

Materials to Catch Small Flies (for Orb Weaver Spiders)

- Small glass jar with lid
- Paper rolled into a funnel with a 1/2" opening at the small end, secured to the jar with tape
- Pieces of meat or rotting fruit

Collecting the Spider

Search in a garden or school yard for spiders. Some spiders build their webs only at night, so a nighttime collecting trip may yield a large orb weaver. Use the small paintbrush to gently guide the spider into the small jar and screw on the lid. Back in the classroom, place the forked branch into the larger jar and coax the spider onto the branch. Cover the opening of the jar with either the nylon hose or cheesecloth and secure it with the rubber band. Add live prey every day and mist the spider lightly once every two days. Closely observe whether the spider is actually eating the prey.

Catching Flies

Place a piece of fruit or meat in the jar. Place the paper funnel in the mouth of the jar (small end of the funnel sitting inside the jar), and tape it to make sure that there are no gaps for flies to escape. Place the jar outside and check every two hours until there are several flies in the jar. Many of them will not be able to find their way out. Quickly remove the funnel from the jar and screw on the lid. To feed the spider, simply shake the flies into the larger jar and quickly put the mesh cover back on. An alternative to making a funnel is to punch small holes (1/8" in diameter) in the metal lid and let flies enter that way.

Observing the Spider

Does the spider build a new web every day? Does it build just one web and wait? Does it hang upside down? How long does it take the spider to attack a fly in the web? Does the spider eat the fly immediately? Does it wrap up the fly in silk?

Vocabulary

abdomen	invertebrate
arachnid	orb weaver
cephalothorax	pectines
chelicerae	pedipalps
drag line	spinnerets
enzymes	telson
exoskeleton	venom
fluoresce	

Suggested Internet Resources

Periodically, Internet Resources are updated on our web site at www.LibraryVideo.com.

www.sasionline.org — The Sonoran Arthropod Studies Institute is a non-profit organization dedicated to arthropod research and education projects.

www.nhm.org — The Natural History Museum of Los Angeles County's web site includes pages devoted to the Insect Zoo.

bugguide.net/node/view/15740 — This website is a comprehensive source of photos and information about bugs and spiders found in the United States and Canada.

spiders.ucr.edu/ — This website, by the University of California Riverside, provides information, photos and myths about spiders, particularly the brown recluse spider.

Suggested Reading

Berger, Melvin and Berger, Gilda. *Do All Spiders Spin Webs?: Questions and Answers about Spiders*. Scholastic, New York, NY; 2000.

Gilpin, Daniel. *Centipedes, Millipedes, Scorpions and Spiders*. Capstone Press, Mankato, MN; 2005.

Miller, Heather L. *Daddy Longlegs*. Thomson Gale, Farmington Hills, MI; 2004.

Murray, Peter. *Spiders and Scorpions*. Child's World, Chanhassen, MN; 2004.

Simon, Seymour. *Spiders*. HarperCollins Publishers, New York, NY; 2003.

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SPIDERS & SCORPIONS

Grades 1–6

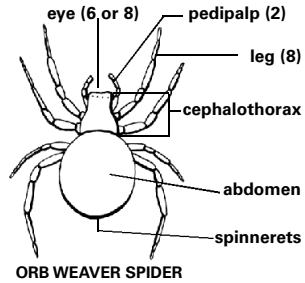
This guide is a supplement, designed for educators to use when presenting this program in an instructional setting.

Before Viewing: Research in learning suggests that it is important for the teacher to discover what the students know — or think they know — about a topic, at the start of a new unit, so that their accurate conceptions can be validated and reinforced, and their misconceptions identified and corrected. Therefore, create an "Everything We Know About..." list. Preview key vocabulary words and have students raise questions they hope will be answered by this program. Most importantly, students should be told to pay close attention to the show, so that after viewing the program, they will be able to tell whether or not the facts/beliefs they put on their list were scientifically accurate.

After Viewing: After a brief discussion about the program, challenge your students to prove or disprove the accuracy of the facts they put on their "Everything We Know About..." list. Discuss what else they learned and any additional questions they may have. Encourage students to research the topic further with the Internet and print resources provided.



Can you name an animal that builds a net to trap prey from a substance that, for its size, is stronger than a strand of stainless steel, and can stretch twice as far as nylon? Some of these animals have six or eight eyes, but most do not see well, relying instead on the vibrations of sensitive hairs on their bodies to detect prey. Most have venom that acts as a digestive enzyme, liquefying their prey for easier consumption. This animal is the spider, a member of the class Arachnida.



Like insects, arachnids are invertebrates, animals that lack an interior skeleton. Arachnids have an exoskeleton, a hard outer shell to protect their bodies, and their bodies and legs have many joints to increase flexibility. There is much variation among spiders, scorpions, ticks and mites, but they do share some basic characteristics. The chart below compares arachnids with insects.

