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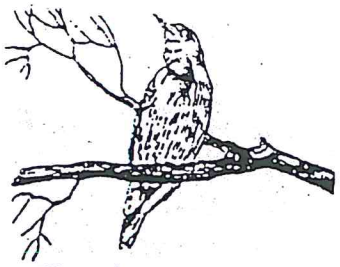
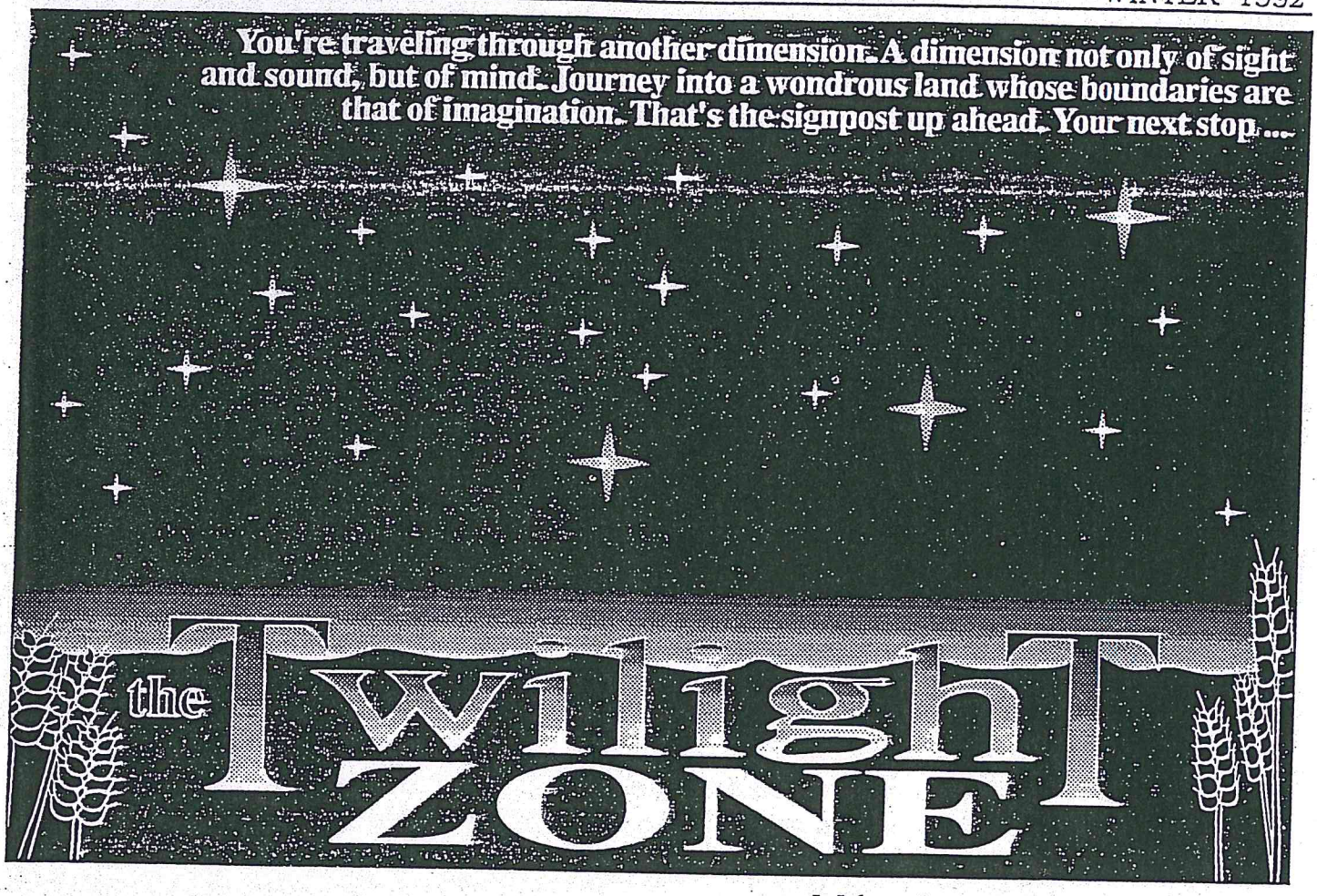


Teaching Resource Activities and Conservation to Kansas Students

VOL. 4 NO. 2 KANSAS WILDLIFE & PARKS WINTER 1992



Life in the dark . . .

