Spot On Science & Technology

Metamorphosis

by Joanne Mattern

What organisms change form as they mature, and how does this happen?

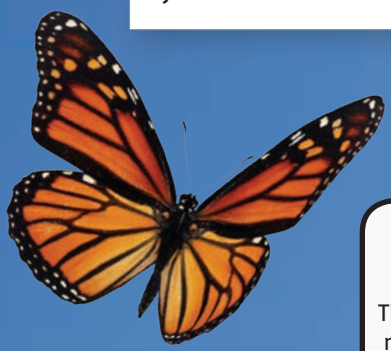
Benchmark EDUCATION

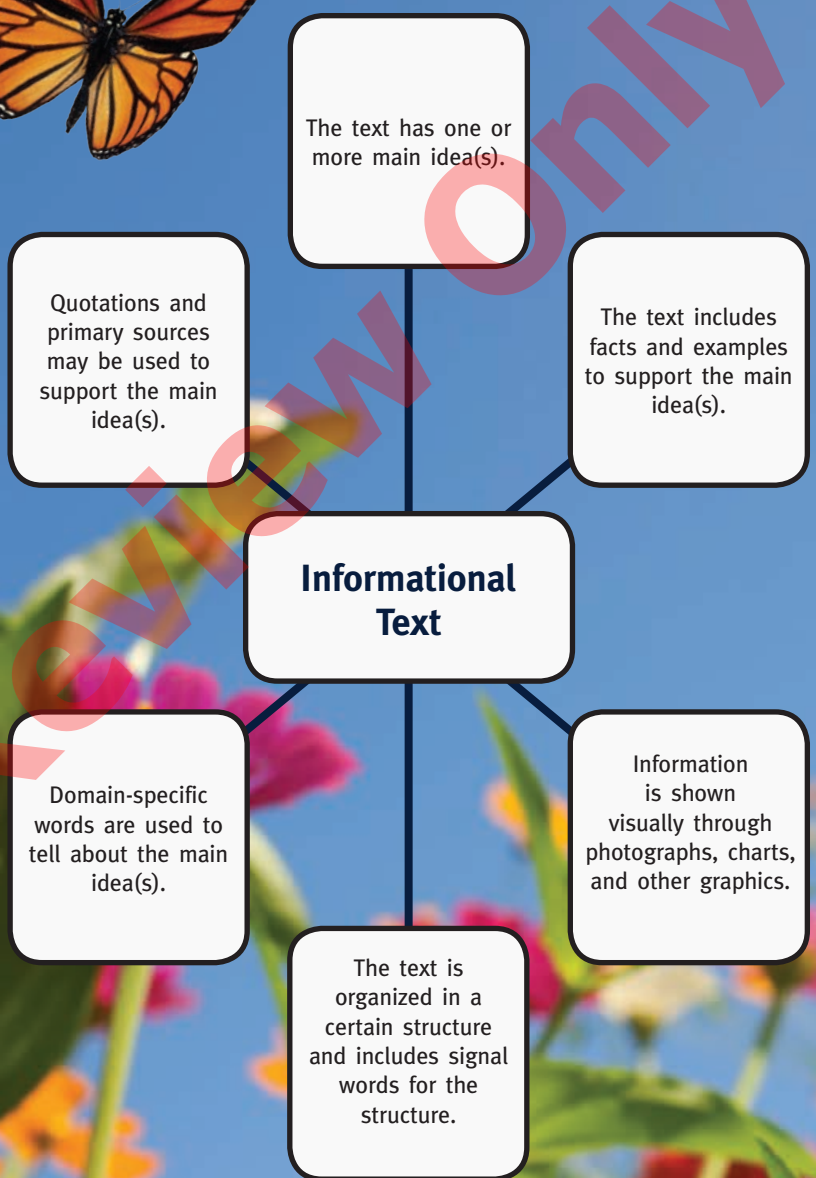
INFORMATIONAL TEXT
SCIENCE & TECHNOLOGY

Level	**W/60**
Lexile®	**980L**

Informational Text

Look for the genre features noted below as you read this book. Use the features to help you understand the text.





E-books and additional digital resources available at benchmarkuniverse.com.

ISBN: 978-1-5322-6069-8

Toll-Free 1-877-236-2465
www.benchmarkeducation.com
www.benchmarkuniverse.com

BENCHMARK EDUCATION COMPANY
145 Huguenot Street • New Rochelle, NY • 10801

Butterflies are known for their stages of metamorphosis. The final, mature stage looks very different from the earlier stages.

