

ARTHROPODS ARE ALL AROUND US

ACTIVITY:

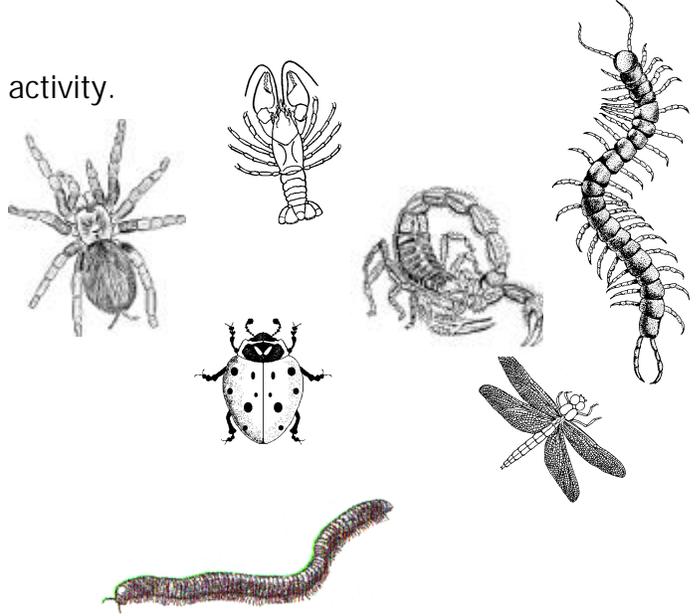
Students are introduced to the world of arthropods by means of puppets, a short walk in the desert, arthropod specimens, and a Velcro-board depiction of basic arthropod anatomy.

LOCATION:

CESC staff will inform you of the location of the activity.

EQUIPMENT AVAILABLE:

5 arthropod hand puppets
velcro board and illustrations
mounted specimens of arthropods
6 magnifying glasses
laminated pictures
Big book: Bugs Bugs Bugs
Book: On Beyond Bugs!



EQUIPMENT BROUGHT FROM SCHOOL:

None needed.

ASSIGNMENT FOR GROUP LEADERS A FEW WEEKS PRIOR TO TRIP:

The leader reads all the material about the lesson.
The leader may wish to do additional research about arthropods.

DIRECTIONS FOR GROUP LEADERS ON TRIP DAY:

A Cooper staff member will give the kit containing the equipment listed above to the leader. If the leader wishes, the staff member will provide hints on using the center, and will point out arthropod signs along the roadway.

If time allows, practice using the puppets and take another walk along the roadway before the first group arrives to familiarize you with the area.

THE LESSON:

1. **Introduction:**

Explain to the students that they are going to learn about arthropods. This is the scientific name for the group of animals that includes insects, spiders, scorpions,

centipedes, millipedes, lobsters, crabs, etc. The first part of the word, *arthro*, means "joint"; the last part, *pod*, means "foot".

2. **Puppets**

For an introduction to arthropods, use the hand puppets to introduce some of our common arthropods. Attached to this lesson are information sheets for each puppet. These start off with a poem, fable, legend, folk tale, etc. about the animal, then continues with factual information about its life and place in the environment. You may follow the "script" or be creative and add your own ideas. Allow for interaction between puppets and children, however, don't let the puppets be mishandled; they are fragile and expensive.

3. **Discovery walk**

Explain that we will be taking a short walk to look for arthropods, or signs that they live here. What might we see on our walk? (Spider webs, signs of chewing on a leaf, anthills, insects in a flower, etc. might be responses.) Then, lead the group on a short walk along the roadway. The most common arthropod signs are spider webs, mainly funnel webs, and termite "mud" on dead wood. Encourage the children to make discoveries. Take time to talk about what they are seeing. Attached to this lesson are fact sheets about a few of the arthropods common to this area.

4. **Discussion**

Return to the center site. Use the remaining time to do one or more of the following:

- a. Give students the opportunity to look at the arthropod specimens. Included in the kit is a small poster asking the following questions (you may wish to add to this list):

How many legs do you count?

