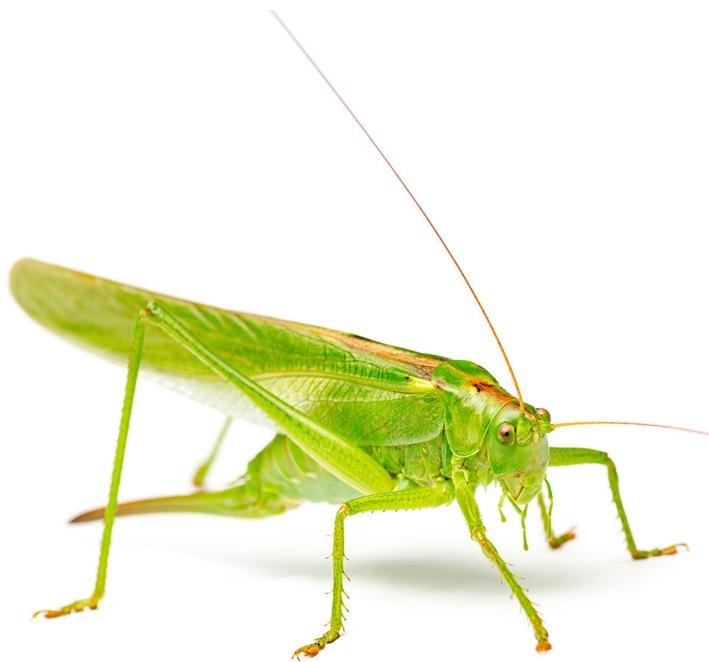




# INCREDIBLE INSECTS: SEE WHAT THE BUZZ IS ALL ABOUT

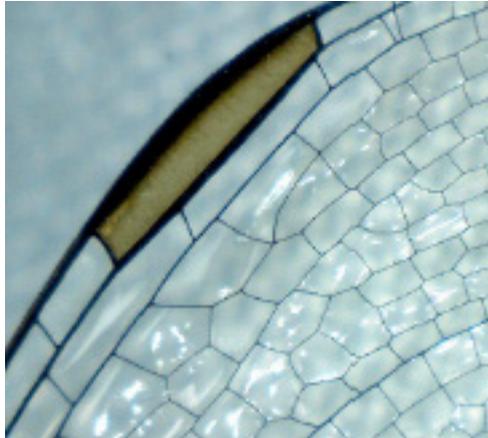
Teacher Resource Guide  
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## Teaching Tips

These lesson ideas are developed with you in mind. We understand that you are the creative force within your classroom. You may choose to use the hand-held microscope in an inquiry center or you may have multiple scopes and teach in pairs, groups of four, or even groups of six. However you manage your classroom, these ideas will assist you in guiding your students as they observe, question, research, and experiment. These inquiry skills are invaluable life skills.

Making connections, being creative, problem solving, and questioning will engage your students as they discover the microscopic world. You can extend these lesson ideas and integrate the study of the specimens into your content areas to make them even more relevant. Be creative. There is no limit to what can be discovered!



Dragonfly Wing, 100x, © STR

## Lesson Ideas

- Identify the structures of insects and describe how they support the insect in their environment
- Compare and contrast the differences in insect structures
- Hypothesize how these differences support each insect
- Recognize that different insect structures are related to the function it performs e.g. a caterpillar mouth for chomping
- Understand and explore insects in their natural habitats
- Develop an awareness of the developmental changes that occur in insects
- Develop an appreciation and understand the importance of insects in our world

## Interesting Insect Facts

- The number of insect species is believed to be between six and ten million.
- Insect bodies have three parts: the thorax, abdomen, and head.
- Insects have two antennae.
- Insects have three pairs of legs.
- Some insects, such as Gerridae, water striders, are able to walk on the surface of water.
- Bees, termites, and ants live in well organized social colonies.
- Only male crickets chirp.
- Insects are cold blooded.
- Silkworms are used as the primary producer of silk.
- Most insects hatch from eggs.
- Some cicadas can make sounds nearly 120 decibels loud.
- The life cycle of a mosquito features four stages, egg, larva, pupae and adult. Female mosquitoes drink blood in order to obtain nutrients needed to produce eggs.
- Spiders are not insects.
- Bees are found on every continent except Antarctica.
- Ants leave trails and communicate with each other using pheromones as chemical signals.



