



# Can't Live Without You

Symbiotic Relationships

Time Frame: 30-45 minutes

Grade: 4

## Overview

In this activity, your students will be given an animal or plant card and must locate their “good buddies” – other plants or animals they think they have a relationship with. Students then will have to determine which symbiotic relationship they have – parasitism, mutualism or commensalism.

*This lesson is modified from Project WILD's "Good Buddies" © Council for Environmental Education, 2002.*

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### Essential Questions

- How do Arizona wildlife interact within a shared habitat?
- What factors contribute to the survival of wildlife species?

### Objectives

- Define parasitism, mutualism and commensalism, and list at least two examples of each.
- Analyze text to identify the correct symbiotic relationship.

### Arizona and National Standards

#### Arizona Science

- S2.C2.PO2
- S4.C4.PO2

#### Next Generation Science

- 4-LS1-1

#### Association of Fish and Wildlife Agencies

- 1.5.2
- 1.8.2

### Materials and Resources

- *Can't Live Without You Matching Cards* printed and cut out
- *Can't Live Without You Key* transparency
- Overhead projector

### Teacher Preparation

- Print and cut out the *Can't Live Without You Matching Cards*. They can be laminated for repeat use.
- Copy the *Can't Live Without You Key* to an overhead transparency. Alternatively, the page can be projected directly from a computer.

### Background Information

The animals and plants within an ecosystem live in a delicate balance, each species connected to another. In some cases, one species actually becomes dependent on another species for survival. A symbiotic relationship is defined as a relationship between two organisms in which at least one benefits from the other. However, these relationships do not always benefit both. In fact, there are three main types of symbiotic relationships:

- Mutualism – a relationship in which both species benefit and they are dependent on each other.
- Parasitism – a relationship in which one species benefits while the other is harmed.
- Commensalism – a relationship in which one species benefits but the other species is neither harmed nor helped.

There is a shorthand way to represent the different symbiotic relationships. When an

organism receives a positive benefit from the relationship, we use a “+” sign. When an organism is harmed in the relationship, we use a “-” sign. And, when there is no benefit or harm, we use “0.” So, mutualism is represented by “+/+” because both species benefit. Parasitism is represented by “+/-” and commensalism is “+/0.”

In this lesson, students will take on the role of an animal or plant involved in at least one symbiotic relationship. They must read a short description and identify the other organism and what type of relationship it is.

### Procedures

1. Introduce the concept of symbiotic relationships. Ask the students to think of examples of the three different types. If there are fewer than 30 students in the class, use one pair from the *Can't Live Without You Matching Cards* to illustrate an Arizona relationship.
2. Inform the students that they will now have the chance to explore the concept of symbiosis in more detail as they look at a number of different relationships found in Arizona.
3. Distribute one of the cards from the *Can't Live Without You Matching Cards* to each student. There are 15 pairs, so each student should be able to have one card. If you have more than 30 students, it may be necessary to allow small groups of students to work together.
4. Ask the students to read the descriptions of their plant or animal and use that information to identify the organism they are paired with.
5. Instruct the students to walk around the classroom and try to find their partner.
6. Once all the pairs have been completed, ask the students to identify which of the three symbiotic relationships is represented by their pair.
7. Allow each team the opportunity to describe the relationship to the class. As they present, ask the class if they agree or disagree with their answer.
8. Once all pairs have presented, project the *Can't Live Without You Key* and have the students check their answers.
9. Ask students whether or not an organism can be involved in more than one symbiotic relationship. They should be able to support their answer with evidence.



## Differentiated Instruction

### Extensions:

- Some symbiotic relationships are widely accepted within the scientific community. Others, however, are not. For example, some biologists do not agree with the nurse tree concept of a palo verde tree providing shade and protection to a growing saguaro. Have students research the arguments for and against this symbiotic relationship and generate their own conclusions. Can they identify other controversial relationships?
- Have the students act out their relationship rather than simply presenting the details to the class.

### Modifications:

- Have the students find their matching pairs. Then, have each pair read the descriptive sentences out loud. As a class, decide what type of symbiotic relationship is represented.