How many body sections do you count?

Do you see the eyes? How many do you see?

Do you see wings?

What color(s) do you see?

Then ask if the arthropod is an insect, spider, scorpion, etc.

- b. Examine the eyes on the mounted insects. Put the photo of the enlarged compound eye on the velcro board. (Most insects have two compound eyes as well as simple eyes.) Each eye has 100's of facets and each facet takes in light and sends it to the brain. However, insects do not see all those individual views. Just as our brain puts the two pictures from our eyes together to form one image, it is believed insects put the pictures from all the facets together to form one picture. The compound eyes probably give a blurred image, and a different perception of color than we have. They are sensitive to ultraviolet light which aids them in finding the pollen in flowers. Compound eyes are excellent for detecting movement, seeing a wide-angle view of the world, and being able to focus in on objects close by and far away.
- c. On the velcro board students can "build" an insect or spider. A variety of parts are in the kit and the students can assemble fanciful insects or spiders. The only rule

is they must have the right number of body parts and legs. They may invent their own names for their creations.

5. **Summary**

Spend the last few minutes talking about the things the children learned. Here are some ideas for questions. You may add your own.

Tell us one thing you learned about arthropods.

How many legs does an insect have? How many body parts?

How many legs does a spider have? How many body parts?

Who can give an example of how an insect or spider is important in our desert?

6. Upon completion of each session, collect all materials and place in the kit box.

CLEANUP:

Upon completion of all sessions, collect all materials, arrange them in the kit box, and return the box to the table in Biznaga cabin.

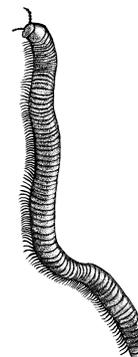
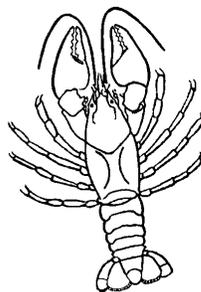
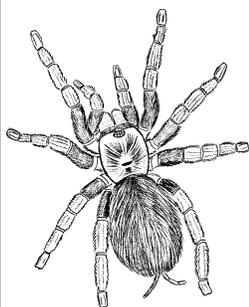
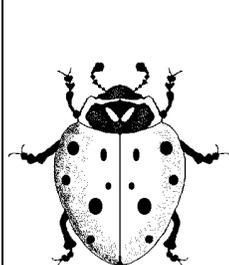
CHARACTERISTICS OF THE ARTHROPODS

Arthropods make up over 90% of the animal kingdom.

All of the animals in the phylum Arthropoda have the following characteristics:

- an exoskeleton—a hard outer cover made of chitin (pronounced *ki' tin*)
- a body divided into segments
- jointed legs and appendages (thus the name of the disease, "arthritis"—inflammation of the joints)
- bilateral symmetry (right and left sides look similar)

	INSECTS	ARACHNIDS	CRUSTACEANS	DIPLOPODS	CHILOPODS
NUMBER OF BODY PARTS	3 body regions: head, thorax, abdomen	2 body regions: cephalothorax (fused head & thorax) abdomen	2 body regions	head, long segmented trunk	head, long segmented trunk
NUMBER OF LEGS	3 pair of legs, all attached to the thorax	4 pair of legs, all attached to the cephalothorax	5 or more pairs of legs	2 pair of legs per segment (first 4 segments have 1 pair of legs)	1 pair of legs per segment
ANTENNAE	1 pair of antennae	no antennae	2 pairs of antennae	1 pair of antennae	1 pair of antennae
EYES	1 pair of compound eyes, often simple eyes	simple eyes on top of cephalo-thorax (as many as 8 eyes)	some have eyes some do not	usually 1 pair of compound eyes	1 pair of compound eyes
WINGS	adults usually have 2 pair of wings	no wings	no wings	no wings	no wings
MOUTH	chewing sucking, piercing sponging lapping	paired chewers (modified mouthparts such as fangs)	chewing	chewing	chewing
EXAMPLES	grasshoppers, ants, bugs, moths, beetles, butterflies	spiders, ticks, scorpions, mites, vinegaroons	lobsters, shrimp, crabs, barnacles, isopods (pill-bugs, sowbugs)	millipedes	centipedes