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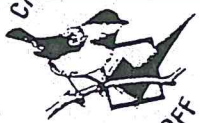


CHECK IT OFF

Why do stars twinkle? Page 2.

The Caped Crusader lives in one. Look into page 6.

How to survive. Check out The WILD Exchange, page 16.

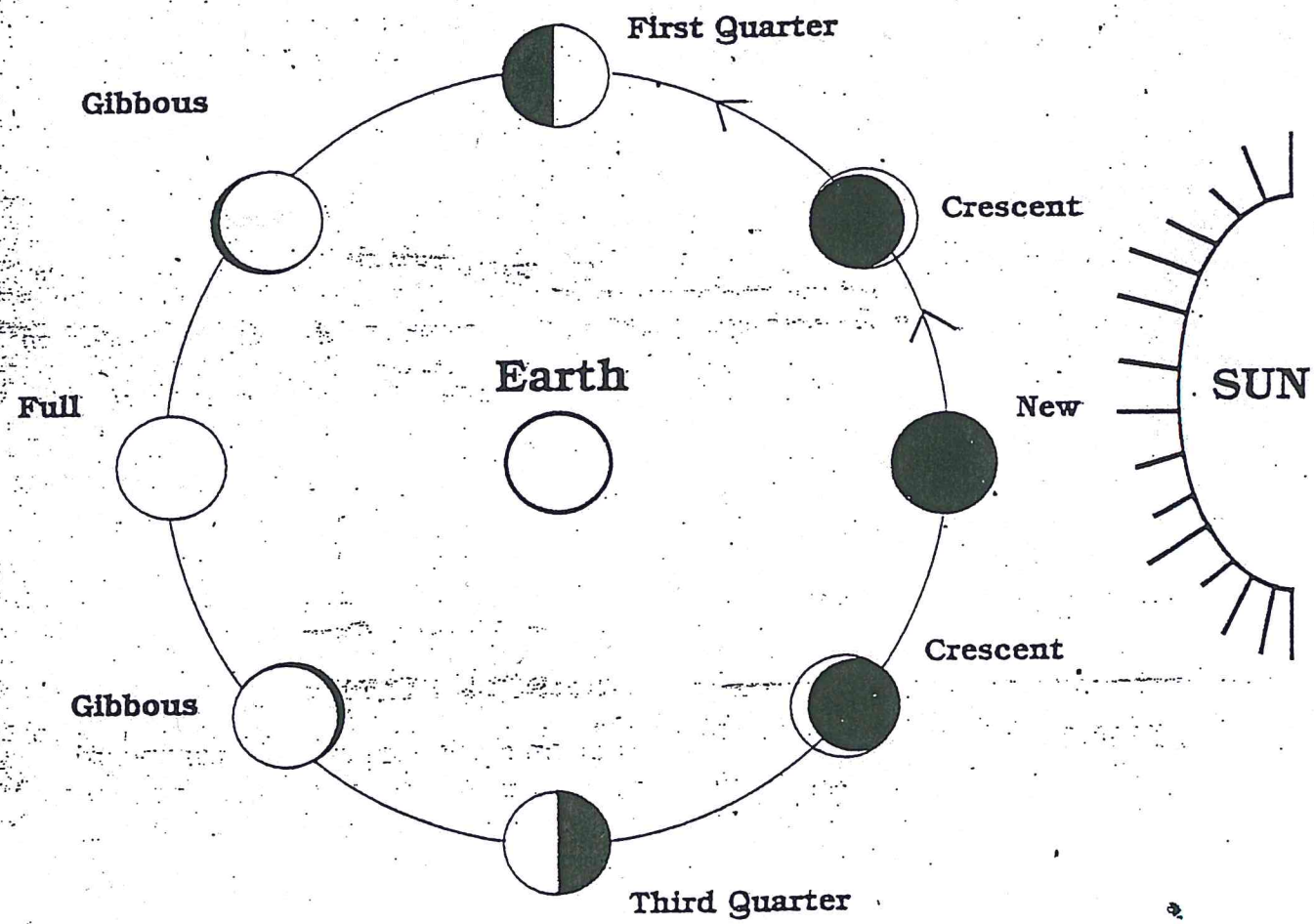
Bluuuuuue Mooooooon. It's shining on page 4.

The animals we love to hate, but shouldn't. Find them on page 8.

What's going on Down Under? Get the dirt on page 14. Who collects dirt? Page 15.

Moonlight really doesn't come from the moon. It's actually sunlight reflecting off the moon. The moon revolves around the Earth which results in the changes of lighted surface we see. These 'phases' of the moon take 29.5 days to complete a cycle.

