



INTEGRATED PEST MANAGEMENT

Unit 1 Lesson 1 More Than Just Dust Bunnies

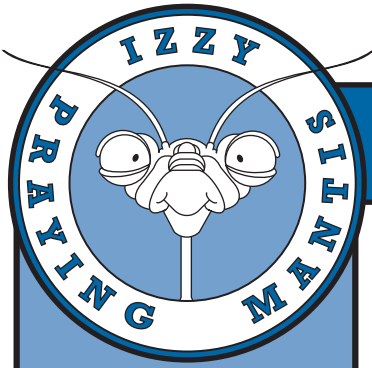
Focus Areas: Pest Identification; Science

Focus Skills: Preparing slides, using a microscope, collecting and recording data

Level of Involvement: MAXIMUM

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***Dedicated
to Reducing
Pesticides***

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Focus Areas: Pest Identification; Science

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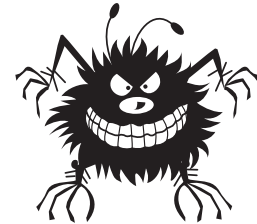
Level of Involvement: MAXIMUM

Objectives

- * To discover that dust contains living organisms
- * To understand that some people are allergic to the fecal material of these organisms
- * To recognize the need to prevent dust from accumulating

Essential Question

Why should areas be kept free of dust?



Essential Understanding

Small arachnids live in accumulated dust and can cause allergic reactions.

Background

The inventor of the microscope, Anton van Leeuwenhoek, reported in 1694 that mites live in dust. Now, more than 300 years later, it is an established fact that dust mites can be found in house dust all over the world. Dust mites are not insects but are more closely related to spiders and ticks. There are two common dust mites, the American house dust mite (*Dermatophagoides farinae*) and the European house dust mite (*D. pteronyssinus*). Due to their very small size, these dust mites are not visible to the naked eye. They live in bedding, couches, carpet, stuffed toys and old clothing. Dust mites feed on the dead skin that falls off the bodies of humans and animals and on other organic material found where they live.



University of
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Background (continued)

Habits and Habitats

Dust mites do not live in air ducts in homes. Many people spend much time and money cleaning the air ducts to reduce dust mites. This is not necessary because dust mites need about 70 percent relative humidity or higher to live, and they need food. Areas where people spend much time, like a bed or a favorite plush chair, are prime sites for dust mites. The top part of mattresses containing fibrous material is a favorite place for dust mites during warm and humid times. The deeper parts of mattresses may provide protected areas for the dust mites during unfavorable conditions. Clothing is used by dust mites as a means of transportation from room to room or even from house to house.



Vocabulary

allergic reactions

Physical symptoms, which may include sneezing, itching, skin rashes, caused by abnormally high sensitivity to certain substances such as pollens, foods, or microorganisms.

allergen

A substance, such as pollen, that causes an allergy.

arachnids

The arthropod class (invertebrate animals with jointed appendages) that includes spiders, mites, ticks, and scorpions.

dust bunny

A clump of dust commonly found under beds, chairs, and couches.



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Challenge Search for animals in a dust bunny!

Logistics

Time: 45 minutes

Group size: as many as your supply of microscopes can accommodate (3 to a scope maximum)

Space: an area to accommodate microscopes

Materials



microscopes

slides (minimum of 6 per group)

slide covers

eye droppers

water for wet mount preparation

dust from several locations and containers for each

computer with Internet access

overhead projector

Overhead Control of Dust Mites *

Assessment for a Scientific Drawing *

Assessment for a Graph *



* single copy provided

Preparations

1. Gather materials as listed above (except dust)
2. Set up lab stations with materials

Important

Before beginning this activity, be sure that neither you nor anyone in your group is prone to severe allergies to dust. Send notes home asking parents to give permission for their child to participate in this activity.



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Activity

Introduction

Ask the group if they know anyone who is allergic to dust. Explain that when people think they are allergic to dust, they are reacting to tiny animals that live in dust, called **dust mites**. In fact, the actual **allergen**, or irritating substance, is any of a variety of proteins present in the feces of dust mites! Inform the group that mites are **arachnids**, which are animals related to spiders, and that they can be seen only under the lens of a microscope.

Involvement

1. With the group, collect several types of dust in small containers. Collect dust from different locations in the room, such as the backs of chairs and under tables. Turn pockets inside out and collect pocket lint. You might use chalk dust, as well.
2. Label the containers to show where the dust in each one was found.
3. Make a dry-mount and a wet-mount slide to view under a microscope.
4. Have participants view the slides and draw what they see, labeling drawings with the locations in which the dust was found. (needed for **Assessment**)



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Follow Up

- * Discuss with group what they saw. Did they find any dust mites? If so, how many?
- * Have them use the Internet to find out more about dust mites and list the facts they learn. Following are examples of facts:
 - * The average mattress contains about two million dust mites.
 - * More than half the weight of an old pillow is accounted for by the weight of the dust mites it contains.
 - * Not everyone has the same reaction to dust mite feces. Each individual reacts to different proteins in the allergen. People may not be allergic to all or any of the proteins that cause allergic reactions.



Note: If you choose to omit the Internet search, share these facts with the group. Brainstorm with the group how dust mites might be controlled. Generate a list and compare your results to the controls listed on the overhead.

