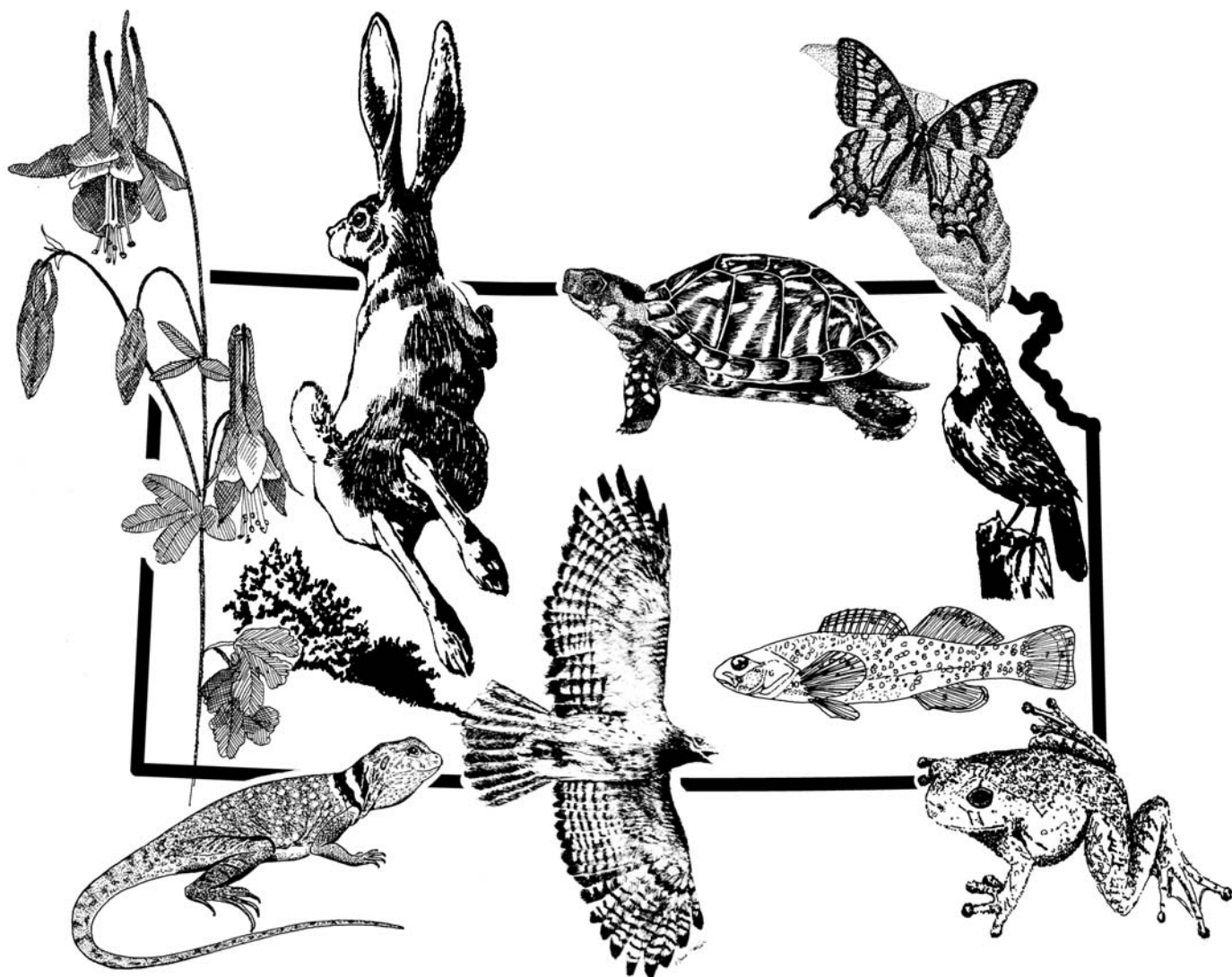
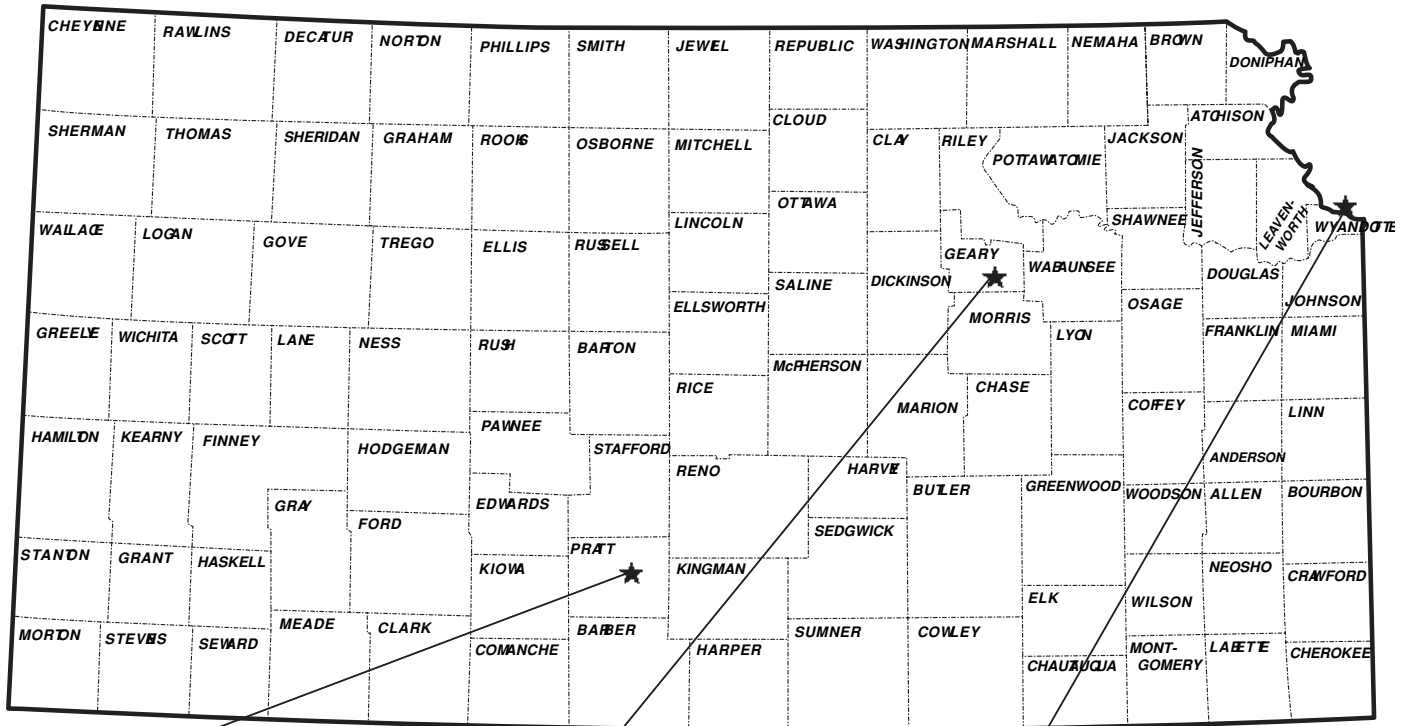