Big Changes

Scientists estimate that there are as many as eight million different species of living things on Earth. These include hundreds of thousands of different species already named and categorized as well as millions of yet-to-be-discovered life forms.

Currently, Earth has more than 950,000 known animal species and more than 300,000 known plant species. All plants and animals grow and change as they move through the stages of their life cycle. However, some species undergo more drastic changes than others.

Some plants and animals undergo a process called **metamorphosis**. In this process, the organism suddenly and drastically changes form and structure as it matures. For these organisms, their final mature "adult" is almost completely different from its original structure and form.

Through metamorphosis, an animal may change in shape and color. It may develop legs or wings where it had none before. In addition, at each stage in the process, the animal has different energy needs and, therefore, different food sources. Some animals even alter their behavior and live in different environments. For example, an animal may live in the water during one stage and on land during another stage.

Despite going through such distinctly different stages of development, the animal is always the same type of animal and remains the same species.

All winged insects undergo the process of metamorphosis. This book examines the process of metamorphosis for two different types of winged insects. The first example is the praying mantis, which undergoes incomplete metamorphosis. Incomplete metamorphosis involves only three stages. The second example is the scorpion fly, which undergoes complete metamorphosis. Complete metamorphosis involves four stages of development.

▼ **Mammals do not go through metamorphosis.**

▼ **Many insects, fish, and amphibians go through metamorphosis.**

scorpion fly

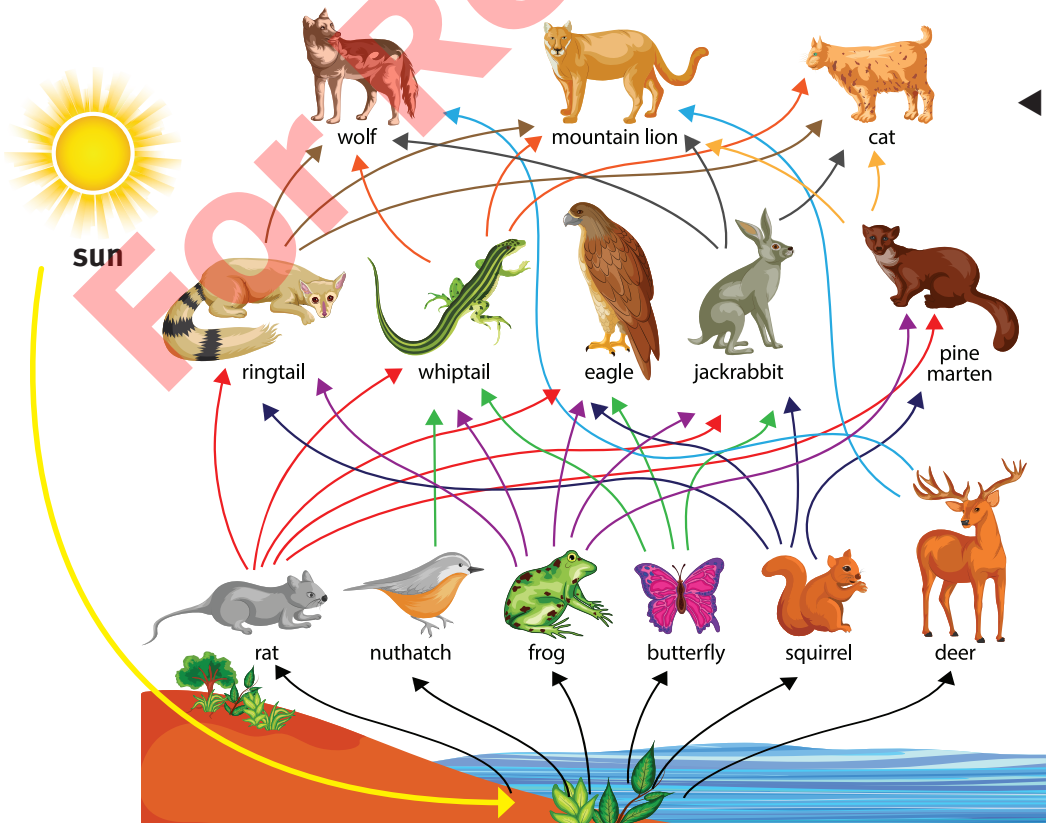
praying mantis

Gathering Energy to Grow and Change

All living organisms require energy to grow and change. Producers, such as plants, get this energy directly from the sun and use it to produce their own food. Consumers are organisms, such as plants or animals, that get their energy by feeding on other living things. Decomposers, such as bacteria and fungi, get their energy from plants and animals that have died.

