



Bob Hammon

<http://wci.colostate.edu/>

Bob Hammon is Tri River Area Extension agent with responsibilities in entomology and agronomy. He just celebrated 25 years with Colorado State University (CSU), the first 15 years with the Western Colorado research Center at Fruita, and the last 10 with TRA Extension at the Mesa County. He has a B.S. in Natural Resources from the University of Michigan and a M.S. in Entomology from CSU. In addition, he spent 4 summers as a field scout with Michigan State Cooperative Extension.

Bob combines personal interests of natural history, photography and gardening with his professional responsibilities by running the TRA insect diagnostic lab. He routinely identifies insects, plants, and other assorted living and mineral matter for much of the Western Region. In addition, he conducts extensive research on pest management issues and manages several insect surveys for exotic pests.

Bob has been an insect collector for more than 40 years. His insect collection housed at the Grand Junction Extension office is a popular and valuable resource that is utilized almost every day. It currently consists of 20 drawers with several thousand pinned specimens and several hundred more in alcohol.

Bob organizes an annual workshop that allows private and commercial pesticide applicators an opportunity to receive continuing education credits to maintain their licenses. The event has 20+ speakers and 250 participants from across the region and is the largest of its kind in the state. This is all done with the goal of protecting the environment through the proper, judicious and intelligent use of pesticides.

STEM Connections



Connecting Science, Technology, Engineering, and Math concepts to our everyday lives.



Picture Perfect Arachnids!

Spiders, Scorpions,
Ticks, and Mites

This is the time of year when we begin to see elaborate webs and the associated orb spiders and other spiders invading our homes. We are going to take a closer look—literally—at spiders, their anatomy, their amazing ability to build webs, and how to classify them by photographing and then identifying them.

Spiders are the 7th most diverse group of animals (insects being #1), with more than 43,600 species described in 109 families! Spiderlike fossils have been found in rocks that are 386 million years old, but the first true spiders (with **spinnerets**) don't show up for another 75 million years. Before we begin, let's look closer at the characteristics that make this **arthropod** an arachnid.



From the photograph on the left of the yellow legged sac spider (*Cheiracanthium inclusum*), you can see that an arachnid has 2 body parts: the **cephalothorax** (head/chest) and the **abdomen**. Eyes, mouth parts, and 8 legs are all part of the **cephalothorax**. This body part includes **pedipalps** between the mouth and legs, which in some species are so large that they look like legs. The males will use these appendages for transferring sperm for reproduction, and therefore we can discern gender. The mouth part, called the **chelicerae**, can be clearly seen in the photo on the right—it is the green part of the bold jumper spider (*Phidippus audax*). This structure is unique and forms the fangs and is hollow to deliver venom. Notice that it has simple eyes, as do all spiders, although they will have up to eight eyes positioned all around their head. The **abdomen** has most of the body's organs and the **spinnerets**, the organ that makes silk. Spiders do not have muscles in their limbs, but move them by **hydraulic** pressure. Their nervous system is centralized into one mass in their **cephalothorax** (just as our central nervous system is centralized in one mass in our skulls, but we call ours a brain).

EXPLORE IT - DESIGN IT - DO IT

- **Exploring:** Before you photograph anything, you have to find it. Look for webs in dark corners and the basement of your house, on your porch, in trees, at the local park, etc. Spiders are everywhere, and right now, they are busy building webs, reproducing, and preparing for the winter (either by protecting their eggs to survive the cold, or finding nice warm spots, like your attic, to survive). Be careful. Do not grab object to move them looking for spiders. If you find a likely spot, use gloves or turn the object over with your foot.
- **Photographing:** Be sure that the spider is in focus. Most cameras have a close-up option that will help you photograph these small creatures. What kinds of lighting do you want: during the day or with a flashlight or lantern at night?
- **Identifying:** The websites listed in materials will help you determine what kind of spider you found (i.e. jumping or sac spider) If you want to go into more depth, the 2nd website from DMNS is a dichotomous key on Colorado spiders.

Age Appropriate:

4th—HS grades

Time Required:

At least 1 hour

Materials:

- Patience!
- Camera
- Computer
- Optional: printer

The Set-up:

- Collect the equipment. If you do not have a camera, your local 4-H agent can loan you a camera for this project.
- There are several resources to help you identify what spiders you find, and these 2 are specifically for Colorado:
 - <http://www.ext.colostate.edu/pubs/insect/05512.html> CSU Bug Mugs)
 - <http://spiders.dmns.org/idkey1.html> (From Denver Museum of Nature and Science (DMNS)—for those of who would really like to spend some time identifying what spiders you find)
- If you want to spend time identifying the spiders you photograph, take a series of photos from different angles and body parts

The Clean-up:

- If you borrowed a camera, return it to your 4-H agent

Power Words

- **abdomen:** the section of body behind a thorax in an arthropod
- **arthropod:** an invertebrate animal (i.e. insects and arachnids) that have a segmented body and jointed appendages
- **cephalothorax:** a combined head and thorax
- **chelicerae:** the first pair of appendages of an arachnid often specialized as fangs
- **hydraulic:** operated or moved by means of water in tubes
- **pedipalp:** second pair of appendages (after chelicerae) of an arachnid that are borne near the mouth and are often modified for a special (as sensory) function
- **spinneret:** an organ (as of a spider or caterpillar) for producing threads of silk from the secretion of silk glands