Nature's Notebook

**EXPLORE YOUR ENVIRONMENT
DISCOVER WILDLIFE**



Wildlife Education Service Staff 2004



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Junction City, Kansas 66441
(785)238-5323

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03/04

FOREWARD

Nature's Notebook is the compilation of the Education section of the Kansas Wildlife and Parks magazine "Nature's Notebook". In 1986, the first collection of these articles was sent to every Kansas elementary school in a bright-yellow, 3-ring binder titled There's Something Wild in Nature's Notebook.

A thorough revision occurred in 1991. A table of contents, with fourteen major or headings, was added to assist the user in locating activities and information. Additional assistance was provided in the form of two cross-reference sections. One utilizes (Curriculum Areas) as its criteria for headings; the other is divided into (Special Topics) which either relates to student motivation activities or the interaction between organisms. These cross-reference sections provide a more "user friendly" approach to the enclosed resource materials.

Additional reference and resource materials can be obtained through the Reference Center at the Pratt Operations Office. Mail in the enclosed order form, or give us a call to place an order at (620) 6725911 Ext. 151 or 176, or you can order materials off the internet, just go to www.kansaswildlife.org and click on the Pratt button. This freeloader center provides videos, films, books, posters, educational games, and learning kits, which can supplement the enclosed activity and information worksheets. The only expense is the return postage to the Pratt Reference Center.

Don't miss exploring nature and discovering more about your environment. We thank you for your interest in Kansas' natural resources (especially wildlife) and the youth of Kansas.

Sincerely,

The Wildlife Education Service Staff

The enclosed information and activity sheets may be copied for educational purposes.