The *new moon* occurs when the moon is between the Sun and the Earth. Although the moon rises and sets, it can't be seen because the lit side faces away from the Earth. In a few days a *crescent* occurs. We call this a *waxing moon*. The horns, or cusps, point left when it's approaching a full moon. One week after the new moon you see a half circle. We call this the *first quarter* because the moon has completed a quarter of its orbit. In a few days almost 3/4 of the moon is lit. We call this a *gibbous moon*. About two weeks after the new moon, the *full moon* appears. Full moons stay out all night. After a full moon, the moon passes through *gibbous*, *third quarter* and *crescent* phases. We call this a *waning moon*. The horns point right which indicates it's heading toward a new moon.



Blue Moon??

It is a rare occurrence of two full moon falling in the same calendar month. This occurs every 2.5 to 3 years. "Once in a Blue Moon" is an old saying that means a rare event. In 1999 there will be two blue moons - one in January and one in March. February will have no full moon at all. Awesome!!

The Truth About Owls

- ✔ Owls are perfectly adapted for their nighttime life.
- ✔ An owl's eyes are one of its most remarkable features. Big species of owls, such as the great-horned owl, possess an eye larger than a human's. If human bodies were constructed on owl proportions, our heads would be as large as a washtub to accommodate our very large eyes.
- ✔ Owls can't move their eyes in the socket because the eyes are so large.
- ✔ Owls must turn their heads instead of their eyeballs to find prey.
- ✔ Some species can turn their heads up to 270 degrees or 3/4th of a circle.
- ✔ Owl eyes are more elongate than a human's. This results in a larger image which allows an owl to see in greater detail.
- ✔ Owls can hear exceptionally well. In total darkness, a barn owl can catch prey using only the sound of a squeak or the rustle of leaves as a clue. An owl can hear the tiny sound of a mouse stepping on a twig 75 feet away.
- ✔ Owls have binocular vision with two forward-facing eyes. Just as in humans, this helps the owl to judge distances more accurately.
- ✔ The feathers of owls are unusually soft and flexible. They also have soft, finger-like edges on the primaries. These adaptations help to muffle any sound produced. As a result, owls have almost silent flight.
- ✔ Owls are not blinded by daylight. During the daytime, owl irises constrict so that only a tiny hole is available for light to enter.
- ✔ An owl cannot digest everything that it swallows. Some things like teeth, fur, and bones are packed into pellets and coughed up. Biologists use owl pellets to determine what animals an owl eats.
- ✔ Most owls need to eat 4 to 5 mice (or the equivalent) per day. In one year, an average owl consumes over 1000 mice!!
- ✔ Usually male and female owls of the same species look alike, although the females are always larger.
- ✔ Most owls have one brood per year and many begin nesting during the winter months. Great-horned owls may begin nesting in late January.
- ✔ Baby owls, called owlets, hatch out with their eyes closed and bodies covered only with a soft white down. Owlets become fully feathered and the same size as the parents by three months of age.
- ✔ Owls can live to be almost 20 years old in captivity. Nine to ten years is old for a wild owl.

CAVES

A brooding figure, clothed in a dark cape and pointy-eared mask, hurtles down the highway in his black jet-powered car. He's a crime-fighter, but hides from those he saves by fleeing to his remote sanctuary. He takes a sharp turn off the paved roadway and arrives at his fortress . . . a pleasant country cottage with a white picket fence?

What would a certain crime-fighting vigilante be without his cave? Caves are full of mystery and suspense. Here unnamed things live, out of sight, and weave their own inscrutable web of life. It's another world down there.

Or is it?

Judge for yourself. Caves are formed by many different processes. Wave action at an ocean seashore can carve a cave out of coastal rocks. Lava flowing underground from a volcano is confined to a narrow channel. When the flow stops and the lava is gone, a tube is left behind. Most often in the interior U.S., though, a cavernous space dissolves slowly from certain kinds of rock by acidic water.

Limestone. You can't turn around in Kansas without looking at a limestone boulder or cliff. According to geologists, Kansas was covered by a shallow sea in its prehistoric past. The shells and skeletons of mostly microscopic sea creatures settled on the sea-floor, layer upon layer. The weight of overlaying materials compressed these skeletal remains into rock. The sea withdrew. The rock remains. Limestone.

