

NOCTURNAL NAVIGATORS

Explore unique strategies of nocturnal animals for making a living in the dark.

ARIZONA SCIENCE STANDARDS

SC03-S4C3-01&02,
SC04-S6C4-02,
SC03-S4C3-05

OBJECTIVES

Students should:

- Become familiar with a variety of nocturnal organisms and their adaptations for nocturnal living by studying examples from the Sonoran Desert.

MATERIALS

- Copy of *Student Handout - Nocturnal Navigators* for each student

VOCABULARY

Adaptation
Antennae
Celestial navigation
Echolocation
Nocturnal
Pollinator
Venom

BACKGROUND

Nocturnal animals have a wide range of adaptations to help them find food and avoid predators in the dark. This student reading provides information on a variety of Sonoran Desert nocturnal animals and introduces students to these adaptations.

GETTING READY

Make a copy of *Student Handout - Nocturnal Navigators* for each student.

DOING THE ACTIVITY

SETTING THE STAGE

- 1) Review with the students why many desert animals are nocturnal. (to stay cool, save water) Ask them what challenges they think night-living might pose? (It is dark, so animals need to rely on other senses besides vision and/or have excellent night vision.)
- 2) Introduce the reading in *Student Handout - Nocturnal Navigators* by asking someone to define the term “navigate” or what it means to be a “navigator.” (Traditionally the term has to do with nautical travel, but in a general sense it means to be able to find one’s way around.) Tell them they are going to do a reading about nocturnal navigators to find out more about how nocturnal animals find their way in the dark.
- 3) Pass out *Student Handout - Nocturnal Navigators*. Have the students read it and answer the questions at the end (see answers at right.)

DISCUSSION

Discuss the answers as a group. Ask the students to determine what sense seems to be the most important for night creatures.

(Hearing) How do night animals use sound? (Some find their prey with it, either by echolocation or hearing the footsteps of animals on the ground. Others, like toads and frogs, use it to find each other in the dark.) How does sound affect prey animals? (They listen for clues to the location of predators to and they try to move silently themselves to avoid predators.) What other senses are important? (vision, touch) Have them cite examples.

EXTENSION

- Write a story from the perspective a night creature. Discuss how the animal gets around at night, what senses are important to it, what it eats and how it finds its food, etc.
- As a homework assignment, sit outside your house in a safe area (let your parents or guardian know what you are doing) for one half hour. What do you observe? What senses are most important to you in the dark? Take note of any observations, impressions, animals or human sounds. After a half hour, return to the house and write down what you experienced.

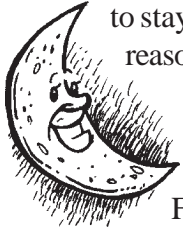
ANSWERS TO QUESTIONS

1. Less competition for food. This allows nocturnal animals to fill a different niche. Nocturnal animals do not have to compete with diurnal animals for the same foods.
2. Smell and sight. They pick up the flower’s scent with their antennae.
3. Strong. Mostly white or pale green.
4. Echolocation
5. They pollinate them.
6. They sense vibrations with their hairs. They paralyze it with their venom then eat it.
7. Hearing and eyesight.

STUDENT HANDOUT

NOCTURNAL NAVIGATORS

Why be **nocturnal**? In the desert, nighttime temperatures are cooler and the air is more humid than in the daytime. Many animals are active at night to stay cool and save water. But there are other reasons for being nocturnal. By “taking the night shift,” a whole group of predators and prey does not have to compete for food with creatures active in the daytime.



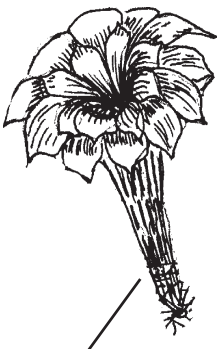
For example, moths and butterflies are similar animals. They both drink nectar from flowers with their long, hollow tongues. But moths drink nectar from night-blooming flowers, while butterflies visit day-blooming flowers. In this way, there are plenty of flowers for everyone!

The night world brings a whole new set of challenges for finding food and keeping away from predators. For us, sight is our most important sense. When it gets dark, we lose our main sense, and it is harder for us to get around. But night creatures manage to live in a world of darkness. What are they doing in the dark? Night creatures need many special **adaptations** to be active at night. Let’s look at some night creatures from the Sonoran Desert to see how they do it!

Moths

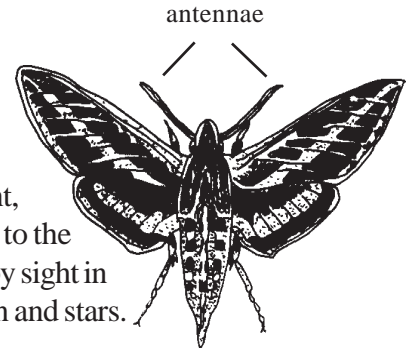
Have you ever seen a large, green caterpillar with a horn on its hind end? Then you have probably seen a hawk moth caterpillar. When a hawk moth comes out of its cocoon, its only job is to fly around, find a mate, and lay eggs. Moths do not need to grow – they did all of their eating and growing when they were caterpillars. But they do need energy for flying, and they get it by drinking flower nectar.