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nature's notebook

CHAPTER ONE

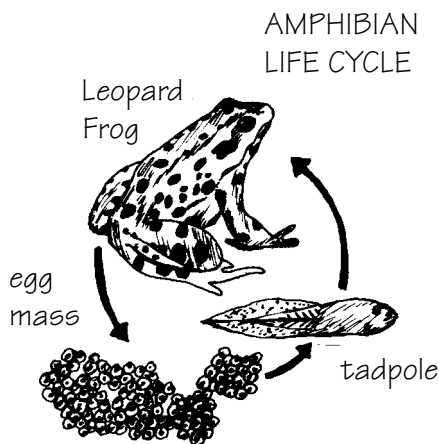
AMPHIBIANS & REPTILES

by Joyce Harmond Depenbusch

FROM EGGS TO LEGS

Of the five groups of vertebrates - mammals, fish, birds, reptiles, and amphibians - we may notice amphibians the least.

Amphibians are fascinating animals. Not only do they grow from an egg to a four-legged vertebrate, but they also spend part of their lives in water and part on



land. They are **cold-blooded**, meaning their body temperature is controlled by their surroundings. Since they are unable to regulate their body temperatures, they spend the winter hibernating beneath the ground or water so they won't freeze. Kansas has 28 **species**, or kind of amphibians, including sala-

manders, frogs, and toads. Amphibians can be identified from **reptiles** by their skin. Amphibians have moist skin, while reptiles, such as turtles and snakes, have shells or scales. Amphibians depend on water and moisture because they can easily lose body moisture. Therefore, amphibians are generally found near water.

There are four families of salamanders represented in Kansas: newts, mudpuppies, mole salamanders (like the tiger salamander), and lungless salamanders such as the cave salamander.

Amphibians lay soft eggs in moist areas. The eggs have not shell and must remain moist to survive. The eggs hatch into **aquatic**, or water living, **larvae** or **tadpoles**. The first

part of an amphibian's life is spent in the water until they **metamorphose**, or change. The adult life is spent as **terrestrial**, or land, animals. Most adult amphibians feed on insects, other invertebrates and small vertebrates.



Mudpuppy



Central Newt

The two major groups of Kansas amphibians - salamanders, and frogs and toads - differ in several ways. Salamanders have

tails, while frogs and toads do not. The front and hind legs of salamanders are similar in size, but the hind legs of frogs are larger than the front legs. Also, frogs and toads make a familiar call or chorus (especially during breeding). None of the Kansas salamanders make sounds. Salamander larvae have gills on the back of their heads, while tadpoles do not.

The most common Kansas salamander is the tiger salamander. It is also the state amphibian, having been chosen as such in 1994. Found statewide, it is the only salamander found in western Kansas. Tiger salamanders have dark bodies with light spots and are generally from six to eight inches long. During times of extreme temperatures, tiger salamanders can be found in caves or

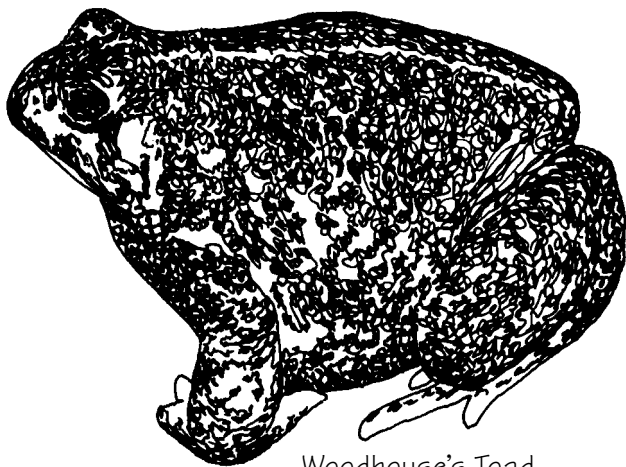
burrows. One female can lay up to 1,000 eggs, which hatch into larvae in a few weeks.