Rainwater, already slightly acidic, becomes even more so when it mixes with carbon dioxide in the soil. As you can see from all the limestone posts in Kansas, limestone naturally breaks along pretty square lines. The acidic water drips down through the cracks in the rocks, dissolving it as it goes. Where the water stops its downward movement - at the water table - even more rock is melted away. The space left behind is a cave. When water bearing dissolved limestone enters the airy cave, it often drops its limestone load to leave behind a ***speleothem*** (stalactites, stalagmites, and so on).

Of course, WE usually don't know the cave is there until erosion of the land's surface breaks the cave open. Once the breach is made, the fun begins.

A cave with a surface opening has two basic zones: light and dark (for those of you with talented tongues, these are the para-hypogean and hypogean domains). The dividing line is the point at which light is never visible. In some caves - those with a long, straight, wide entrance like a lava-tube - the light zone may be quite long. If the cave entrance twists and turns, light may only penetrate a few feet. Then it's dark. Not just dim. DARK. Even the best animal eyes see nothing.

The environmental conditions in a cave don't vary much. The humidity is high. The temperature stays remarkably constant through the year assuming nothing breaks

(that is, the cave roof doesn't collapse, the volcano doesn't erupt, etc.). In fact, the temperature once you get into the cave is close to the ***average*** surface temperature above the cave. In many parts of Kansas, the average surface temperature runs about 11°C (52°F). So a cave in Kansas would seem cool in the hot summer, and warm in the cold winter. How long has the human race been trying to do the same thing?

Life in a cave is demanding. We think of caves as a separate world, but life down *there* depends on life up *here* for survival. As you enter the cave, you'll see green plants. But you'll soon reach a threshold where there isn't enough light for photosynthesis to work. No green plants to form the center of a food web. So how does the system survive? Go with the flow.

The cave food web survives mainly by a flow of material brought in by outsiders: species that spend time both in the cave and out in the light (some nutrients come in with stream flows; some fall into the cave through surface openings). Cave species fall into three groups:

- Troglobites: the species that MUST live in a cave to survive (like some microscopic animals).
- Troglophiles: they can - and usually do - spend their whole lives in a cave, but can also live in the world above (some fly species).
- Trogloxenes: they spend part of their life cycle in the cave, part out.

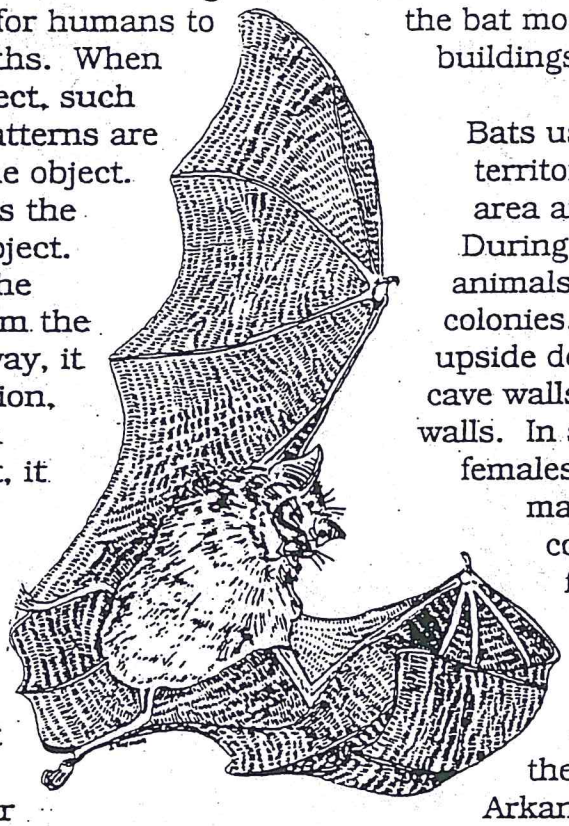
In many cases, it's the trogloxene that makes things work . . . goes out to feed, then deposits feces laden with enough organic fuel to keep the cave system going. Trogloxenes constantly inject the cave food web with new life. Rats and mice are trogloxenes. So are bats. (And, for that matter, so is the mystery superhero appearing at the beginning of this article!!)

Speaking of humans, if we believe cave drawings, humans were at one time trogloxenes as well, living in caves. Now only a few humans are trogloxenes; they explore an exciting part of our world, and show us that even underground - away from the light - the vital connection between life and environment exists.

