	Name	Class	Date
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Investigative Lab 6

The Life of WOWBugs

Observing WOWBug™ Behavior

Question How do WOWBugs interact and communicate with each other?

Lab Overview In this investigation you will observe an active culture of WOWBugs, identify the males and females, and compare their behaviors. Then, you will perform an experiment to discover how WOWBugs communicate over a distance.

Introduction To start the investigation, you'll learn about differences between male and female WOWBugs and about WOWBug behavior. In the lab activity, you will observe male and female WOWBugs separately. Then, you will observe them together. Next you will conduct an experiment to determine how male and female WOWBugs communicate and find each other.

Prelab Activity Read the information below about WOWBugs, then complete the Prelab Activity.

WOWBugs (*Melittobia digitata*) are tiny wasps that live as parasites on the larvae of other insects. There are many differences between female and male WOWBugs. Females can fly, while males just have stubby wings and cannot fly. Females have reddish, compound eyes. Males have tiny pits where their compound eyes would be. They have three simple eyes on their foreheads that allow them to sense light, but they are essentially blind. Only females have stingers (though the stingers are too small to penetrate human skin). Females have black bodies. Males have light brown bodies. Females have thinner antennae than males.

When an adult female and male mate, up to 95% of the female's hundreds of eggs are fertilized. Female larvae with two sets of chromosomes (diploid) hatch from the fertilized eggs. From the unfertilized eggs hatch male larvae with only one set of chromosomes (haploid). Therefore, female WOWBugs have twice the amount of DNA as males.

Female WOWBugs leave their colony to start a new colony. If a female has mated before she leaves her original colony, she will lay fertilized eggs on other insect larvae. If she has not mated, she will lay a few unfertilized eggs. When male larvae hatch from these eggs and mature, the female mates and the new colony begins.

Male WOWBugs are very aggressive in the presence of other males. In the lab, males must be kept separate because they will fight to the death. Since such a small number of male eggs are laid in each batch, you will need to take extra care in the lab to be sure that the males are not harmed.

	lictions:
rel	ab Questions
1.	Given that WOWBugs are insects, what types of characteristics do you expect to observe?
2.	List two ways that the female and male WOWBugs differ in appearance.
3.	Explain the reason that female and male WOWBugs have different amounts of DNA.
4.	Do WOWBugs undergo complete or incomplete metamorphosis? Explain.

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• labels

• cotton swabs

Procedure 🖾 📈 🗓

Part A: Sorting the Female Pupae

- **1.** Use a hand lens or stereomicroscope to examine the WOWBug pupae culture. At this stage you will be able to identify females by their reddish eyes. Use a toothpick to gently push several female pupae into an isolated clump.
- **2.** Touch the end of the paintbrush to the clump of female pupae. Some will become trapped in the bristles. Transfer them to a new acrylic box by gently tapping the brush on the side of the con-tainer. Label the container "Unmated females." Later, your teacher will transfer each male into a separate container.
- **3.** Sketch a female WOWBug pupa in the space below.

4. Check the pupae every day to see if they have emerged as winged adults.

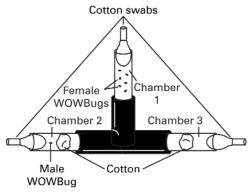
Part B: Observing Female WOWBug Behavior

1. Once the female WOWBugs have matured, observe them closely with a stereomicroscope or hand lens. **CAUTION:** *Do not open the container during your observations. The WOWBugs may escape.* Every 3–5 min for about 15 min, record your observations in the space below. During the observation period, tilt the container to see how the WOWBugs respond. Cover about half of the container with aluminum foil to see how they respond to light and dark.

me	Class	Date
. Sketch one of the adult	female WOWBugs below.	
rt C: Observing WOWBı	ug Courtship and Mating Beh	aviors
	Bug provided by your teacher. Nor the female WOWBugs' behavi	
servations:		
from the container label females crawling on the	ainer holding the male WOWBug led "Unmated females." There sha e lid. Quickly but gently, tap the l hale until several females drop in over both containers.	nould be several lid over the
over the next 15–20 min	the male WOWBug in the present. These pre-mating behaviors and your observations below.	
servations:		
. Go back to the Prelab A	ctivity and review your prediction	ons. Based on
your observations in pa predictions? If so, expla vised Predictions:	rts B and C, would you now like in your revisions below.	to revise your
visea rredictions:		

Part D: Discovering How WOWBugs Communicate

1. Now you will perform an experiment with a "choice chamber" to find out how male and female WOWBugs communicate and find each other. To construct a choice chamber, insert aquarium tubing into the T or Y connector (see diagram below). Construct Chamber 3 first. Use a toothpick to insert a small piece of cotton about 2.5 cm into the tube. Use scissors to cut off one end of a cotton swab and use that to plug the chamber.



Sample Choice Chamber

- **2.** To construct Chamber 2, use a toothpick to insert a small piece of cotton about 2.5 cm into the tube. Place the open end of Chamber 2 over a male WOWBug. The insect will crawl up the side of the tube. Seal the chamber with another cut-off cotton swab.
- **3.** Next, place the open end of Chamber 1 over the female WOWBugs. Once you have about 10 females in the tube, quickly seal it with a cut-off cotton swab.

4.	Observe the female WOWBugs. Do they wander aimlessly or in a
	particular direction? Based on your observations, can you rule out vision,
	touch, sound, or smell as senses that female and male WOWBugs use in
	locating each other? Explain.

5. Experiments have shown that if a dead male WOWBug is placed in Chamber 3, females are attracted toward both Chamber 2 and Chamber 3. Based on this information, which sense do you think WOWBugs use to commumnicate? Explain.

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alysis and Conclusions		
Describe the WOWBugs'	behavior in the choice chamb	oer.
	ur experiment(s). What concluabout how WOWBugs comm	
Ch and room for diagrams with	other leb moune Did other l	Lab arrang Juan
similar conclusions? Exp	other lab groups. Did other l lain.	lab groups draw
What are some of the cha	allenges you faced working w	ith live WOWBugs?
Discuss some possible so WOWBugs behave in nat	urces of error in your conclus ture.	sions about how
tension		

You can use the choice chambers to design experiments to study many other questions. For example, you could observe how mated females behave in the choice chamber with just a male or in the presence of unmated females. You could also use the choice chambers to test the reaction of WOWBugs to different environmental conditions such as temperature and light. Choose one of these examples or come up with a new question of your own and devise an experiment. Check with your teacher before carrying out any experiments.