One of the best ways to better understand how energy moves through a community of organisms is to look at a food web. A food web shows connections among living things in an area and how the sun's energy flows from one living thing to another. A food web also shows which consumers are plant-eating **herbivores**, meat-eating **carnivores**, or **omnivores**.

Food Web



This food web shows how energy from the sun moves through a community of organisms.

Insects are an important link in many food chains and food webs. Insects can eat a lot; they can consume a large number of plants and other insects. For example, one ant can eat up to one-third of its body weight each day.

Insects are also consumed by other animals, making them a valuable source of food and energy. For these reasons, insects are often integral to the steady flow and balance of energy in an **ecosystem**. Many fish, frogs, lizards, birds, and mammals eat insects.

▲ **Most mice are omnivores.**

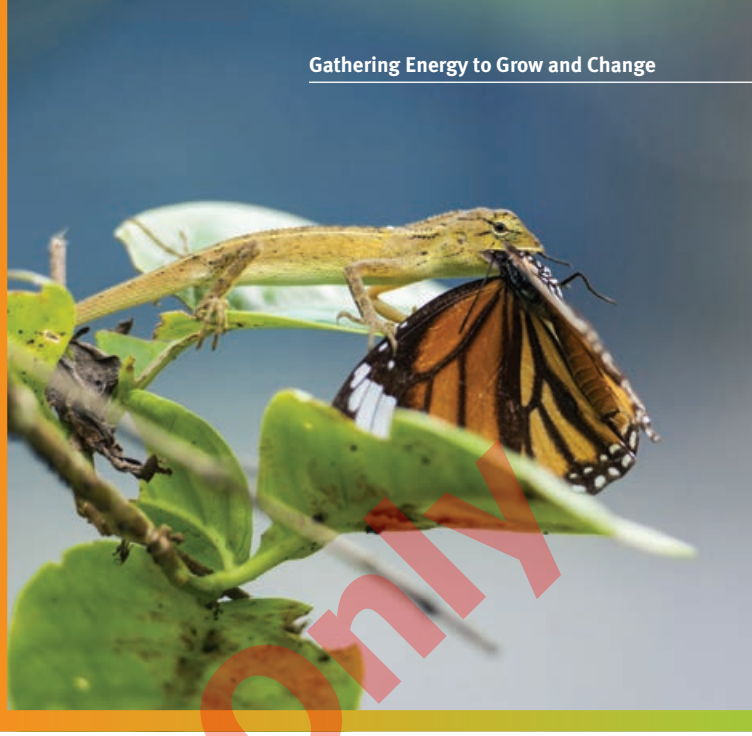
▲ **Rabbits are herbivores.**

▼ **The snake, owl, lion, jackal, and cat are all carnivores.**

▲ **The butterfly eats different types of food at different stages.**

Certain life processes require more energy than other processes do. Certain life stages may also require different types of food. For an insect's body to change dramatically and develop a new shape or form during stages of metamorphosis, the insect needs a steady and abundant food source. The insect's food source is also subject to change from one stage to the next.

For example, monarch butterflies lay their eggs on milkweed leaves so that when the monarch caterpillar hatches, it can eat the leaves of the milkweed plant. The plant gives the caterpillar enough energy to transition into a pupa, the next stage in its development. Later, after the monarch caterpillar has morphed into a mature monarch butterfly, it no longer eats milkweed leaves. Instead, it eats the liquid nectar in milkweed flowers and other flowering plants.



▲ At each stage of its life, the butterfly may also be an energy source for other living things.

Careers in Science

Insect Scientists

An entomologist is a scientist who studies insects and learns all about their life cycles and habitats. Some entomologists specialize in just one kind of insect, while others study various types of insects.

To become an entomologist, a person must complete a college degree in biology, zoology, or entomology. A person should then work for several years in a field studying insects. A person may choose to go on to obtain a Ph.D. in entomology. Many people then choose to take a formal exam and become a Board Certified Entomologist (BCE).