BUMBLEBEE PUPPET

NOTE: This information sheet is for your use with the bumblebee hand puppet. It begins with a fable and continues with factual information. This is merely a guideline for introducing the arthropod. You do not have to follow this "script". Please feel free to be creative when you use the puppet with your group.

INTRODUCTION

Long ago a Queen bee visited Jupiter, the Roman god. She brought him a gift of fresh honey from her hive. He was very pleased with the present and promised to give her anything she wished. The Queen asked if the bees could be given stings so they could kill people who stole their honey.

Jupiter was very unhappy with her wish because he cared very much about people, but since he had made a promise, he agreed to give bees stingers. However, he gave the bees a special kind of stinger. Whenever a bee stings a person, the sting stays in the skin. The sting seldom kills, it only scares people away from the hive, and the bee soon dies.

Aesop Fable

FACTS ABOUT BEES (You can have the puppet "tell" about itself using this information...such as, "I am in the same family as ants and wasps. etc....")
Bees belong to the same family as ants and wasps.
The name for bee in Spanish is **abeja**.

Description:

Bees are usually black or brown with bands of gold, orange, yellow, or white. They have transparent wings...you can see right through them. The wings beat so fast they make a buzzing sound. The long, pointed tongue can poke into flowers.

Their food:

Bees gather nectar (the sweet liquid) and pollen (the yellow powder) in flowers. The long proboscis (a mouth part) can probe deep into flowers to get the nectar. The pollen sticks to their hairy bodies when they crawl into a flower. Stiff hairs on the legs comb pollen from the body into pollen carriers on the hind legs. The pollen is carried back to the beehive where the larvae feed on the nectar and pollen.

Their home:

Bumblebees and honeybees live with many other bees of their kind in a hive. Different bees have different kinds of jobs to do.

Other interesting facts:

Bees are very important to us. When they travel from one flower to another flower of the same kind, they drop some of the pollen from the previous flower into the next flower. This causes a flower to be pollinated which means it will produce fruit and seeds.

COCKROACH PUPPET

NOTE: This information sheet is for your use with the cockroach hand puppet. It begins with a legend and continues with factual information. This is merely a guideline for introducing the arthropod. You do not have to follow this "script". Please feel free to be creative when you use the puppet with your group.

INTRODUCTION:

*Timid roach, why be so shy?
We are brothers, thou and I.
In the midnight, like thyself,
I explore the pantry shelf.
by Christopher Morley*

FACTS ABOUT COCKROACHES: (You may have the puppet "tell" about itself using this information...such as, "I have thousands of relatives all over the world, but...etc.)

Thousands of species of cockroaches live in the world, but most live in warm forests. The Spanish name is **cucaracha**.

Description:

Cockroaches are brown. Their bodies are flat. Their flat shape helps them hide in small cracks. They have long antennae and sharp spines on their legs. The most common and largest species in Arizona is the American cockroach, reaching 2 inches in length.

Their food:

Cockroaches eat almost any kind of plant food. In their natural habitats they are an important part of the environment because they eat the dead plant material that has fallen to the ground. They help recycle it back into the soil.

Their home:

The desert cockroach has always lived here, but we seldom see it because it is usually burrowed in the ground or lives in packrat nests, not usually venturing into houses.

Other species of cockroaches were brought here from other parts of the world. People did not do this on purpose. The cockroaches or their eggs were hidden in food or other cargo that people brought with them. These non-native cockroaches are pests in our homes because they eat our food. Our warm homes and moist sewers make perfect homes for them.