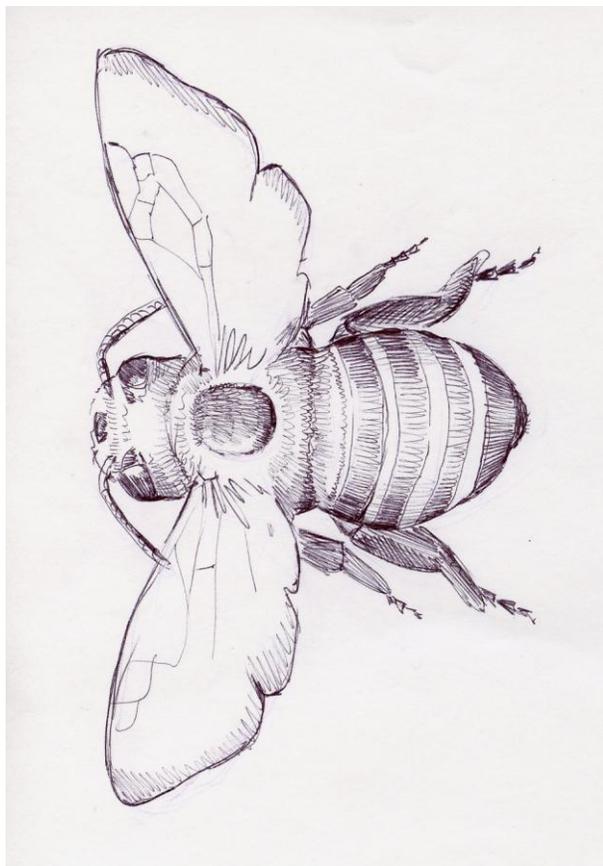
## Reflection

Use the space below to reflect on the success of the lesson. What worked? What didn't? What changes would you make? These notes can be used to help the next time you teach the lesson. In addition, the Department would appreciate any feedback. Please send your comments to [focuswild@azgfd.gov](mailto:focuswild@azgfd.gov).



## Can't Live Without You Matching Cards

### DIGGER BEE



The digger bee feeds on the nectar and pollen from the *palo verde*.

### PALO VERDE



The nectar and pollen from the flowers of the palo verde are an important food source for the *digger bee*. In the process of gathering food, the bee transfers pollen from flower to flower.

## BRONZED COWBIRD



The cowbird often lays her eggs in the nest of an **oriole**. When the eggs hatch, the oriole feeds and raises the young cowbirds along with her own babies.

## ORIOLE



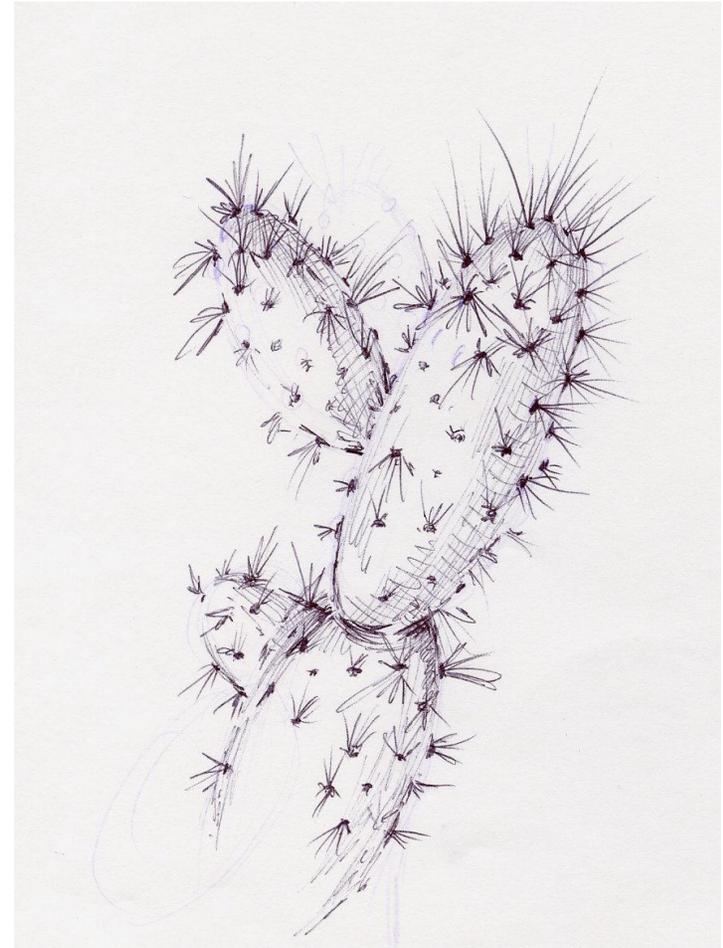
Unknowingly, the oriole will incubate the eggs from the **bronzed cowbird** and raise the babies as her own. As a result, the young cowbirds will often take food away from the young orioles.