Kansas Caves

* Caves in Kansas consist of either limestone in Eastern Kansas or gypsum caves in the Red Hills of Southcentral Kansas.
* The Kansas Speleological Society has catalogued 528 caves in 37 counties.
* Comanche County leads the list with 128.
* Gypsum caves can extend several hundred feet and form when water dissolves the rock. These caves are especially attractive to bats.
* One cave in Comanche County has several Indian pictographs drawn on cave walls.
* One of the largest caves known in Kansas occurs south of El Dorado. While most Kansas limestones are too thin to form large caverns, this cave extends at least a mile into a thick ledge of limestone.

Bats may look strange to us because many of them have funny ears and funny noses. These unique features permit some bats to use an extraordinary sonar system. This system, called **echolocation**, is a thousand times better than anything man has developed. Echolocation enables bats to locate and capture flying insects. (Not all bats can echolocate. Fruit-eating bats rely on sight and smell to locate their food.) Bats send out high pitched chirps (too high for humans to hear) through their mouths. When the sound strikes an object, such as an insect, the wave patterns are altered and shaped by the object. The bat hears the echo as the sound bounces off the object. The bat then compares the difference in the echo from the original sound. In this way, it can tell the object's location, size and shape. As a bat comes closer to an object, it increases the chirps to between 200 and 500 chirps per second. The echoes even report the speed of the insect's wingbeats which tells the bat the kind of insect and if it's edible. Bats can detect insects smaller than a mosquito. Some bats can detect objects no wider than a human hair!! With this kind of accuracy it is easy to see why bats don't get tangled in people's hair!!



Bats are the only major predator of night-flying insects and one endangered gray bat may eat up to 3,000 insects in a single night. Some of these insects include such pests as cutworm, corn-borer moths, and mosquitoes. In Bracken Cave, Texas, a colony of 20 million Mexican free-tailed bats eat 500,000 pounds or more of insects nightly!! (Information from Bat Conservation International)

Fifteen species of bats call Kansas home. All feed on insects. Most species weigh less than an ounce (between 4-34 grams). In southeast Kansas the endangered gray bat uses a most unnatural cave - storm sewers. It is believed this is the only place in the United States where gray bats do not use limestone caves. The most common Kansas bat is the big brown bat. It is the bat most often encountered in buildings or attics.

Bats usually have two territories - their roosting area and their hunting area. During the day, these social animals roost together in large colonies. They sleep hanging upside down while attached to cave walls, trees or building walls. In summer, the pregnant females form their own maternity and nursery colony and the males form a bachelor colony. Females bear one or two young a year. In winter, many insect-eating bats migrate to the cave regions of Arkansas, Missouri, Kentucky, Tennessee, and Alabama where they hibernate. They may stay in the caves for up to six months, living on fat stored in their bodies. If a bat is disturbed during hibernation, most likely by humans, waking up may cost the bat several days or weeks worth of stored fat. If this happens too often, a bat will die before spring as it will have used up too much of its stored energy.

Not all bats eat insects. Worldwide, there are about 300 different species of bats that eat fruit. (About 700 of the nearly 1,000 species eat insects.) Most of these species live in the tropics and

are a major pollinator of plants such as peaches, plantains, bananas, figs, avocados, cashews, cloves, tequila, chicle latex for chewing gum, balsa wood, manila and sisal fibers for rope, and kapok for bandages and life preservers. Without bats, we might not have these items. The loss of bats could seriously threaten the survival of tropical rainforests because these bats spread the seeds of many kinds of fruiting trees. The seeds generate new trees to replace trees that die.

Unfortunately, there are more misunderstood animals in the world than understood ones. Our list of "unhuggables" could go on and on. Even if we don't like an animal for one reason or another, we need to remember how important that animal is in the scheme of things. To want them gone would only make things worse. When an animal disappears from the earth, it is gone forever. The gap caused by its disappearance creates an interruption in the flow of energy through the ecosystem. Something else must take up the slack. We don't know how many gaps can be created before the flow of energy stops completely. Humans have greatly accelerated the natural process of extinction. We are creating gaps at a rate faster than ever before. How many plants or animals can we lose before everything collapses? Knowing the truth about an animal helps everyone. A lot of needless persecution can be replaced with awareness and understanding when we have the truth. Now that you know how beneficial bats are, spread the word. Put up a bat box (plans on page 12). Tell your friends. And, the next time you see a skunk, leave it alone. It won't bother you. Remember, it doesn't want to spray you!!

BATS NEED FRIENDS OREGON CAVES

Reprinted with permission from the Oregon Caves Company

BAT FACTS

Order: Chiroptera.

Bats are the only flying mammal.

Most are nocturnal.