Answer Key none needed

Follow Through

Focus Skills: Collecting samples, graphing results

1. Assign individuals the collection of dust samples from 3 other sites. Each sample must be contained and labeled with the site from which it was obtained.
2. Repeat the **Involvement** portion of the initial activity.
3. Have participants create graphs to illustrate their findings.
4. Hold a group discussion to compare results.



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Assessment

- Option #1** Evaluate the scientific drawings produced in the initial activity.
- Option #2** Evaluate the graphs created in the **Follow Through** activity.
- Option #3** Have participants create graphs for the initial activity and submit for evaluation.

Resources



Suggested Reading

"Slime City"

Andy Coghlan, *New Scientist*, August 31, 1996

In the past few years, scientists have learned how to observe the structures of biofilms or mucilages, which are built and populated by humble bacteria such as *E. coli* and salmonella. New findings about genetics and biochemistry of biofilms are reported.

"Biofilms Invade Microbiology"

Carol Potera, *Science*, September 27, 1996

The great recent shock in the field of microbiology is the discovery of "biofilms," or free-floating aggregations of common bacteria that create "slime cities" in water pipes or human bodies to create infection, disease, and even kill.



Internet Websites

Dust Mites: A Primer

An interesting and informative site about the diverse, small arthropods commonly known as dust mites.

<http://members.ozemail.com.au/~lblanco/>

Mites That Attack Humans

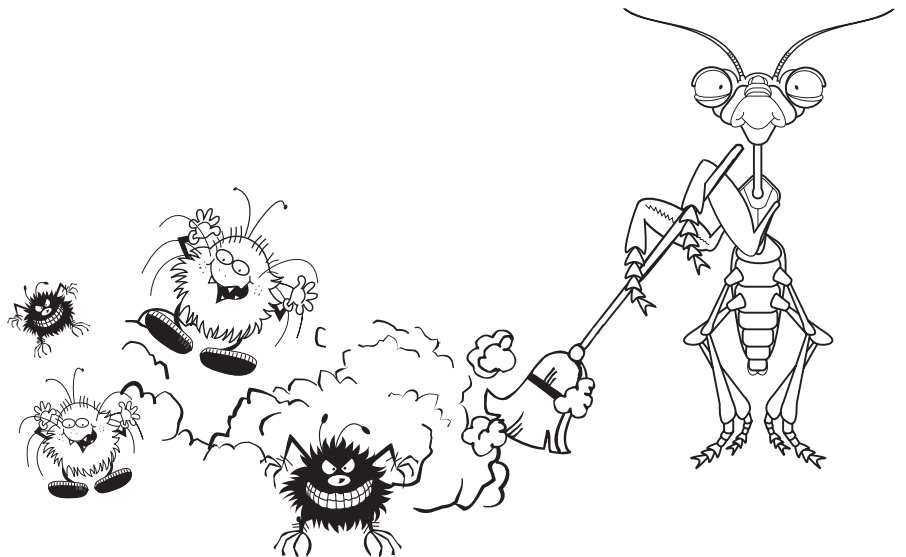
Good information on different types of mites. The diagrams are particularly helpful to students when comparing and contrasting specific species.

<http://edis.ifas.ufl.edu/IG086>



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Notes





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Assessment for a Scientific Drawing

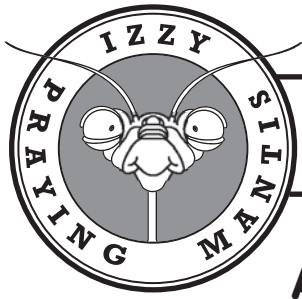
Criteria	Possible Points	Points Earned
1. There is an explanatory main title.	_____	_____
2. All elements of the drawing use the same scale.	_____	_____
3. Appropriate details are shown accurately.	_____	_____
4. The drawing is correctly labeled, including magnification if appropriate.	_____	_____
5. The drawing is easily understood.	_____	_____
6. Space is used well.	_____	_____
7. The drawing is neatly done.	_____	_____

Comments:

Assessment for a Scientific Drawing

Criteria	Possible Points	Points Earned
1. There is an explanatory main title.	_____	_____
2. All elements of the drawing use the same scale.	_____	_____
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Comments:



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Assessment for a Graph

Criteria	Possible Points	Points Earned
1. There is an explanatory main title.	_____	_____
2. Starting points and intervals are appropriate.	_____	_____
3. Axes are clearly and correctly labeled.	_____	_____
4. The data is plotted correctly.	_____	_____
5. The graph is easily understood.	_____	_____
6. Space is used well.	_____	_____
7. The graph is neatly done.	_____	_____

Comments:

Assessment for a Graph

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Comments:



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Overhead

Control of Dust Mites

- * Enclose mattresses, box springs and pillows in zippered allergen- and dust-proof covers.
- * Wash bedding materials, including pillowcases, sheets, blankets and mattress pads every other week in hot water (130°F).
- * Eliminate or reduce fabric wall hangings such as tapestries or pennants.
- * Purchase stuffed toys that are machine washable.
- * Avoid using curtains, drapes or blinds on windows. Use plastic shades instead.
- * Remove carpeting from the bedroom of the allergic person and replace it with tile or wooden floors.
- * Replace upholstered furniture with wooden or plastic furniture.
- * Vacuum often with a vacuum cleaner provided with a high efficiency purifying air (HEPA) filtration system. Throw away vacuum bags after use because dust mites can leave the bag.
- * Chemical control is not necessary, nor will it have a lasting effect on dust mite populations. Regular cleaning and vacuuming will have a greater impact.