## CACTUS WREN



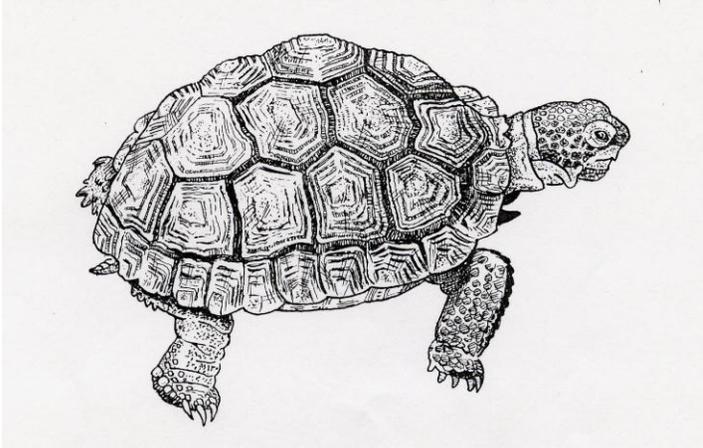
The cactus wren often builds its large football-shaped nests in the spines of the *cholla cactus*.

## CHOLLA CACTUS



The cholla cactus has long spines that provide protection for the *cactus wren*.

## DESERT TORTOISE



Desert tortoises often feed on *prickly pear cactus* fruit, which is full of seeds. By eating this fruit, the tortoise gets some good food.

## PRICKLY PEAR



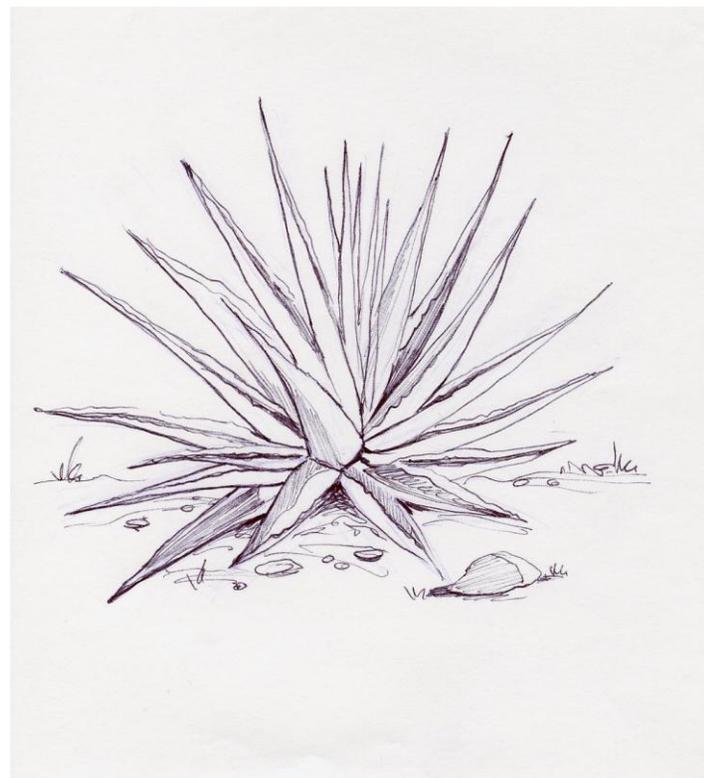
The fruit of the prickly pear is very attractive to *desert tortoises*. When the tortoise eats the fruit, it spreads the seeds, causing the cactus to grow in new locations.

## MEXICAN LONG-TONGUED BAT



The Mexican long-tongued bat uses its long bristle-like tongue to get the nectar out of the flowers of the **agave**.

