground oatmeal and a very small slice of apple or potato. Explain that the wheat bran or oatmeal is the food the mealworm will consume and the apple or potato will provide moisture for the mealworm. Therefore, no water will be needed. You will need to replace the apple or potato every few days as the

slice dries out. You will need to add a small amount of bran or oatmeal every couple of weeks.

3. Now give each student or group a mealworm. You can scoop each one up with a plastic spoon or a small index card if you don't want to touch them. They should gently place their mealworm into the cup and observe what it does.
4. Collect the habitats and have the students wash their hands before writing in their notebooks.
5. In their science notebooks, or on the class chart, have the students tell you what an animal needs to survive and what they did to provide these needs for their mealworm. Also, encourage them to write or share questions/wonderings they have about the mealworms.

Lesson 2—A Mealworm's Body

1. Explain to the students that today they will be observing their mealworms closely to find out all about its body.
2. Ask them what they think they might find on the bodies of their mealworms. Chart this information or have the students write in their notebooks and then share their thinking.
3. Give each student their mealworm habitat, a paper plate, and a hand lens.
4. Show them how to gently tip their cup and, using their hand or a pencil, carefully place the mealworm on the paper plate.
5. Allow a few minutes for them to observe and discuss with other students what they are finding out.
6. If the mealworm is moving too quickly to observe easily, show the students how to gently use their pencil tip to pick up their mealworm. It will curl around the tip of the pencil and the students will be able to hold it about two to three inches above their paper plates to observe it more closely.
7. Next, ask them to share what they have noticed and, if necessary, ask some questions, such as:
 1. Does a mealworm have a head? Is there anything on it?
 2. What color is it?

3. What do you notice about its body?
4. Are there any legs?
5. How long is it? Compare it to something that is longer, shorter or the about the same length.
6. Does your mealworm look like other students' mealworms? How are they the same? How are they different?
8. Ask them to fold their paper plate like a taco and carefully slide their mealworms back into the cups.
9. Now gather the students in the group area to model how to draw a mealworm. You will need to have a mealworm to observe as you do this. (It is also helpful to do a think aloud as you are drawing so the students understand how you are looking at just one part at a time to draw.) On the board or on chart paper, draw a large mealworm, showing the 13 segments on its body, the two antennae and the six legs. Label some of the parts you draw.
10. Explain to the students that insects have three body parts—a head, a thorax where the legs, and later the wings, are attached, and an abdomen. On the mealworm's body, there are 13 segments divided with lines. The first segment is the head; the next three segments are the thorax, and the last nine segments make up the abdomen.
11. This would be a good time to use one of the books listed in the "Additional Resources" section to find out more about the bodies of the mealworms.
12. Now send the students back to their desks to draw their mealworms. Allow the students to keep their mealworm habitats on their desks so they can refer to these as they draw. They can add information that they have learned about their mealworm.
13. When the students are finished, allow time for them to share their drawings and notes. Now collect the habitats and have the students wash their hands.

Lesson 3—Behavior of Mealworms

1. Gather the students in the group area and quickly review what they have already learned about their insects.

2. Pass out the habitats and paper plates. Have the students place their mealworms gently on the plates and observe their behavior. In their notebooks, or on chart paper, have them record their observations.
3. Now ask them: How do you think the mealworms will behave if they are on a different surface? Have the students predict and explain their reasoning for their predictions.
4. Ask the students on what types of surfaces they might put their mealworms. Some suggestions would be: the carpet, the desk or tabletop, waxed paper, aluminum foil, paper towel, construction paper, a laminated piece of paper. Have the class choose two or three surfaces to test.
5. Guide the students in setting up a fair experiment. Suggest that they test each surface at least three times. It is advisable with the younger students to chart their procedures as a whole class, then type this information and give each student a copy of this on another day. Allow time to conduct their tests. They can write their observations and data in their science notebooks.
6. As a group, have the students share their results.

Additional Lesson Ideas

1. On subsequent days, students can conduct more tests with their mealworms. They can use their own questions/wonderings or choose from some of these ideas:
 - Do mealworms prefer a dark area or a well lit area?
 - When confronted with an obstacle, such as an index card folded as a small hill, will mealworms go over the obstacle or go around it?
 - Do mealworms prefer a wet surface (damp paper towel) or a dry surface (dry paper towel)?
 - How do mealworms react to smell? (Vanilla, vinegar, peppermint oil, etc.)
 - How do mealworms react when we blow on them gently?

2. Continued use of research materials should be done as well in order to learn more about these insects.

VOCABULARY

- **Abdomen**—the third or back part of an insect's body
- **Adult**—the stage of metamorphosis that is responsible for laying eggs
- **Antennae**—two feelers on an insect's head which are used to sense what is around it
- **Bran**—a type of meal that is eaten by mealworms
- **Egg**—the first stage of an insect's metamorphosis
- **Exoskeleton**—the hard, outer cuticle that covers the larva's body
- **Habitat**—the place or site where an animal lives
- **Head**—the front part of an insect's body
- **Insect**—an animal that goes through metamorphosis, has 3 body parts and 6 jointed legs
- **Larva**—the second stage of an insect that goes through a complete metamorphosis
- **Life Cycle**—the series of stages through which an organism passes
- **Meal**—the dry food that mealworms eat, such as oatmeal or wheat bran
- **Mealworm**—the larval stage of the darkling beetle
- **Metamorphosis**—the stages of change and growth that insects experience
- **Pupa**—the third stage in a mealworm's metamorphosis
- **Thorax**—the second part of an insect's body; contains the legs and wings

ADDITIONAL RESOURCES

- <http://www.nyworms.com/mealworms.htm>
- <http://www.lhs.berkeley.edu/foss/fossweb/teachers/materials/plantanimal/tenebriobeetles.html>

- http://www.uen.org/utahlink/activities/view_activity.cgi?activity_id=3022
- <http://insected.arizona.edu/mealinfo.htm>
- Mason, Adrienne. *Mealworms: Raise Them, Watch Them, See Them Change.* . Kids Can Press. ISBN-13: 9781550745061.
- Rustad, Martha E. H. *Mealworms.* Capstone Press. 2009. ISBN: 9781429622264/1-4296-2226-1.
- Salas, Laura Purdie. *From Mealworm to Beetle: Following the Life Cycle.* Picture Windows Books. 2008. ISBN-10: 1404849254.
- Schaffer, Donna. *Mealworms.* Bridgestone Books. 1999. ISBN-10: 0736802096.

NEVADA STATE STANDARDS

L2A2 Students know differences exist among individuals of the same kind of plant or animal. E/S

L2B1 Students know humans and other animals use their senses to know their world. E/S

L2C1 Students know plants and animals need certain resources for energy and growth. E/S

L2C2 Students know a habitat includes food, water, shelter and space. E/S

L2C3 Students know living are found almost everywhere in the world. E/S

L2D1 Students know plants and animals can be sorted by observable characteristics and behaviors. E/S

N2A1 Students know how to make observations and give descriptions using words, numbers, and drawings. E/S

N2B2 Students know that, in science, it is helpful to work in a team and share findings with others. E/L

SAFETY REMINDER

- Be sure to remind the students that they must wash their hands with soap and water after each hands-on experience with the mealworms.
- Before beginning any experiences with animals, discuss with the students how to show respect for living creatures. It is advisable to set ground rules for proper treatment of these insects.