Blanchard's Cricket Frog



Tiger Salamander



Woodhouse's Toad

Among the Kansas toad species, the Woodhouse's toad may be one of the most common. It is found state-wide, but prefers lowlands and shady areas. The Woodhouse's toad is active from March to late September. Like most toads, the Woodhouse's is **nocturnal**, or active at night. In the spring and summer male Woodhouse's chorus in small groups to attract females. One female can lay up to 25,000 eggs.

by Joyce Harmond Depenbusch

TOADS

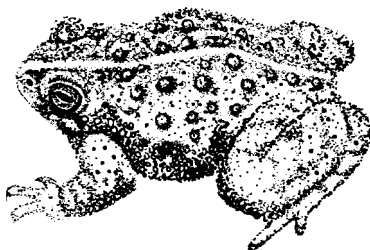
Spend some time looking for, listening to, and learning about some interesting amphibians ---

Five species, or kinds, of toads live in Kansas. The family of toads, Bufonidae, has 279 species worldwide. All toads have thick, glandular skin and short limbs. They tend to burrow and are terrestrial (live on land).

In Kansas, toads have adapted to most parts of the state. The Woodhouse's toad has been found throughout Kansas. It prefers lowlands and sandy areas. This 2½-4 inch long toad is active from March to late September, using the burrows of other animals to hide in. The Woodhouse's toad eats beetles, spiders, ants, insect larvae and bees. They are helpful to humans because they eat large numbers of insects daily; eating as much as two-thirds of their weight in one day!

Most toads' hide beneath the ground or rocks during the

Woodhouse's Toad



day then hunt for food at night. The Great Plains toad searches for beetles and ants from April to September. It moves underground for the winter. Male Great Plains toads "chorus" to attract females in the spring and early summer. Eggs are laid in long strings in water; each female may produce up to 20,000 eggs. The young tadpoles grow in the pond until adulthood. The adult Great Plains toad is generally 2- 3 ½ inches long. In Kansas, this species is found from the Flint Hills west.

The western green toad is

Great Plains Toad



typically less than two inches in length with green, yellow, and black spots on its body. In Kansas, this species is found only in open grasslands in the far western counties. The western green toad is very secretive and active mostly at

night. Breeding occurs in ditches, stock ponds, cattle tanks, and flooded fields throughout the spring and

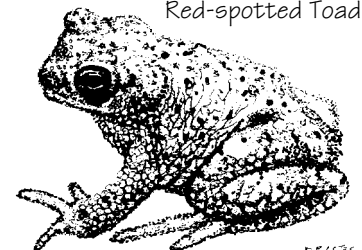
Western Green Toad



summer.

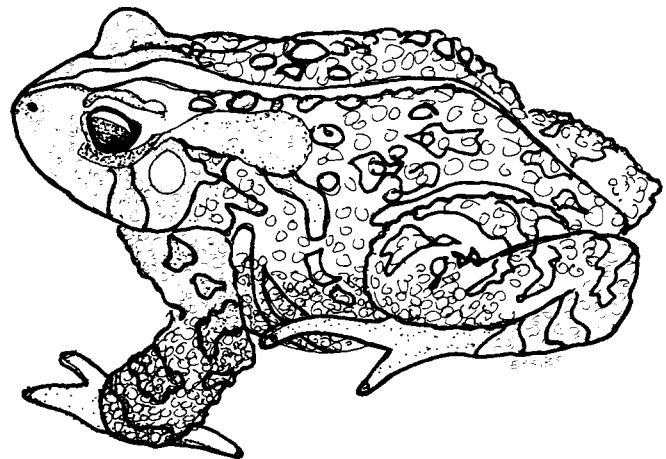
Red-spotted toads earn their name from the sometimes-red warts on their otherwise brown or gray bodies. Ranging in size from 1¼-2½ inches in length, this toad eats ants, beetles, and bees. Its habitat is rocky areas of dry prairies and canyons in the Red Hills and southern High Plains. As with most toads, the female red-spotted toad is larger than the male.