## AGAVE



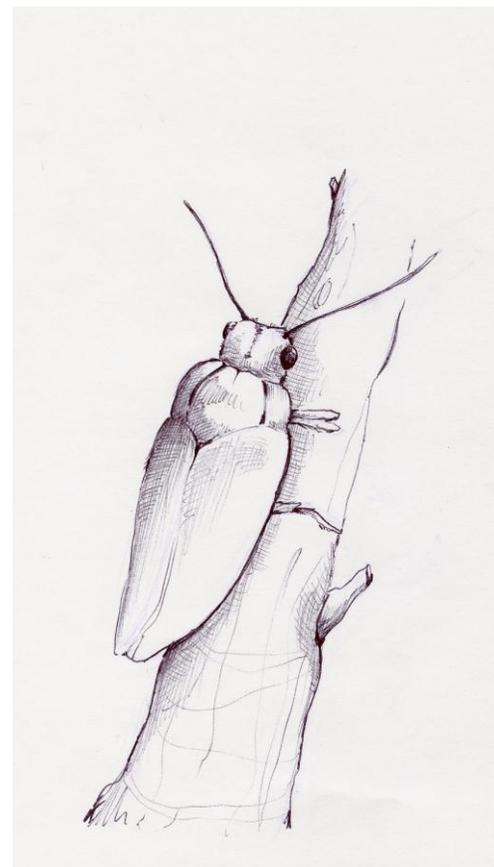
The flowers of the agave provide nourishing nectar to the **Mexican long-tongued bat**. When the bat sticks its nose in the flower to get to the nectar, some of the pollen sticks to the bat. When the bat visits another flower, it deposits the pollen in the new flower.

## YUCCA



The *yucca moth* lays eggs inside the flowers of the yucca. When they hatch, the baby moths will eat some of the seeds.

## YUCCA MOTH



The yucca moth lays its eggs in the flowers of the *yucca* causing some pollen to stick to the moth. When the moth visits another flower, it may pollinate the flower.

## GILA WOODPECKER



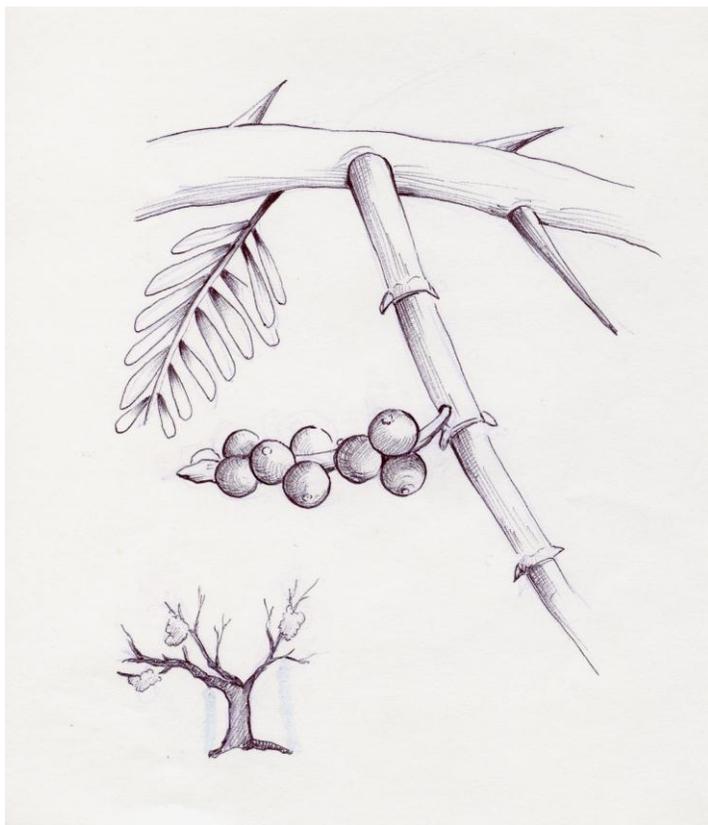
The Gila woodpecker uses its specialized beak to drill a hole into a saguaro cactus for a nest. When the woodpecker is done with the nest, a **screech owl** will move in.