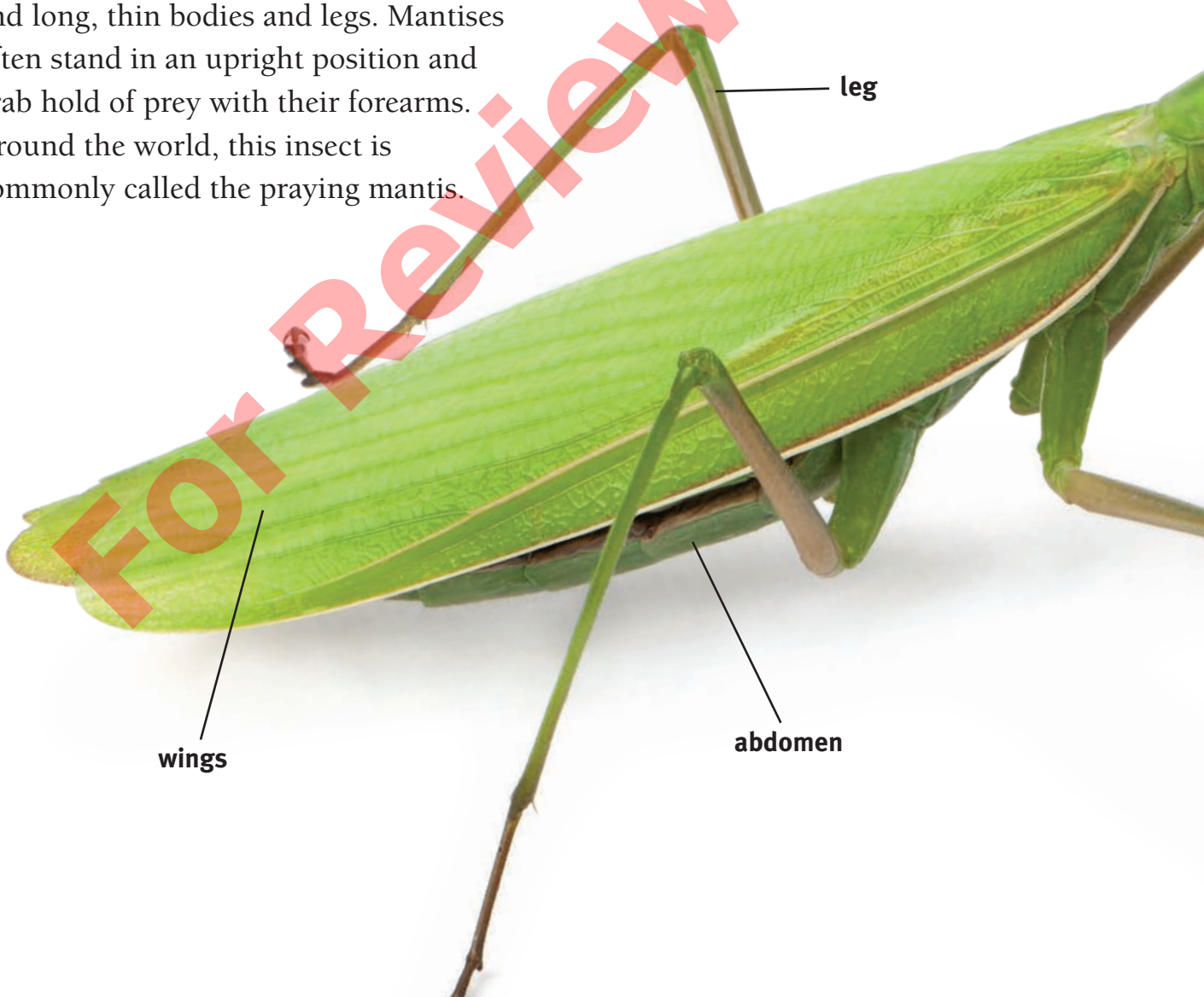
Some entomologists work for public health organizations to help stop insects from spreading disease, while others work as teachers or do research to learn how insects reproduce or what foods they eat. They might also look for ways to help endangered insects, such as certain types of bees, from becoming extinct.

CHAPTER 2

The Praying Mantis

A mantis is an insect that is a member of the Mantidae family. There are more than 2,300 species of mantises in the world. Most are brown or green and are about two to three inches long. Mantises can be found in warm and humid climates around the world. They are known for their triangle-shaped heads, large eyes, and long, thin bodies and legs. Mantises often stand in an upright position and grab hold of prey with their forearms. Around the world, this insect is commonly called the praying mantis.

Like all insects, a praying mantis is an **invertebrate**. That means it does not have a backbone. Instead, a mantis's body is covered with a hard **exoskeleton**. The exoskeleton both supports the body and protects the body like a suit of armor. The exoskeleton is made of a hard, stiff rial called chitin.