Hawk moths visit night-blooming flowers like primroses, queen of the night cactus, datura, and orange blossoms. How do you think they find these flowers? First by smell and then by sight. Many night-blooming flowers have a strong, sweet smell and a white or pale green color. Hawk moths have



queen of the night cactus flower

antennae that can pick up flower scents as much as 300 feet away. They fly toward the scent, and when they get close to the flowers, they find them by sight in the dim light of the moon and stars.



Moths depend on the moon and stars for more than just to see the flowers. They use their light to know the direction and position of their flight. This is called **celestial navigation**. They fly toward moonlight and starlight, keeping it at a certain angle to their bodies. Of course they never reach those lights because they are too far away. But that is why moths flutter around artificial lights. They are attracted to the lights, get confused, and keep flying into them.

Moths are a favorite food of another night flier, bats.

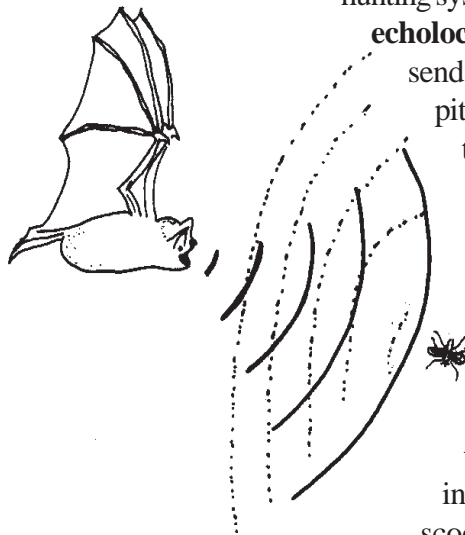
Bats

Bats are one of best navigators of the night. There are more bats than any other kind of mammal in the world! Most of them eat insects such as moths and mosquitoes. How do you think they find a flying insect in the dark? Bats have a specialized

hunting system called

echolocation. They

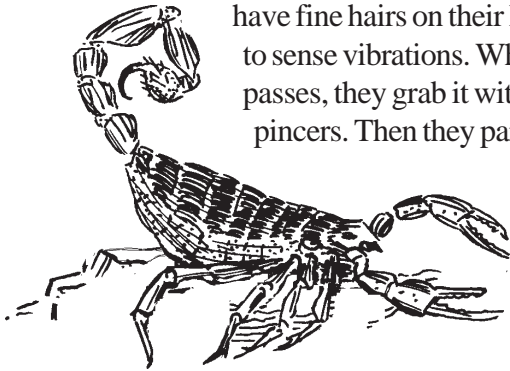
send out high-pitched sounds that echo off an insect and bounce back to the bat’s ears. Bats send out sounds in rapid bursts to track a moving insect. Some bats scoop up insects with their tails as they fly.



Around the world there are bats that eat fruit, flower nectar, frogs, fish, night-flying birds, small mammals, and even blood. They use echolocation or have a keen sense of sight or smell to help them find their food. In the Sonoran Desert, we have 28 different kinds of bats! One, the pallid bat, uses echolocation to find scorpions, centipedes, crickets, and grasshoppers crawling on the ground. Another, the Mexican long-tongued bat, drinks nectar from saguaros, organ pipe cacti, and agaves. As they drink nectar at different flowers, they carry pollen from one flower to the next. They are important **pollinators** of these plants.

Scorpions

Scorpions hide in cracks, rocks, and tree bark by day. At night they come out to hunt small mammals, insects, and other invertebrates. Scorpions have fine hairs on their legs that they use to sense vibrations. When a small animal passes, they grab it with their claw-like pincers. Then they paralyze their prey with **venom** from the stingers on their tails.



Have you ever seen a scorpion? They are easy to spot on a desert night, even around your house. If you shine a special light called

a fluorescent light at night, the hard outer skeleton of scorpions glows in the dark. If you look around trees or woodpiles you will probably find bark scorpions. These are the only Sonoran Desert scorpions with venom that could harm people. Be careful where you step and lean at night, but don't worry. Most scorpions are harmless. You may even be lucky enough to see a mother scorpion carrying her babies on her back! They protect their babies this way when they are born.

Owls

Another night flier eats scorpions, too. Elf owls, the tiniest owls in the North America, hunt insects and invertebrates like moths and scorpions. They have excellent hearing to sense the rustle of small animals moving on the desert floor. They also have sharp night vision.

Other owls use these senses, too. Great horned owls, the biggest owls in our region, hunt rodents, jackrabbits, and cottontails. They swoop down on them with silent wing beats and grab them with their sharp talons.

elf owl



You'll learn more about these and other special creatures of the night when Desert Museum's teacher comes to your class!

QUESTIONS:

1. Besides staying cool and saving water, what is another reason to be active at night? _____
2. What senses are important to moths for finding their flowers at night? _____
How do they first find the flowers? _____
3. Do night-blooming flowers have a strong scent or weak scent? _____
What color are they? _____
4. How do insect-eating bats find their prey? _____
5. What do nectar-feeding bats do for the cacti and agaves they visit? _____
6. How do scorpions find their prey? _____
How do they kill it? _____
7. What senses are most important in owls? _____