## SCREECH OWL



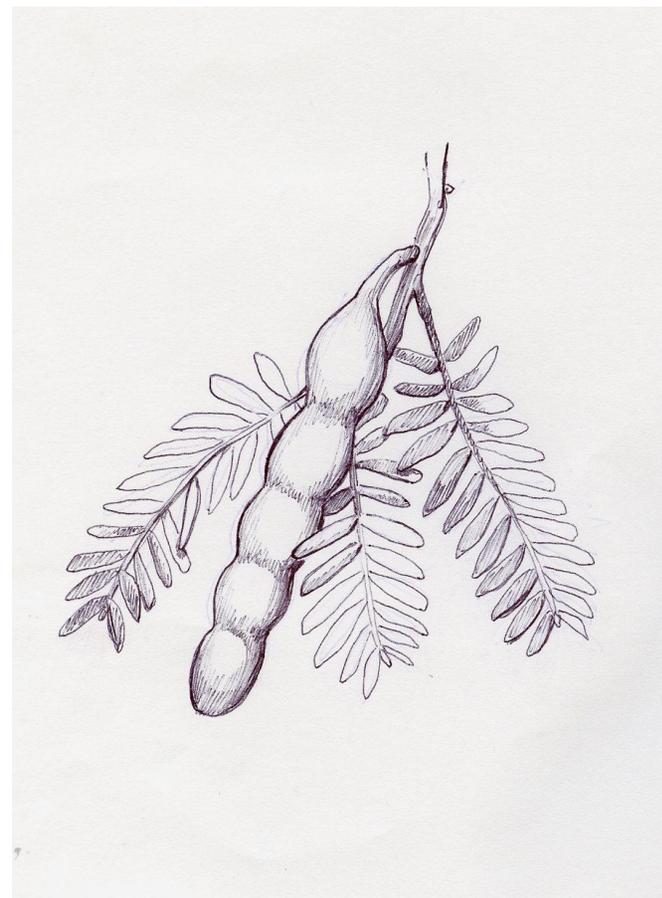
The screech owl takes over the abandoned nests made by **Gila woodpeckers** in the side of a saguaro cactus.

## MISTLETOE



Mistletoe grows on the branches of **mesquite** and live off the food and nutrients produced by the mesquite.

## MESQUITE



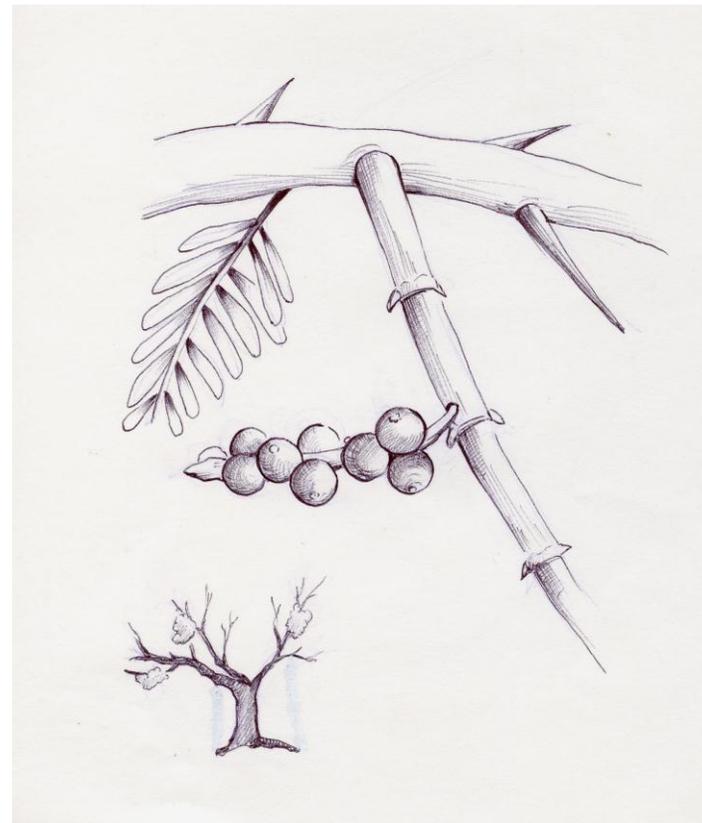
**Mistletoe** grows within the branches of the mesquite. The mistletoe takes some of the food and nutrients from the tree, weakening it and making it more susceptible to disease.

## PHAINOPEPLA



The phainopepla eats the berries of the *mistletoe*. The male birds also use the berries to impress the females.

## MISTLETOE



Mistletoe berries are eaten by the *phainopepla*. When the bird lands on another tree, it will often poop out the berry seeds and spread the mistletoe.

