

# Ant Lions and Biology

by Brad Williamson

## Introduction

Science is driven by questions. For students to really experience the process of science they should work on answering questions that arise from their own natural curiosity. Ant lions (Neuroptera) and their intriguing behaviors naturally generate student questions. Since most students are not familiar with "doodle bugs", ant lions make an effective way to open the school year. If a few students have prior experience with ant lions this only adds to the effectiveness of the activity.

## Day 1 Activity

On the first day of class my students find an four ounce, low form cup of sand at their desk, one for each student. In the middle of the sand is a small conical depression. From the very beginning of class students begin to ask questions. The first questions range from: "What are we supposed to do with this?" to "How did you make that hole?" I respond by asking them to record some measurements of the pit and draw a simple sketch.

Several at this point actually end up collapsing the pit accidentally as they move the cups around to make observations. If I am patient at this point, the ant lions in the collapsed pits will begin to repair the damage after a short period of time. Once the students realize that a living organism is at the bottom of the pit the I am inundated with questions. "What is that?" "Did it make this hole?" "Why" "What does it look like?"

From this point we will bring in potential prey items such as ants or flour beetles. Once they see a pit and the ant lion in action I don't have to do much the rest of the day except turn their questions back to them in a manner that is supportive but develops question and observations skills. I ask that they record their thoughts, observations, and questions as they investigate their ant lions. When they want to use microscopes or stereoscopes I get them out so they can. We simply explore. This opening day activity serves two purposes. One, it jump starts the students into inquiry based science and two, it helps me to establish appropriate questioning skills as I help the students develop their general, curiosity-based questions into questions and hypotheses that are suitable for scientific investigation.

## Day 2 Activity

The next day we bring out the ant lions again, feed them and then begin to explore the notes and observations made the day before. I select some questions and observations that seem to be particularly promising and ask questions of the students to direct them toward a working hypothesis that is suitable for experimental design. For instance, invariably the students notice that the pits are of different sizes and ask the question "Why?" If I wait long enough a student will usually speculate that the size of ant lions might have something to do with the size of the pit. I focus on this and ask for suggestions on how we might examine this idea. What kind of predictions can we make? How can we limit the scope of our question so that we can satisfactorily answer them. Of course, we are working on hypothesis formation but

they aren't aware of this just yet. Soon we have developed a method of investigating this question and start collecting data. We work on this methodology so that students can start to work on focusing their own, personal questions about ant lions into working hypotheses.

Each student is then assigned at least one ant lion to care for and serve as a focus for student research. Students are given the option of taking the ant lions home and share the activity with their parents. This past year students investigated questions about habitat preference, substrate effects on pits, effect of rainfall on pit construction, effect of temperature on pit construction and others. Students are required to maintain a laboratory notebook record their research. At parent conferences I heard from several parents about the effectiveness of this activity.

### **About Ant Lions**

Acquiring ant lions is the limiting factor for this activity. As far as I know ant lions are not available commercially so I have always collected my own. This is not as difficult as it may sound since once suitable habitat is located several dozen can be collected in a just minutes. Ant lions range throughout the United States. Ant lion larvae prefer dry, sandy or loose soils that are sheltered from the weather. Under the eaves of my house is just such a location and every summer I have about one hundred ant lion pits along the bare, loose dirt next to the foundation. Other local sites that I can count on include the dry duff beneath juniper trees and along the sand bars along the river. You just have to keep an eye out for these intriguing insects and mark down locations so you can return later. Collecting involves using a spoon or similar instrument to scoop 1/2 inch of soil from the bottom of the pit. The ant lion should be in the sample and can be transferred to a tray, pan or cup. Several can be held, temporarily, in a large 44 ounce, plastic drink cup (I've had up to 36 in one cup) with minimal loss. You'll have to look hard because they like to freeze and become very difficult to see. Once you've developed a search image you'll be able to make them out in the soil debris in the cup. By the way, about one half of my students usually can't find their ant lion. They are sure that they have escaped. I like to collect about 2 ant lions per student before school starts.

Caring for the critters couldn't be much easier. They can survive quite nicely without any food or water for more than a week at a time. Feeding them small ants, fruit flies, house flies, flour beetles, etc. works nicely.

Holding containers such as cottage cheese containers, small cups, trays are all suitable. A proper substrate of sand is best to work with. Even if you caught your ant lions from dry soil you'll find that they are easier to work with in a sand substrate. If your sand has variable grain size this is a productive area of investigation. Fill whatever container you use with about 1.5 to 2.5 inches of sand. There is no need to cover the container. Don't water the sand (unless you wish to investigate the effects of rain) the ant lions will get enough water from their prey. Adapt with whatever you have available. Just get the ant lions and you'll find that this is truly worthwhile activity.

### **Resources**

Bernd Heinrich, "In a Patch of Fireweed", pp 141-151

Sally Stenhouse Kneidel, "Creepy Crawlies and the Scientific Method", chapter 10. Though this is targeted to an elementary teacher audience I highly recommend it for high school biology teachers that are looking for creative ways to incorporate insects as vehicles for scientific inquiry.

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This lab is also available via Access Excellence.