Red-spotted Toad



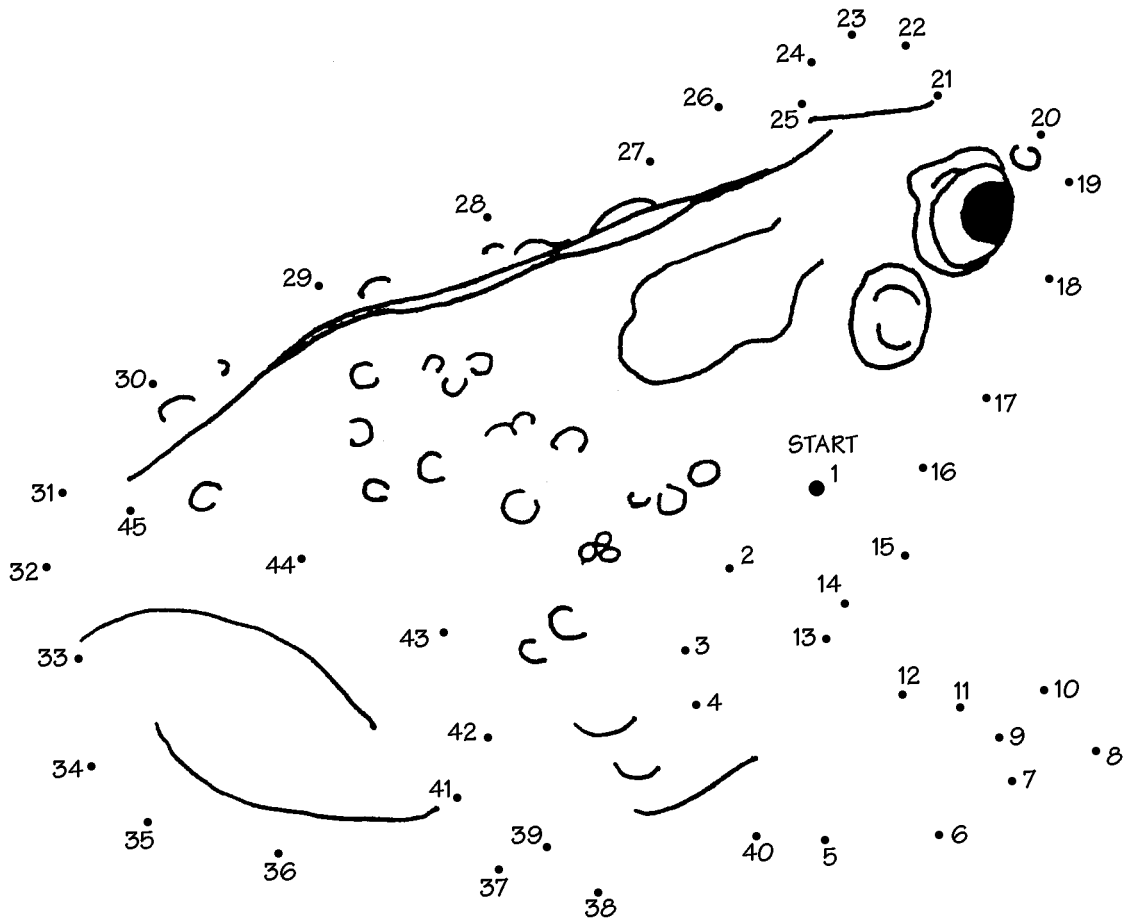
Found mainly in Eastern Kansas, the American toad is active in rocky woodland areas from March to October. Generally 2-2 ½ inches long, this species eats beetles, crickets, grasshoppers, leafhoppers, spiders, and ants. In the spring, American toads gather at upland streams or ponds and chorus to attract mates. One female may lay 4,000 to 20,500 eggs in double strands.

American Toad



Color the American toad shown above as follows: The body can be gray, light brown or reddish brown. The patches and spots are dark brown or black. There is a light stripe down the back, which can be colored white.

CONNECT THE DOTS



by Joyce Harmond Depenbusch

HAVE SHELL, WILL TRAVEL

When it comes to moving, U-Haul can take some lessons from turtles. Turtles carry their homes with them. They are made of an upper shell, or **carapace**, and a lower shell, or **plastron**.

What else makes turtles so unique?

Read on, and share what you know with a friend. The words in bold type are vocabulary words.

