



Description: Students look for insects, spiders, and other arthropods. The survey leads into an examination of microhabitats.

Objectives: Students will:

- discover which insects, spiders, and other arthropods live in the bosque (or other natural area);
- learn the differences between insects, spiders, and other arthropods;
- Learn about different microhabitats within the bosque (or other natural area) and how these locations are used by arthropods.

Materials:

- Bug boxes—one for every three students; small box with magnifier top is best, but any small clear vial or jar with a cover and a magnifying lens will work.
- Magnifying lenses (ideally one for every 1-2 students, if not incorporated into the lids of bug boxes)
- Insect nets (optional)
- Extra small jars
- Field journals / paper and pencils, pens
- Insect guides—one for instructor; student pages (Surface-active Arthropods) and /or Appendix E: Arthropods

Phenomenon: There are many arthropods in the bosque, and they can be found in a variety of different places (in trees, on the ground under leaf litter, in rotting logs, etc.)

Lesson Questions:

- *What arthropods can I find in the bosque (or other natural area)?*
- *What different types of microhabitats support arthropods?*

5. Crawly Creatures



Grades: K–8

Time: approximately 45 minutes

Subject: science

Terms: *arthropod, centipede, habitat, insect, invertebrate, isopod, millipede, microhabitat, spider*


New Mexico STEM Ready! / Next Generation Science Standards

(NOTE: see **NGSS Connections** in *Going Out: Field Activities* at the end of this chapter for more possible field trip NGSS connections and for suggestions using each standard).

3.LS2.C Ecosystem Dynamics, Functioning, & Resilience

3.LS4.C Adaptation

3.LS4.D Biodiversity & Humans

4.LS1.A Structure & Function*

MS.LS2.C Ecosystem Dynamics, Functioning, & Resilience

NGSS CCCs

Structure & Function

*indicates extension activity

Background:

Crawly creatures abound in the bosque! Although larger animals, including mammals and even birds, can be difficult to spot, **invertebrates** (animals without backbones) are numerous and relatively easy to find. **Arthropods**, invertebrate animals with jointed legs, are particularly easy to observe. These include **insects**, **spiders**, crustaceans (**isopods**), **centipedes** and **millipedes**. Because they are very accessible, students get excited to search for arthropods. A beetle may walk past you on the trail, a butterfly sail by on wings, a spider dart across a web to snag a fly, or a cicada buzz noisily from a branch. There is much to be discovered!

See *Appendix E* and *Bosque Bugs Boogie* activity for more detail on arthropod classification, identification, and natural history.

All animals require appropriate habitat to survive. **Habitat** includes the food, water, shelter and space suitable to an animal's needs; an appropriate arrangement of all of these is required for a given species to live in a certain location. Within a given habitat, such as the bosque, there are smaller, more specialized areas referred to as microhabitats. A **microhabitat** is a small area that is different from the surrounding habitat. For example, within the bosque or riparian habitat, microhabitats could include a grassy area, underneath a rock, inside a rotting log, on the branch of a large tree, etc. Microhabitats provide even more specialized conditions for the animals that live there. Whether an area is considered a microhabitat to a given species depends on the size of that animal; a millipede might live completely within a rotting log, but a coyote in the same area might consider the log to be just one small part of its home range. In this activity, students will search different microhabitats within the bosque to discover their inhabitants.

Procedures:

- Ask students what animals they have seen in the bosque. If you have done *Wildlife Detectives*, your students may have focused on some of the larger animals, the vertebrates. Today is your chance to focus on the smaller animals. Remember, arthropods are animals! You can't make this point often enough. Briefly discuss the difference between insects, spiders, centipedes and millipedes. *Where do you think you will find arthropods? Do you expect to find different species in different locations?*



