



***Dedicated
to Reducing
Pesticides***

Unit 4 Lesson 3: Insectivores

Focus Areas: Pest Control: Biological/Natural; Science, Math

Focus Skills: comparing and contrasting, math calculation, critical thinking

Objectives

- To identify creatures that biologically control insects
- To understand how insects' biotic potential, their ability to reproduce at incredible rates, can be controlled by insectivorous animals

Essential Questions

- What creatures are insectivorous?
- How effective are creatures that some of us consider pests at helping to control insect populations?
- What type of Integrated Pest Management (IPM) control do insectivorous animals provide?

Essential Understandings

- Bats, shrews, hedgehogs, and moles are examples of insectivorous animals.
- Insectivorous animals consume millions of insects each day and help to maintain a balance in the food chain.
- Insectivorous creatures provide biological or natural control of insect pests, one of the most important IPM methods.

Background

Moles, shrews, hedgehogs, and bats are part of a unique group of creatures that are insectivorous. They eat insects, millions a day, in order to live. The critical role they play in our world helps us by controlling insects from overpopulating environments. Many are very small, and some weigh less than a dime. They are nocturnal, secretive miniature



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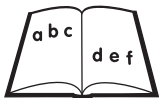


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mammals that scurry about. They tend to have sharp pointed noses, tiny ears, and small eyes. Although their brains are tiny, they are incredibly skilled hunters, living not only on insects but also on worms, fish, spiders, frogs, mice, lizards, and carrion.

Controlling insect pests is one of the major goals of Integrated Pest Management (IPM). In addition to mammals that feed on insects, insects also feed on each other. Many insects, such as ladybugs and the praying mantis, provide an extremely effective natural, biological method of controlling insects that harm farm crops or cause disease. Praying mantises and dragonflies eat only living insects. They are skilled hunters because they can move their heads up, down, and sideways without moving their bodies. Very few creatures have the ability to do this.

Insects are the most successful animals on earth. There are over 900,000 known species and thousands that are still not classified. Spiders are not insects but they, too, devour millions and millions of insects that destroy crops and eat green leaves on backyard plants.



Vocabulary

bat one of the most diverse groups of small mammals in the world (1,000 different species exist). Bats are adapted to feed on a variety of foods, including insects, frogs, fish, fruit, nectar, pollen, and blood.

biotic potential the ability of an organism to reproduce to ensure survival

hedgehog a spiny, nocturnal mammal that people in Europe or Asia keep as a household pet because of its effective control of household insect pests





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insectivore

a creature (insect predator) that eats large numbers of insects

mole

a burrowing mammal that lives beneath the ground. It finds food through a superior sense of touch. Whiskers and sensitive bumps on its snout are vital to survival.

shrew

a small mammal that relies on a keen sense of smell and hearing to find food. Shrews have a high metabolic rate and need to eat constantly.



Logistics

Time: 45 minutes

Group Size: 5 to 30

Space: a room with comfortable seating



Materials

Overhead 1 “You and the Shrew” *

Handout 1 “Bat Math Challenge”

with Answer Key *

Handout 2 “Bat Challenge Brain Teaser” *

Insectivore Portraits (shrew, bat, hedgehog, mole) *

Supplemental information on bats *

* single copy provided



Preparation

1. Display the Insectivore Portraits and hang up the “Insectivores” sign.
2. Set up the overhead projector with Overhead 1, “You and the Shrew.”



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Activity



Challenge: Investigate insectivores.
(Display for group viewing)

Introduction

1. Ask the children if they can identify any creatures that eat insects in order to survive. [Frogs, toads, birds, anteaters, fish, spiders, bats, skunks, black bears (eat grubs)].
2. Explain that insects lay millions of eggs. If all of them survived, the world would be overrun with insects. Nature controls insect populations and provides control through creatures that eat insects. Explain that the term “biotic potential” is used by scientists to explain why some creatures are capable of having so many young.