## SAGUARO



Like all cacti, the saguaro takes a long time to grow. Saguaros often find protection during their early years under the shade and shelter of a *palo verde* tree.

## PALO VERDE



Palo verdes grow to be large trees. It is common to find small *saguaros* growing in the shade of palo verde trees.

## BROOMRAPE



The broomrape is an unusual plant. It cannot produce its own food through photosynthesis. As a result, it grows on the **bursage** and gets its food and other nutrients directly from the roots of the bursage.

## BURSAGE



**Broomrape** is commonly found growing on bursage. The broomrape takes some of the food and nutrients from the bursage, weakening it.

## HUMMINGBIRD



The hummingbird uses its long beak and tongue to get the nectar out of the flowers of the *ocotillo*.

## OCOTILLO



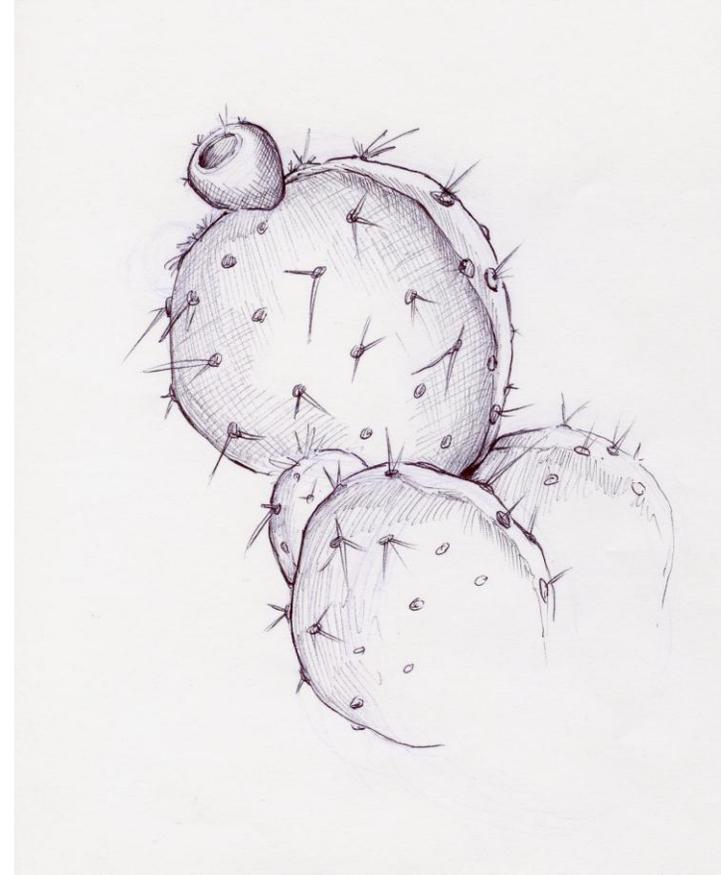
The nectar of the ocotillo flowers provides food for the *hummingbird*. When the hummingbird feeds, some pollen sticks to it. When the hummingbird visits another flower it deposits the pollen in the new flower.

## WOOD RAT



The wood rat eats parts of the *prickly pear cactus*. In addition, the spines of the cactus provide protection for the rat.

## PRICKLY PEAR



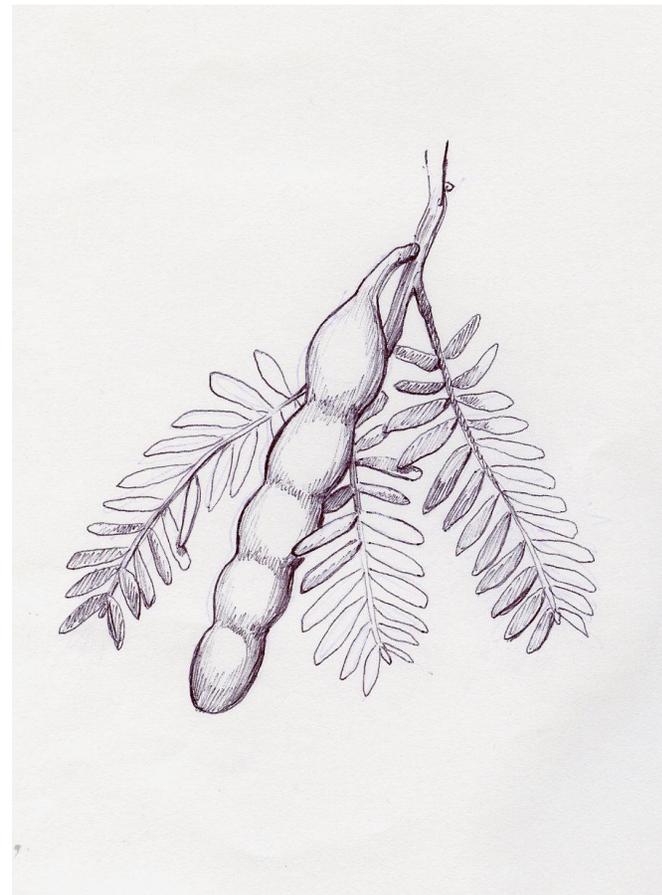
The *wood rat* wanders around the desert searching for interesting things to take back to its burrow. In the process, it will often carry parts of the prickly pear around. This will distribute the cactus in new locations.