Other interesting facts:

The female cockroach lays a hard egg case. The eggs are protected inside and hatch in about a month. Most species develop from egg to adult in about 6 months. The adult life span is from a few months to a year. About 20 species live in Arizona, 10 of which are native and rarely seen in cities. About 7 introduced species are well established in urban areas throughout Arizona.

DRAGONFLY PUPPET

NOTE: This information sheet is for your use with the dragonfly hand puppet. It begins with a poem and continues with factual information. This is merely a guideline for introducing the arthropod. You do not have to follow this "script". Please feel free to be creative when you use the puppet with your group.

INTRODUCTION:

*Anna chased a dragonfly
That darted here and there.
It hovered, so she reached up high,
Escaped her grasp – unfair!
surprise!*

*Soon, with a sigh, she sits to rest,
Giving up her childish quest.
But now, the unexpected prize
Lands on her toes – oh sweet*

Madeleine Scott

*She followed it through meadow green,
Into the woods, across a stream.
Those jeweled eyes and rainbow wings,
They spoke to her of magic things.*

FACTS ABOUT DRAGONFLIES (You can have the puppet "tell" about itself using this information...such as, "I am a large flying insect and have bright colors, etc....")

The names for dragonfly in Spanish are **libélula, cigarrilla, and mariposa de agua.**

Description:

They are large, long-bodied, often brightly colored. When at rest they spread their two pairs of transparent wings sideways. Dragonflies have huge compound eyes. Each of the two compound eyes has as many as 30,000 individual eyes which give them excellent eyesight for seeing what is around them.

Their food:

They catch insects with their legs while in flight. They eat many, many mosquitos and flies.

Their home:

They are found all over the world but are usually found near fresh water because that is where eggs are laid, hatched, and where young dragonflies begin their lives eating water insects, tadpoles, and small fish.

Another interesting fact:

They are very good fliers, reaching speeds as fast as 30 miles per hour.

LADYBUG PUPPET

NOTE: This information sheet is for your use with the ladybug hand puppet. It begins with a nursery rhyme and continues with factual information. This is merely a guideline for introducing the arthropod. You do not have to follow this "script". Please feel free to be creative when you use the puppet with your group.

INTRODUCTION:

*Lady-bird, lady-bird, fly from my hand,
Tell me where my true love stands,
Up-hill or down-hill or by the sea sand,
Lady-bird, lady-bird, fly from my hand.
Fly, lady-bird, fly!
North, south, east or west;
Fly to the pretty girl
That I love best.*

This is an old English rhyme that children would recite when a ladybug (they called it a lady-bird) landed upon them. The rhyme was believed to make the ladybug fly away unharmed, for they thought it was unlucky to hurt the insect. If said politely, they believed the ladybug would fly to a girlfriend or boyfriend.

All around the world and from times long ago, ladybugs have been looked upon as special insects that should not be killed or injured.

FACTS ABOUT "LADYBUGS" (You can have the puppet "tell" about itself using this information...such as, "I am an insect, but not a bug, etc....")

Ladybugs are insects, but they are not true bugs, they are **beetles**.
Their name in Spanish is **mariquita**.

Description:

There are many species, but they usually have a domed, rounded back and flat underside. They are bright yellow, orange, or red with black markings, or black with yellow to red markings, and short, clubbed antennae.

Their food:

During the spring they are often found on plants with aphids which are their main food. Aphids are small insects that suck sap from plants which causes damage to the plants of gardeners and farmers. Ladybugs are important because they eat many, many aphids.

Their home:

In late winter and spring we see them on our plants. From May until January or so they go high up in the mountains of southern Arizona.

Other interesting facts:

Adults secrete a fluid from their leg joints when they are disturbed. It is harmless and has a slight odor, but it has a terrible taste and predators don't try to eat them.

TARANTULA PUPPET

NOTE: This information sheet is for your use with the tarantula hand puppet. It begins with a legend and continues with factual information. This is merely a guideline for introducing the arthropod. You do not have to follow this "script". Please feel free to be creative when you use the puppet with your group.