South American fruit bats have a SIX FOOT wingspan and excellent vision.

Bats mate in fall, but the sperm doesn't meet the egg until spring, allowing young to be born after the harsh winter.

Bats nurse their young.

Some bats migrate, others hibernate.

Except for fruit bats, most bats are insectivorous. They catch insects on the wing using echolocation. The bat emits a high pitched sqeak. When the sound bounces off the insect and returns, the bat knows not only where the insect is, but its speed and direction as well.

Bats live up to 20 years.

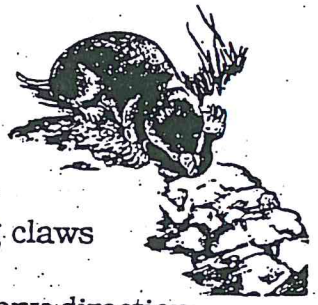
LIFE DOWN UNDER

Below our feet is a land where sunlight's dominion is thrust back and the shroud of night drapes the land. It appears this zone is under a curse which has driven all life from it.

In reality, this zone is home to a wide variety of living things; all flourishing in the land of darkness. Two unique groups share this zone of life; those who move between the zones of darkness and sunlight and those who live permanently in the zone of darkness. Most of us are more familiar with the transient organisms, such as prairie dogs, burrowing owls, ground squirrels and kangaroo rats. Those which live in permanent darkness seem more mysterious, seldom seen. You might say they are "out of sight, out of mind". How do these organisms survive in total darkness? What adaptations have they developed to cope with a sunless environment?

The mole family provides a unique opportunity to learn how an animal adapts to underground living. The eastern mole, which occurs across Kansas, but mainly in the eastern half, spends almost its entire life in underground tunnels. Their unique underground adaptations include:

- very small eyes and no external ears - both are normally hidden completely by fur
- short, stubby tail very sensitive to touch
- long, pointed snout - also very sensitive to touch
- powerful forefeet which includes large 'hands' and strong claws
- cylindrical-shaped body with silky hair which lies flat in any direction (handy for backing up in a tunnel!!)



These features allow the mole to be a great digging machine and very sensitive to touch. Is sight important to most moles? Why? How do moles locate their food sources?

A better known underground dweller is the earthworm. They have similar down under adaptations. The earthworm has a cylindrical-shaped body. The muscle arrangement allows the worm to push and pull itself through the soil. Special glands secrete a lubricating mucous which makes movement through the soil easier. The earthworm has bristle-like hairs (seta) on each body segment which assist the burrowing activity of the worm.

The earthworm has no sensory appendages, such as eyes or ears, but areas of their body are sensitive to touch and vibrations. Some have light sensitive cells which

enable the worm to detect and avoid harmful light conditions.

Both moles and earthworms are important ecologically. Their burrowing activity increases the porosity of the soil, allowing air and water to penetrate more freely and deeper. Their tunnelling also mixes surface materials with soil. Birds, mammals (including moles) and reptiles eat earthworms.

Ask your students to draw an animal which has special adaptations for living underground. Would it have eyes? Would it require protective colorations or camouflage? What body form would it have? Does it require special appendages for locomotion or feeding?

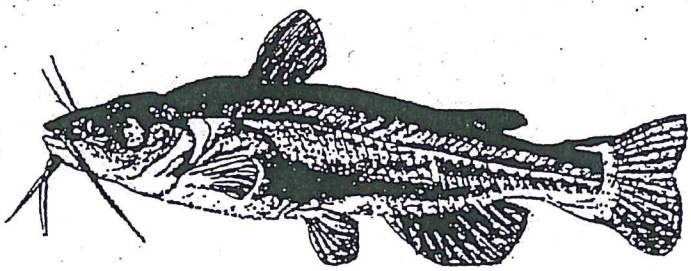
Speaking of Ground . . .

Willis Callahan of Pittsburg, Kansas shares this unique project. He collects dirt. Actually he collects soil samples from the various places he travels and places them in empty film canisters (another way to recycle these). Willis labels each sample and arranges them alphabetically by state in a drawer. When his students study that state, they look at the soil - sometimes under a microscope - and locate the origin of the sample on a map. Willis wrote that it is interesting to see the variety of colors, textures and even smells of the samples.

An interesting twist to this project . . . a magazine ran an article on this project and asked if anyone would like to help. Willis writes that the response has been overwhelming - he has close to 900 samples from all over the U.S and several foreign lands. Some of the more interesting include volcanic eruptions from Washington, Alaska and the Philippines, a sample from Disneyland (from Mickey and his friends), even someone from Michael Jackson's home sent a sample. What a neat and unique way to study our earth!! You can't take the kids to Alaska (well, most of us don't have budgets to do so) but this way you can bring a small, real part of Alaska, or wherever, to them.