- ♣ Define the area for the activity. It can be “stay between this path and the river” or “within ten paces of this path” or whatever is appropriate. Many areas in the bosque look alike and if separated from the group, students can get disoriented and feel lost.
- ♣ Remind students that these animals are living creatures and we are in their homes. Treat them very gently. Explain how to use the equipment.
 - **Bug boxes:** Spot an insect on the ground or on a plant, carefully encourage it to go in the box (or jar) and quickly put the cover on. Look at it with a magnifying lens. Pass it around for other students to see. Return it to the area where it was caught.
 - **Insect nets:** Sweep the net through plants or grasses, then tip the rim of the net sideways or up-side down so the rim closes the net; inspect to discover what has been caught. To get a better look, ease a jar and cover into the net, to capture some of the bugs and get a better look at them. Always return the arthropods to the place where they were caught. Insect nets must be returned free of any debris. Sometimes the sweep collects mostly grass seeds, so students must take the time to clean the net.
- ♣ Divide the class into groups of three students. Provide each group with two or three bug boxes and a net, if available. Let students explore for at least 15 minutes. Wander among groups to help them identify their finds. In field journals or on a piece of paper, make a list of the animals collected. Students should draw one or more of the animals captured.
- ♣ Here are some collecting tips:
 - Look in a variety of microhabitats: under rocks, in rotting logs, in bushes, in the bark and along the branches of trees, in grass, down in the leaf litter on the ground – look everywhere!
 - Keep track by noting in journals which microhabitat each creature was found in. You might set up a chart with specific microhabitats (describe or draw) and record captures found in each.
 - When looking under rocks or wood, roll the rock towards you; this reduces the chance of getting bitten by something hiding underneath—it will strike toward the opening, which is away from you. Always return the rock to the same resting spot. Why? Animal homes are underneath.
 - Do not collect wasps, bees, or black widow spiders; all can give a painful sting or bite and some students may be allergic to them.
 - It is best not to handle arthropods directly with your hands. This is especially important for moths and butterflies, as their wings may easily be damaged. Use a bug box or jar instead.
 - Emphasize putting creatures back where they were found and treading lightly on the ecosystem.



- ♣ Call the groups together in a large circle. Have the students pass their bug boxes around the circle so everyone gets a chance to see what was caught. Provide interesting tidbits of natural history related to the creatures collected. Record arthropods captured for all of the groups in journals.
- ♣ Introduce the concept of habitat (the arrangement of food, water, shelter or cover and space suitable to animals' needs). Assuming you are in the bosque, you are in a riparian habitat, but each arthropod will have its own particular microhabitat. Have students describe the specific microhabitat for each of the types of arthropods caught, i.e., grass, large tree, under leaves on the ground, etc. *What does each location tell us about the microhabitat requirements of the arthropod? Would you expect a given arthropod to be able to survive in a different microhabitat? Why or why not? What would happen if the microhabitat were to disappear?* **(3.LS2.C; 3.LS4.C; 3.LS4.D; MS.LS2.C)**
- ♣ After the discussions, have students release their catches in the same place they were found.

Assessment: Use field notebooks to indicate participation and learning.

Extensions:

- Do the *Bosque Bugs Boogie* activity.
- Discuss what contributions arthropods make to the ecosystem (food chain, soil aerators, seed planters, pollinators and so on). *What contributions do insects, spiders, and other arthropods make to humans?* (seed planters, pest control, food producers) Note that sometimes, a species might not seem to benefit humans directly (such as mosquitoes), but it might play an important role in the ecosystem (mosquitoes are pollinators, and they provide an important food source for dragonflies, birds, bats and more).
- Pick one of the arthropods discovered in the bosque. Research specific habitat needs for this species. Create a poster, model, etc. to share this information with the class.
- Take pictures of arthropods found; post sighting data, along with the photos, on iNaturalist / Seek or other bug identification app. Learn about other arthropods observed in your study area.
- For older students, look at arthropods under a field microscope. Draw the body parts and details observed. Try to figure out how these physical adaptations help them. **(4.LS1.A; Structure & Function)**

Reference:

Appendix E: Arthropods

A Field Guide to the Plants and Animals of the Middle Rio Grande Bosque,
Jean-Luc E. Cartron, et al. 2008. University of New Mexico Press, Albuquerque.