Involvement

There are a special group of creatures that are very effective at eating huge numbers of insects (insectivores). Some of these are small mammals that remind us of mice and cause people to be scared. But they do much more good than harm. They scurry all day and night using lots of energy so they need to eat lots of food. (Use Overhead 1, “You and the Shrew.”)

Let’s compare the food needs of a **shrew** (point to the portrait) to those of **you** (a 4th or 5th grader).





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Human Facts

1. I weigh 70 pounds.
2. I see color.
3. I breathe in and out 20 times a minute.
4. Without food, I would starve in 20 to 30 days.
5. My heart beats 80 times per minute at rest.
6. My heart beats 120 times per minute when I am running.
7. I am 54 inches (1.4 meters) tall.
8. I eat less than 1/14th of my weight in food each day.
9. I could live to be 100.

Shrew Facts

1. I weigh less than a penny.
2. I am color blind. I only see light and dark and black.
3. I breathe in and out 850 times a minute.
4. I can starve to death in about 6 hours if I don't eat.
5. My heart beats 600 times a minute resting.
6. My heart beats 800 times a minute when I'm active.
7. I am 3 inches (7.5 cm.) long.
8. I eat 1½ times my weight in food each day.
9. I will live about one year.

Follow Up

1. Read any great book about bats, such as *Bats: Creatures of the Night* by Joyce Milton or *Zippering, Zapping, Zooming Bats* by Earle, Ann, and Henry Cole.
2. Tell the children that bats, one of the most effective insect eaters, always seem to get a bad rap. People don't realize how important they are to the world's ecology and how harmless they are. In addition to being terrific insect controllers, they help to pollinate plants. Like many beneficial creatures, they are having a difficult time surviving due to habitat destruction and loss. Some bats are killed for food, but many die due to pesticide poisoning. Hikers who go investigating also destroy their safe homes. Biologists are trying to educate people so that bats will not be killed out of fear and ignorance.
3. Distribute Handout 1, "Bat Math Challenge" and have participants complete.



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Tell the children:

- Most bats feed on insects. Some can catch and eat over 1,000 fruit flies in an hour.
 - If there are 24 hours in a day, how many fruit flies can one bat eat in a day? (24,000)
 - How many would one bat eat in a week? (168,000)
 - How many days would it take for one bat to eat over a million fruit flies? (42 days)
5. Handout 2, “Bat Challenge Brain Teaser” can be offered as extra credit (Answers appear below.)

How many mosquitoes does a little brown bat eat during one summer?

Clues:

- There are 90 days to a summer.
- A mosquito weighs 2 milligrams.
- A bat eats 4 grams of insects in one night.
- There are 1,000 milligrams per gram.

Children figure:

1. 4 grams = 4,000 milligrams
2. Divide this by the weight of 1 mosquito
(4,000 divided by 2 = 2,000)
3. 2,000 mosquitoes get devoured each night and there are 90 nights (2,000 x 90 = 180,000)
4. 180,000 mosquitoes get eaten by one little brown bat during the summer.



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Assessment

Evaluate Handout 1, “Bat Math Challenge” and offer Handout 2, “Bat Challenge Brain Teaser” for extra credit. These are very challenging problems and could be done in groups. What is important is the magnitude of the numbers of insects eaten. Have the children make up additional problems with other real insectivores!

Resources

Bats: Creatures of the Night by Joyce Milton. 1993. Gosset & Dunlap, New York, NY.

A clear and simply-written non-fiction book covering the importance of bats as insect-eaters and indicators of ecological balance. It also addresses common misconceptions about bats.

Zippering, Zapping, Zooming Bats by Earle, Ann and Henry Cole. 1995. Harper Collins, New York, NY.

A very informative, yet accessible and fun non-fiction book on bats for children. Includes information on how people can help bat populations prosper, including building bat houses. Pairs nicely with the fiction book *Stellaluna* by Janell Cannon. 1993. Harcourt Brace and Company, New York, NY.





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Notes