Darkness in the Depths

A whole underwater world exists in darkness. A somewhat different twilight zone. Animals that reside in the deep have developed special adaptations to survive in this dark, watery world.



A nocturnal hunter, this catfish looks like it has whiskers. We call these fleshy projections barbels. Covered with taste buds, they enable the fish to taste, smell and feel its way along the bottom, where it looks for food. That's why you use smelly things for bait when you fish for catfish.

Did You Know??

Kansas has 12 species of catfish including channel, flathead, blue, madtoms and bullheads.

The WILD Exchange

Reunion News

The first Project WILD facilitator reunion workshop was held November 6-8, 1992 at Camp Tomah-Shinga. Eleven facilitators were able to attend. Hopefully the activities met some of the needs and concerns expressed by facilitators over the last year. A large amount of support material was also given to the participants. A list of these materials will be made available to those facilitators unable to attend.

The Survival Game

Preparation: This game was presented at the reunion workshop. It can be played by 10-25 individuals, less than ten may not produce the necessary variation. You need six different colors of paper. Each color represents one of the following resources: people, food, land, consumer goods, raw materials and capital. Cut, label, and number the corresponding papers into one inch squares; number the squares from one to the number of players. For example, if you have 15 players, you will have 15 labeled squares numbered 1-15 for each of the six above resources: people, food, land, consumer goods, raw materials and capital.

Directions: Each player selects one of the numbered squares from each of the six resources. They should not see the numbered squares when selecting. The object of the game is to balance the requirements of the people with the available resources. Each person requires one unit of food. To produce one unit of food requires one unit of land. Each person would like one consumer good, but to produce the consumer good requires one unit of raw materials. Two units of capital can purchase one unit of food, land, raw materials, or consumer goods. Players may also trade resources (food, land, consumer goods, or raw materials) one for one. For example, a player has seven units of people, six units of land, four units of food, ten units of raw materials and five units of consumer goods. The player also has four units of capital. The player needs seven units of food to meet the requirements of seven units of people. He/she must try to acquire one unit of land and three units of food to achieve this balance. The player has three extra units of raw materials, but needs two more units of consumer goods. The player can utilize the three extra units of raw materials and trade one for one to obtain additional units of land, food and consumer goods. With four units of capital, the player can also purchase food, land or consumer goods on a two to one ratio. The object of the trading and selling is to try and acquire the necessary resource for your people. In the above situation seven units of people require seven units of land, food, raw materials and consumer goods. Not all players will be able to accomplish this, in fact you should experience individuals who are very well off, some who are just breaking even and others who are not meeting their needs very well at all.

After the trading sessions, players can suggest new rules or strategies to expand on the game. This may include merging players together, bartering at different levels - the list goes on.

project WILD
from awareness to responsible actions

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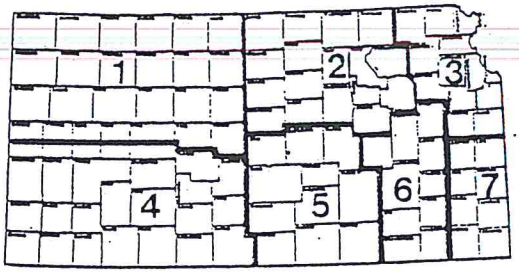

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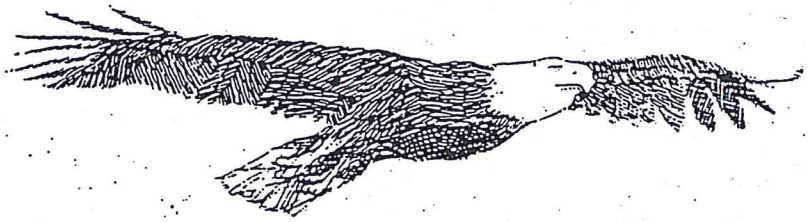
Janice Harryman, Girard
Michael Healy, Chanute
Nancy Hurt, Pittsburg
Sally Imhof, Cherokee
Monica McCloud, Pittsburg
Chris Pistole, Pittsburg
Georgia Pollard, Oswego



Can You Beat This Record?