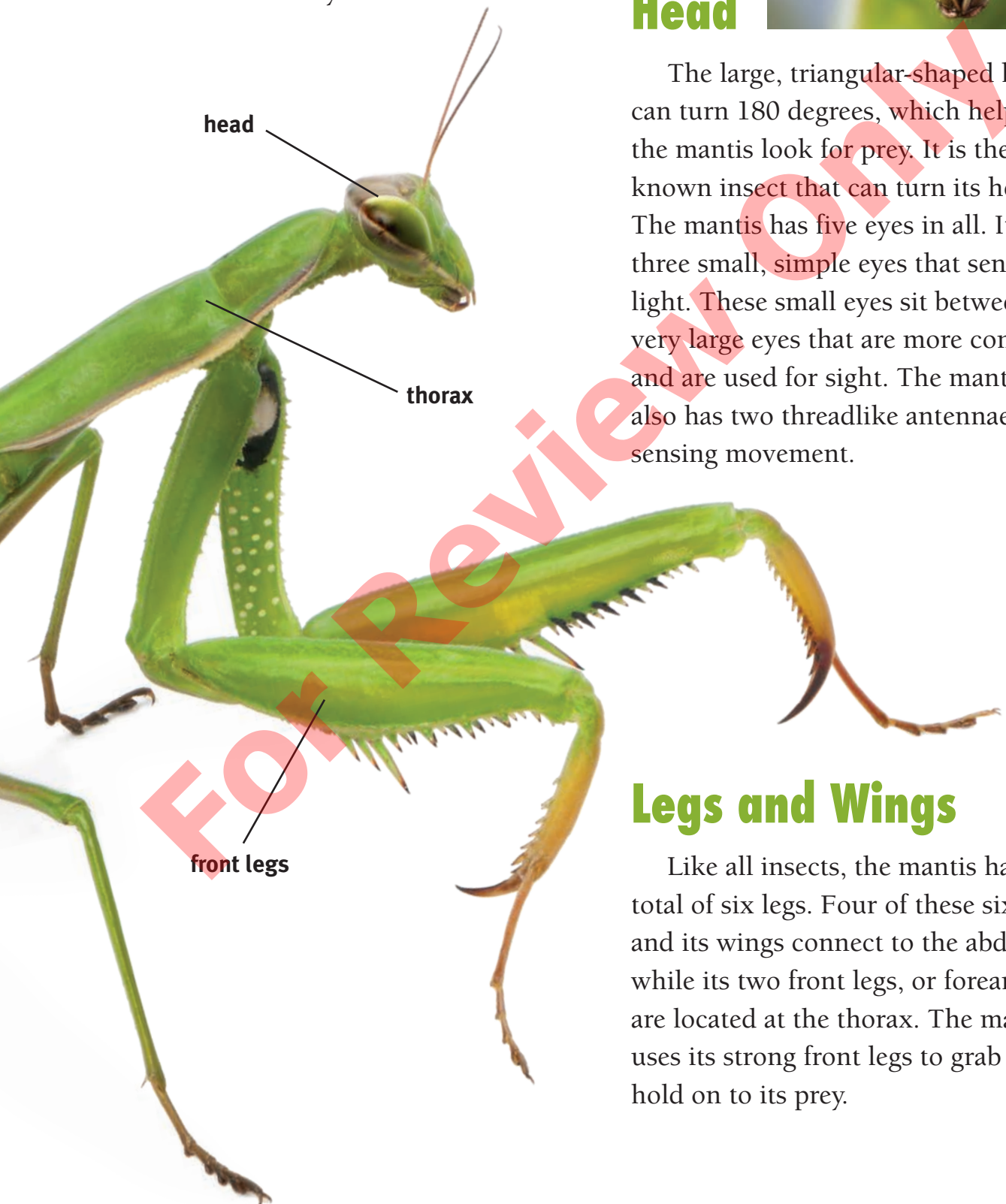


Thorax and Abdomen

The thorax connects the mantis's head to its abdomen. Its long abdomen makes up most of the mantis's body.

Head

The large, triangular-shaped head can turn 180 degrees, which helps the mantis look for prey. It is the only known insect that can turn its head. The mantis has five eyes in all. It has three small, simple eyes that sense light. These small eyes sit between two very large eyes that are more complex and are used for sight. The mantis also has two threadlike antennae for sensing movement.



Legs and Wings

Like all insects, the mantis has a total of six legs. Four of these six legs and its wings connect to the abdomen, while its two front legs, or forearms, are located at the thorax. The mantis uses its strong front legs to grab and hold on to its prey.