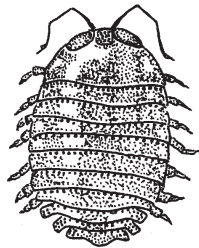
Surface-active Arthropods



Here are drawings (not to scale) and descriptions of some common surface-active arthropods encountered in pitfall traps in the Rio Grande bosque. (Specialized terms and species names in *italics*. Artists: B=Bosque School student; M=New Mexico Museum of Natural History & Science; E= Ernie Pyle Middle School student)



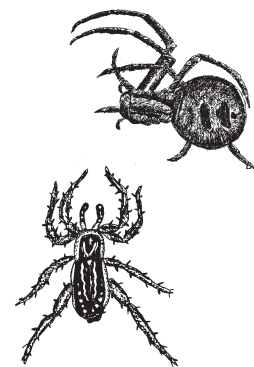
sow bug
ROLAND SHAW (B)



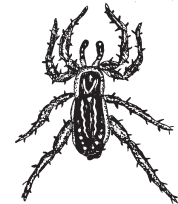
pillbug
CLAIRE EBERT (B)

Class: Crustacea
Order: Isopoda pillbugs or roly polys
and sow bugs or woodlice

While most isopods are marine some, such as the widely distributed pillbugs (“roly polys”) and sow bugs (woodlice), are terrestrial. All have somewhat flattened and multi-segmented bodies. Actually, none are either bugs or lice. Terrestrial isopods have 14 legs used for walking and crawling. In the bosque there are two species: a pillbug (*Armadillidium vulgare*) that rolls into a ball when stressed and a sow bug (*Porcellio laevis*) that cannot. Both species, like nearly all of their relatives, are scavengers and require moist habitats.

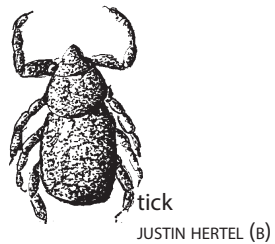


black widow spider
WILL COUTRET (B)



spider
LAURA ROSENBERG (B)

Class: Arachnida
Order: Araneae..... spiders
Spiders and other arachnids have two obvious body sections: The *cephalothorax* (combined head and thorax) supports eight walking legs, a pair of *chelicerae* (or “jaws,” often contain claws or fangs) and the *pedipalps* (primarily sensory organs). The second body section is the *abdomen*, which in spiders contains the silk-spinning *spinnerets*. Spiders are predators of other arthropods, which they pierce with their chelicerae. They externally digest their prey into a liquid state, then suck out the tissues. Spiders and other arachnids come in many body styles, sizes, and colors.



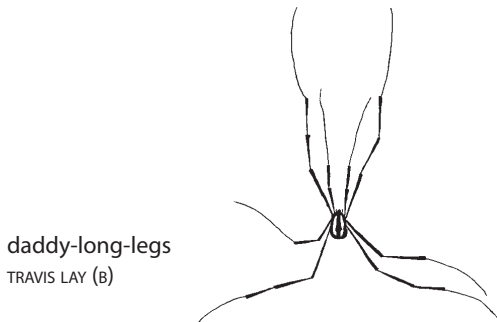
tick
JUSTIN HERTEL (B)



tick
AVIANNA MECK (B)

Order: Acarina ticks and mites
With eight-legged adults and what appears superficially as a single body unit, mites and ticks range in size from tiny to as large a human fingertip. Many are parasites of animals and plants. Many others are predators, especially of other arthropods, or are scavengers. Many mites found in the bosque are brown or nearly white, while some are bright red. It is no exaggeration to say that mites are almost everywhere.