INTRODUCTION:

There is an old Greek legend that tells of the time long ago when a beautiful young girl named Arachne was the best weaver in the land. She could weave beautiful cloths from silk, gold, and silver threads. The goddess Athena challenged Archne to a contest to see who was the better weaver. After all, Athena was a goddess. But Athena's fabrics were crooked and messy and Arachne won the contest. Athena became so angry and jealous of Arachne's wonderful weaving that she turned her into a spider. As she did this she said, "Now you can weave forever and catch flies and bugs in your silken threads!"

And that is how spiders came to be called arachnids, because of Arachne's weaving.

FACTS ABOUT TARANTULAS (You can have the puppet "tell" about itself using this information...such as, "I am a spider, not an insect, etc....")

The tarantula is a spider which is an arachnid. It is not an insect.

The name spider is **araña** in Spanish. The name **tarantula** is the same in Spanish.

Description:

Tarantulas are large, hairy spiders. Legs and all, they are about as large as your hand. They have a cluster of 8 eyes on top of the cephalothorax (the head and thorax fused together). The adult male (this is what we usually see) is dark brown, long legged, and has a small abdomen. The adult female is lighter brown, shorter-legged than the male, and has a large abdomen.

Their food:

They hunt for their food, rather than catch it in a web. They hunt by touch, capturing and eating insects, lizards, and even small mammals such as newly born mice.

Their home:

They dig a round, deep burrow in the ground. They stay in their burrows in winter.

Other interesting facts:

Females live about 25 years. Males live about 10 to 15 years.

All spiders are venomous, but the tarantula seldom bites humans and the venom is usually not dangerous.

As a defense against predators, the tarantula will kick the hairs from its abdomen into the face of a predator. The hairs have little barbs or hooks, and when they get into the nose and eyes of the predator, that animal will stop bothering the tarantula.

Tarantulas cannot jump. They are too big and heavy to jump but they can move quickly. Arachnids also include scorpions, vinegaroons, mites, ticks, and daddy longlegs.

ARTHROPOD DISCOVERY TRAIL

As the group walks along the trail the children will see a variety of signs that arthropods are around. Here are some of the common signs they will discover...

FUNNEL WEB SPIDER

Large funnel-shaped webs are woven into packrat nests, in prickly pear cactus patches, and under small bushes. The top part of the web is made of threads, which catch flying insects causing them to drop on the funnel web below. The spider runs out and grabs the insect, then dashes down into the funnel to eat. If you look into the bottom of a funnel, you might see a spider waiting for its next meal. The spider is medium-size, usually brown/gray in color.

In the fall the female deposits eggs in an egg sac, which she attaches to the underside of a plant or dead wood.

TERMITES

If you see what appears to be dried mud over dead twigs, cactus skeletons, or on the woody base of a saguaro, that tells you that termites have been here.

Termites are small, soft-bodied, whitish insects in the ant and bee family. They live in colonies underground. They eat dead woody plant material. They connect the nest to the food source with mud tubes. By staying within the moist mud they protect themselves from the dry air and hot sun which would otherwise dry out their soft bodies.

Other animals cannot eat wood because their bodies cannot digest it. But termites can eat wood because they have very tiny one-celled animals living in their intestines which help them digest the wood.

We may not want termites in our houses because they eat the wood, but in the natural world they are very important because by eating the wood and eliminating their waste, the wood finally goes back into the soil.

COCHINEAL BUGS

If you see what appears to be old cotton stuck onto a prickly pear cactus, that tells you that cochineal bugs are there. When the female insect lays her eggs, she dies and the little nymphs crawl out from under her. They settle to feed and form tangled strands of white cottony wax which keeps them from drying out under the hot sun. The males develop wings. The females never have wings. They feed on the juices of the cactus—usually prickly pear or cholla.

These insects are red with red waxy scales under their bodies. Native Americans of the Southwest dried the female insects, extracted the red color, and made a crimson (bright red) dye to color their clothing.