## JAVELINA



The javelina often eats the beans produced by a *mesquite* tree once they fall to the ground.

## MESQUITE



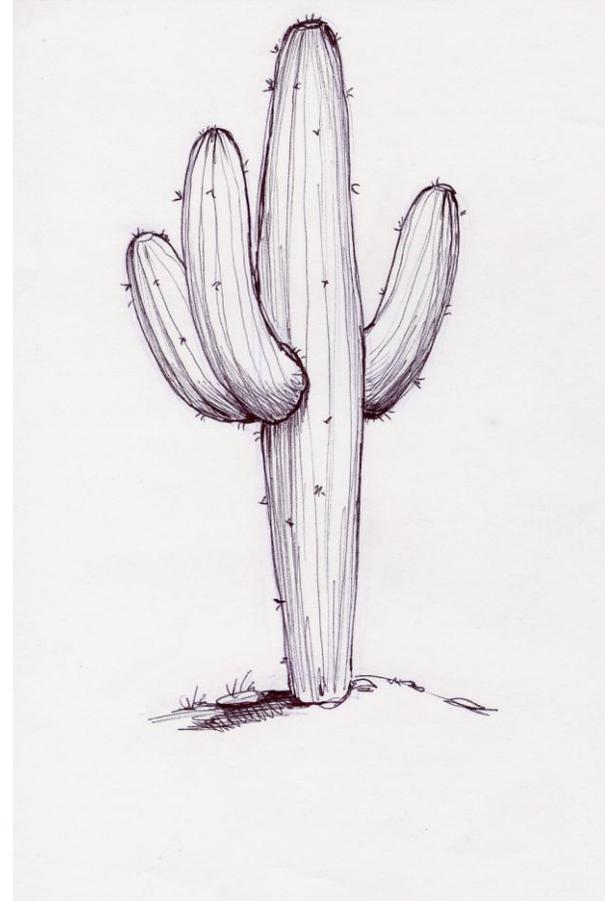
Mesquite beans have a protective cover. When they pass through the digestive system of a *javelina*, they sprout more easily and grow into new trees.

## GILA WOODPECKER



The Gila woodpecker will use its specialized beak to poke a hole into the side of the **saguaro**. The hole is then used as a nest.

## SAGUARO



The saguaro provides an ideal location for the nest of a **Gila woodpecker**. The holes created by the woodpecker are minor and do not harm the cactus.

# Can't Live Without You Key



PAIRED ORGANISMS	TYPE OF SYMBIOTIC RELATIONSHIP
Yucca / Yucca moth	Mutualism
Mexican long-tongued bat / Agave	Mutualism
Gila woodpecker / Screech owl	Commensalism
Gila woodpecker / Saguaro	Commensalism
Bronzed cowbird / Oriole	Parasitism
Saguaro / Palo verde	Commensalism
Digger bee / Palo verde	Mutualism
Hummingbird / Ocotillo	Mutualism
Javelina / Mesquite	Mutualism
Mistletoe / Mesquite	Parasitism
Phainopepla / Mistletoe	Mutualism
Cactus Wren / Cholla	Commensalism
Wood rat / Prickly pear	Mutualism
Desert tortoise / Prickly pear	Mutualism
Broomrape / Bursage	Parasitism