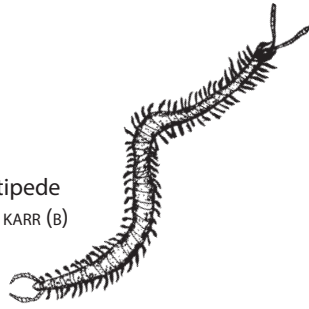
Order: Opiliones harvestmen or
daddy-long-legs
Most people recognize daddy-long-legs by their eight long legs, which except for their apparently unsegmented body make them resemble pholcid spiders (which also live in the bosque). Most harvestmen are predators; however, some are scavengers.



daddy-long-legs
TRAVIS LAY (B)



centipede
EVAN KARR (B)



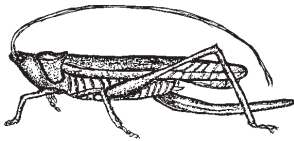
Class: Chilopoda..... centipedes
Centipedes are flattened and have many body segments, each with one pair of legs. They are usually brown, tan, or yellowish. The head bears antennae, and just behind and to the side of the head is a pair of poison fangs. Occasionally one finds small brown centipedes in the bosque. The large local centipede species in the bosque is *Scolopendra polymorpha*. Like other centipedes, it is mainly a predator of other arthropods. Handle it carefully: it moves very fast and has a painful bite.



millipede
JAY KORY JOHNSON (B)

Class: Diplopoda..... millipedes
Unlike centipedes, millipedes have two pairs of legs per rounded body segment. They move slowly and smoothly, using their short antennae to sense to check for environmental information. Millipedes eat mainly dead vegetation and are not poisonous, but many species secrete foul-smelling chemicals from abdominal glands.

grasshopper
BROOKE KARLER (B)



Class: Insecta
Order: Orthoptera..... grasshoppers, crickets and other groups

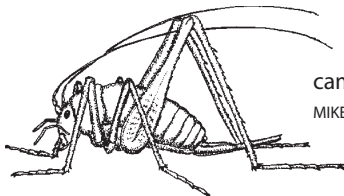
Grasshoppers and their relatives are common in the bosque. Adults of these and most insects bear six legs and a pair of wings on the thorax, which is behind the head and in front of the abdomen. The often colorful hind wings are held lengthwise along the back and are covered by the more drab and leathery front wings. Grasshoppers themselves are of many colors—including brown, tan, yellow, and green—that can match background colors. Grasshoppers are essentially herbivores and chew plant material with their strong mandibles.



field cricket
KENDRA CROWLEY (B)

Crickets and their close relatives are mostly nocturnal scavengers. The common field cricket is black in color with large hind legs and long antennae. The brownish tan or gray camel crickets have long, curved antennae and an arched back. They often hide under logs and stones or in dark moist places. The Jerusalem cricket, or child of the earth, has a large head with powerful jaws that can cut plant roots and unwary fingers. Its antennae are short. The rest of its body other than its tan legs is pale yellowish with dark stripes. It spends much of its day in loose soil.

field cricket
JUSTIN STEWART (B)

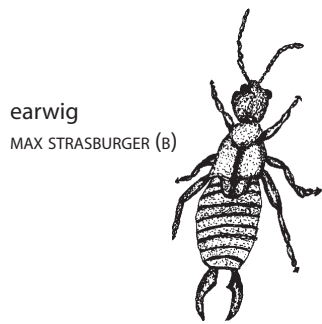


camel cricket
MIKE SANCHEZ (M)

jerusalem cricket
MIKE SANCHEZ (M)



kadydid
KATIE SHAW (B)

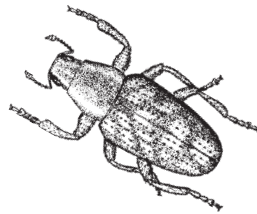


earwig
MAX STRASBURGER (B)

Order: Dermaptera earwigs
Earwigs are identified by their scissors-like pincers (*cerci*) at the tip of the abdomen. Their back wings are folded under very short, hard front wings. Their elongate, rather flat bodies are generally light brown to black in color. Although they do not bite or sting, these mainly scavenging insects can pinch. But they don't get into people's ears, as their name would suggest.