Arachnids	Insects
<ul style="list-style-type: none"> • Body covered with an exoskeleton • Eight legs • One or two body regions • No wings • No antennae • Mostly meat eaters, or carnivores 	<ul style="list-style-type: none"> • Body covered with an exoskeleton • Six legs (in adult stage) • Three body regions • Two or four wings, or no wings • One pair of antennae • Mostly herbivores, with some carnivores and omnivores

All of the approximately 30,000 species of spiders are predators, feeding exclusively on insects and in no way competing with humans for food. These shy and industrious invertebrates are beneficial to us because they consume the insect pests that nibble on our wool sweaters, live under the kitchen sink or threaten our agricultural crops.

Spider Anatomy

Spiders have two body regions. The abdomen contains the digestive, reproductive and respiratory systems. Spiders do not have a separate head and thorax like insects; the cephalothorax (literally meaning “head and thorax”) contains the muscles associated with movement as well as the eyes and mouth parts. Spiders have a set of short appendages, called pedipalps, that hold food while the spider eats it. Most spiders have 2, 4, 6 or 8 eyes, though their eyesight is rather weak. Spiders that spin webs are sensitive to vibrations, either on the

silk strands of their webs or on the hairs on their bodies. By contrast jumping spiders have a keen sense of sight, which they need as they leap after prey.

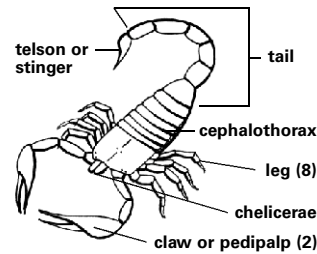
All spiders have fangs, or chelicerae, that are used to inject the venom that kills or paralyzes their prey. Spider mouth parts are too weak to chew through the tough exoskeleton of insects, so they inject their prey with digestive enzymes to turn the internal organs to liquid that they can then suck out of the exoskeleton.

Spider Webs

All spiders have the ability to make silk from glands inside their abdomen. The liquid silk becomes a thread as it is pulled from 4–8 spigots at the tip of the abdomen called spinnerets. Spiders are able to produce several types of silk, with varying amounts of stickiness and strength. Not all spiders use a web to trap their prey; tarantulas line their burrows with silk while actively hunting for insects and other spiders. Jumping spiders also do not spin a web; instead they trail a drag line, a strand of silk that will suspend them if they have to leap off an object to escape from a predator. Different families of spiders spin differently shaped webs. Orb weavers spin the round webs with radiating spokes often seen in a garden, constructing a new web every night. These webs are designed to catch flying insects, and in some tropical species, small birds or bats. Trap door spiders build a tube-shaped burrow in the ground with a hinged lid, then spring out of the burrow to seize their prey. Funnel web spiders construct a flat web that tapers down to a narrow point, where the spider waits. If an insect walks on the sheet, the spider immediately senses its presence and springs out to claim its meal.

Scorpions

Scorpions, denizens of warmer areas of the world, are also arachnids. They have eight legs and bodies that are divided into two parts. The most noticeable feature of scorpions is their pedipalps, or claws, that they use for defense and to seize prey. Unlike spiders, scorpions have a tail armed with a stinger, or telson, and a venom sac. The venom varies in toxicity. The venom of an emperor scorpion is no more dangerous than a bee sting, while some species of scorpion found in the desert



regions of the Middle East and Africa are highly poisonous. The genus *Centruroides*, is the only type of scorpion in the United States that is considered to be dangerous to humans.

Scorpions either dig burrows in the soil or take refuge beneath objects such as bark or rocks, where they remain during the day. They hunt at night, using the sensitive hairs on their bodies to detect the vibrations of moving insects, spiders and other scorpions. Pectines, a set of comb-like structures on the underside of a scorpion’s body, are thought to have a vibration detecting function as well. All scorpion exoskeletons fluoresce, or glow, under ultraviolet light, making them easy to spot outdoors with a portable black light.

When mating, male and female scorpions grasp each other’s claws and perform a ritualized mating “dance.” The male produces a sperm packet and, after placing it on the ground, maneuvers the female over it. She picks it up and fertilizes her eggs. After several weeks, the female scorpion bears live young. The young scorpions crawl up on her back and ride there, protected, until they shed their exoskeletons for the first time. They then scatter and begin to feed on their own. Some desert hairy scorpions can live for as long as 25 years, though most scorpions probably live 5 to 8 years. Scorpions are able to survive without food for 4 or 5 months.

Make a Spider Home for the Classroom

Spiders are easy to keep in captivity as long as they are fed live prey. Spiders should never be handled by the students; even small spiders have fangs and can bite. Some tarantulas are docile but should be handled only by a trained adult; tarantulas are fragile and will suffer broken legs or abdomens if dropped. You can easily collect a spider outside the school or in a garden that can be observed in the classroom. When you collect a spider, remember where the web was (in a bush or near the ground) so you can figure out whether it prefers flying or walking insects.

Materials for Spider Home

- A clean one-gallon glass jar for the spider home
- Smaller glass jar with a lid for collecting spiders
- Fine mesh, nylon hose or cheesecloth
- A rubber band
- A small paintbrush
- A spray bottle with filtered water, for misting
- A forked branch
- A steady supply of LIVE insects such as flies