Ken Riddleberger, Project WILD Coordinator for Georgia, participated in a "WILD Week" held at Dug Gap Elementary School. Riddleberger along with 336 students and teachers 'lap sat' to the tune of John Denver's song "Celebrate Earth Day". Can you beat it?

Finally. . .

The Project WILD brochure is *finally* available. This neato brochure gives an explanation of the Why, What and How of Project WILD. If you would like a copy, please write Project WILD-Kansas, RR2, Box 54A, Pratt, KS 67124.

The old Lakota was wise. He knows that man's heart, away from nature, becomes hard, he knew that lack of respect for growing, living things soon led to lack of respect for humans too.

Luther Standing Bear (Lakota)

What's Happening . . .

January 16, 1993	Eagle Days. Milford Nature Center. Call Pat Silovsky at 913/238-5323 for more information.
January 21, 1993	Project Learning Tree Workshop. Topeka. Call Pat Silovsky at 913/238-5323 or Mary Birrell at 913/267-5900.
January 23, 1993	Project Learning Tree Workshop. Wichita. Call Connie Elpers at 316/264-8323.
January 30, 1993	Project Learning Tree Workshop. Garden City. Call Roland Stein at 316/672-5911 or Nancy Paulson at 316/276-5290 or 316/276-5295.
February 8, 1993	Project WILD Workshop. Blue Rapids. Call Pat Silovsky at 913/238-5323.
February 23, 1993	Project WILD Workshop. Topeka. Call Pat Silovsky at 913/238-5323 or Mary Birrell at 913/267-5900.
April 29, 1993	Project Learning Tree Workshop. Call Pat Silovsky at 913/238-5323.

Write Now!!

Write now for your "new and improved" Reference Center Catalog. The format of the catalog should allow you to locate and select materials with greater ease. Need materials on endangered species? All materials on endangered species will be found together, divided by media type. The catalog will also be housed in a three ring binder to allow for the addition or deletion of revised listings. The new catalog also contains descriptions for the thousands of dollars of newly purchased materials. Many new videos and computer programs, covering a wide range of subject areas related to wildlife, were included in this purchase. To request your copy of the catalog write to:

Kansas Dept. of Wildlife and Parks
Wildlife Education Service
RR2, Box 54A
Pratt, KS 67124

Check It Out!!

The newly revised catalog will make it easier for you to find materials. The section on Astronomy and Weather lists several neat items for you to borrow. Check out the various animal topics for specific information on nocturnal animals. For a neat item on bats, check out LK-69 .

New, New, New!!

Don't miss exploring nature and discovering more about wildlife. The new Nature's Notebook is here. This updated version is exciting, more 'user friendly' and colorful. User friendly translates into being given a table of contents and two cross reference sections; one by curriculum areas and the other by special topics. How do you obtain this new version? Just send your request to: Kansas Dept. of Wildlife and Parks, Wildlife Education Service, RR2, Box 54A, Pratt, KS 67124. (Please state if you have the three-ring binder which housed the old Nature's Notebook.)

Reminder . . .

Send in your nominations for those educators who go above and beyond the call of the wild. Send a one page nomination to Mary Kay Crall (address below). The 'top gun' will receive a certificate, a *Natural Kansas* book and a beautiful Kansas birds poster. Send them in before March 1, 1993.

☞ F.Y.I.

The swift referred to in last issue's Trivia Questions is the European Swift, *Apus apus*. This is just one of 80 species of swifts that occur in the world.

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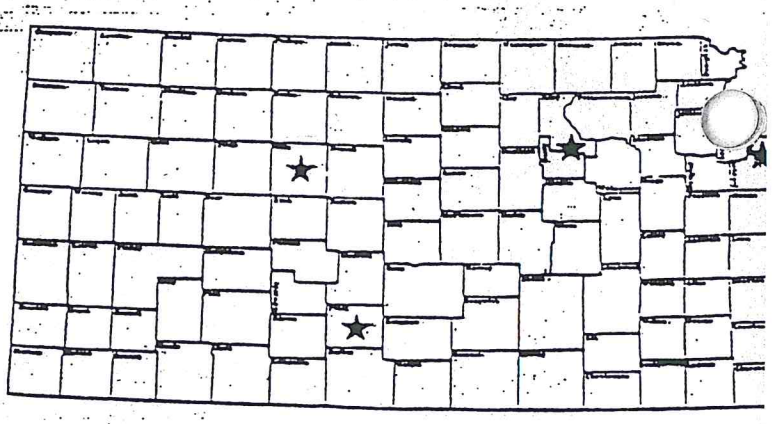

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