## Background Information on Insects

An **exoskeleton** is a hard covering that supports and protects the bodies of some types of animals. The word exoskeleton means “outside skeleton.” Many invertebrates, or animals without backbones, have exoskeletons. Insects are the largest group of animals that have an exoskeleton.

Exoskeletons contain hard and resistant components and have several purposes; protection, excretion, sensing, support, feeding, and acting as a barrier against drying out. Exoskeletons protect the insect from pests and predators, support, and in providing an attachment framework for musculature. Exoskeletons contain chitin; the addition of calcium carbonate makes them harder and stronger.



Madagascar Hissing Bettle © STR

### Growth of Exoskeleton:

Since exoskeletons are rigid, they limit growth. A true exoskeleton, like that found in arthropods like insects, arachnids, and crustaceans must be shed, molted, when it is outgrown. A new exoskeleton is produced beneath the old one. As the old one is shed, the new skeleton is soft and pliable. The animal will pump itself up to expand the new shell to maximal size, then let it harden. When the shell has set, the empty space inside the new skeleton can be filled up as the animal eats. Failure to shed the exoskeleton once outgrown can result in the animal being suffocated within its own shell, and will stop young from reaching maturity. This is the mechanism behind some insect pesticides, like Azadirachtin.

As you may remember from elementary school, the most basic definition of an insect is an organism with three pairs of legs and three body regions, head, thorax, and abdomen. Entomologists, scientists who study insects, might also add that insects have a pair of antennae and external mouthparts. As you learn more about insects, you will find there are some exceptions to these rules.

## Insect Anatomy Basics

### The Head Region:

The head region is at the front of the insect's body, and contains the mouthparts, antennae, and eyes. Insects have mouthparts designed to help them feed on different things. Some insects drink nectar, and have mouthparts modified into a tube called a proboscis to suck up liquid. Other insects have chewing mouthparts and eat leaves or other plant matter. Some insects bite or pinch, and others pierce and suck blood or plant fluids.

The pair of antennae may have obvious segments, or look like a feather. They come in different forms and are a clue to identifying the insect. Antennae are used to perceive sounds, vibrations, and other environmental factors. Insects can have two types of eyes, compound or simple. Compound eyes are usually large with many lenses, giving the insect a complex image of its surroundings. A simple eye contains just a single lens. Some insects have both kinds of eyes.



### The Thorax Region:

The thorax, or middle region of an insect's body, includes the wings and legs. All six legs are attached to the thorax. The thorax also contains the muscles that control movement.

All insect legs have five parts. Legs can be different shapes, and have different adaptations to help the insect move in its unique habitat. Grasshoppers have legs designed for jumping, while honey bees have legs with special baskets to hold pollen as the bee moves from flower to flower.

Wings also come in different shapes and sizes, and are another important clue to help you identify an insect. Butterflies and moths have wings made of overlapping scales, often in brilliant colors. Some insect wings appear transparent, with just a web of veins to identify their shape. When at rest, insects like beetles and praying mantis, keep their wings folded flat against their bodies. Other insects hold their wings vertically, like butterflies and damselflies.

### The Abdomen Region:

The abdomen is the final region in the insect body, and contains the insect's vital organs. Insects have digestive organs, including a stomach and intestines, to absorb nutrients from their food and separate waste matter. The sexual organs of the insect are also in the abdomen. Glands that secrete pheromones for marking the insect's trail or attracting a mate are in this region as well.

The next time you observe a lady beetle or a moth in your yard, stop and take a closer look. See if you can distinguish the head, thorax, and abdomen. Look at the shape of the antennae, and watch how the insect holds its wings. These clues will help you identify a mystery insect, and provide information about how the insect lives, feeds, and moves.

Insect Anatomy Article from <http://insects.about.com/od/insects101/p/whatisaninsect.htm>

Have a question or comment?

**CALL TOLL FREE:**

877-YOURLAB (877-968-7522)  
9am – 6pm CST, Monday-Saturday

**WRITE:**

SOUTHERN SCIENCE SUPPLY  
1248 AUSTIN HIGHWAY  
#106-118  
SAN ANTONIO, TX 78209

**EMAIL:**

Customer Service: [sales@southernsciencesupply.com](mailto:sales@southernsciencesupply.com)  
Technical Questions: [carol@southernsciencesupply.com](mailto:carol@southernsciencesupply.com)



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