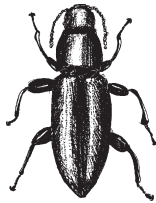


weevil
HELEN HASKELL (M)

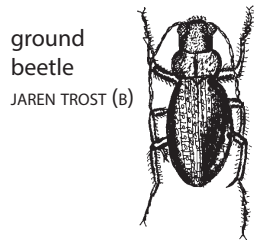


weevil
MIKE SANCHEZ (M)

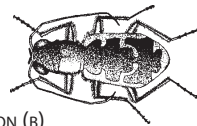
Order: Coleoptera beetles
Beetles, which make up the most species-rich order of animals on earth, are extremely diverse structurally. However, like the orthopterans and earwigs, they have chewing mouthparts, which in the plant-feeding weevils (*curculionids*) are located at the end of a sometimes long proboscis or beak. The hard front wings (*elytra*) of beetles cover the hind wings and abdomen. The generally predaceous ground beetles (*carabids*) tend to be indicators of relatively moist environments. In contrast, the darkling beetles (*tenebrionids*) are often found in drier environments. The rove beetles (*staphylinids*), which range from medium size to quite small, have short elytra that resemble the short front wings of the unrelated earwigs. However, unlike earwigs, rove beetles do not have prominent cerci at the tip of the abdomen. They are mainly predators, not scavengers. Species of these beetle families found in the bosque are often dark in coloration.



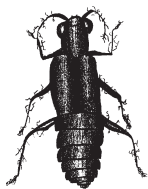
darkling beetle
CAROLYN BARR (B)



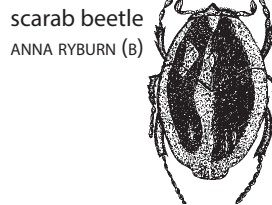
ground beetle
JAREN TROST (B)



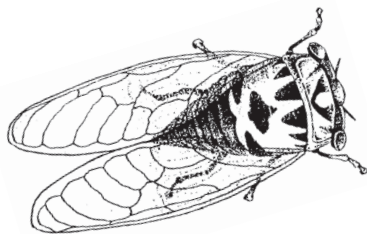
tiger beetle
MAX RICHARDSON (B)



rove beetles
MARIO DELGADO (E)

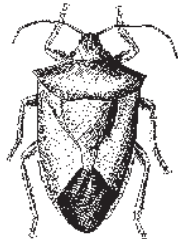


scarab beetle
ANNA RYBURN (B)



cicada

Order: Homoptera leafhoppers, aphids, cicadas and other groups
Homopterans and the next order, Hemipterans, have sucking mouthparts and are highly variable in body shape and size. The front wings of homopterans are uniform in texture and tend to cover the back like a roof. Mostly plant feeders, these insects keep their short beaks between their front legs when not in use.



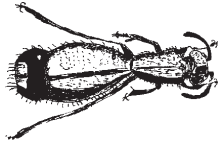
stink bug
HELEN HASKELL (M)



assassin bug
HELEN HASKELL (M)

Order: Hemiptera true bugs
True bugs are have front wings that are relatively thick at the base and membranous at the tip. (The name Hemiptera means “half-wing.”) Their feeding habits are highly variable, but most are plant feeders. Stink bugs and squash bugs are among a range of bugs found in the bosque.

velvet ant
JIMMY SCANTLIN (B)



Order: Hymenoptera..... wasps, bees and ants
Ants are the most common hymenopterans in the bosque. They are found on the ground, in bushes, on tree bark, under rocks, etc. They have important and diverse ecological roles world-wide. So-called velvet ants, which are really wasps and can deliver a painful sting, are often seen walking on the ground. They are predators and parasites of other insects.



ant
MARIA SOCHA (B)

NOTE: Bees, wasps, and other flying hymenopterans, may be captured in nets. Use extreme caution when releasing these captures and do not handle directly!

ant
ANNA HEINTZMAN (B)