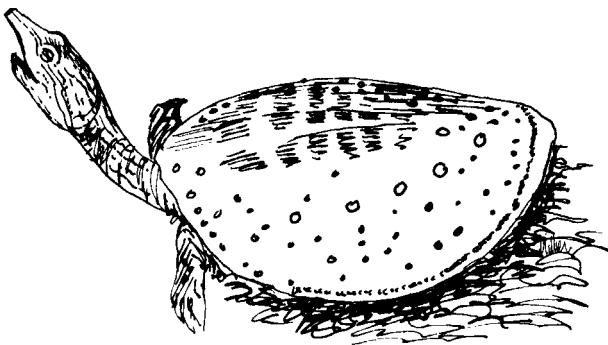
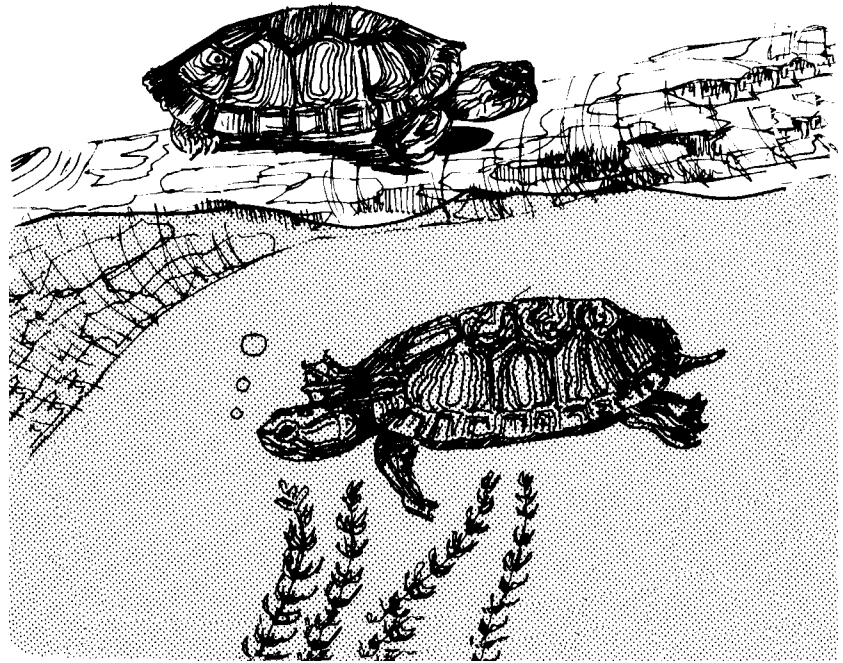
There are 222 kinds of turtles worldwide. Fourteen of these **species**, or kinds, are found in Kansas. Turtles are **reptiles**, as are snakes, lizards, and crocodiles. They are **cold-blooded**,

which means their body temperature changes to match the surrounding air or water temperature. They breathe with lungs, forcing air in when they swallow. They also have air chambers, which work like gills for breathing during hibernation. Some kinds of turtles enjoy basking in the sun on top of rocks

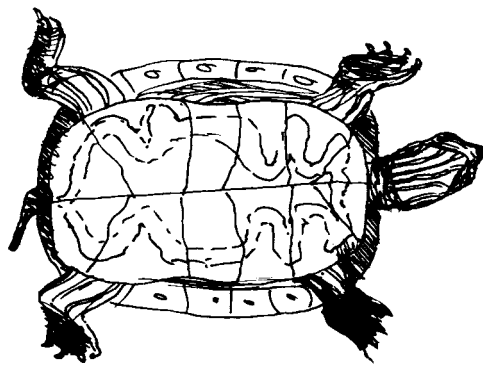
or logs in a pond.

Turtles' moveable parts are limited to the head, neck, legs, and tail. The neck is very flexible, especially in soft-shelled turtles, because they have about eight **vertebrae**, or bones in their long necks. Turtles have three-chambered hearts.

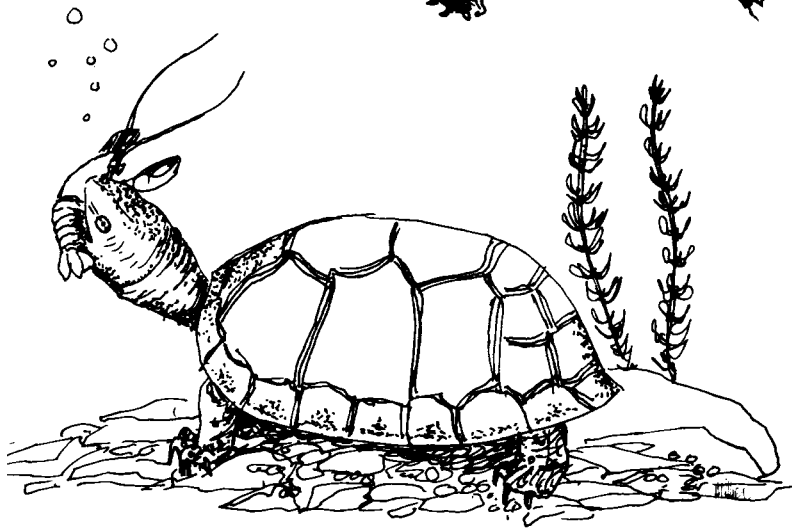
Like birds, some turtles migrate. Green turtles migrate 1,400 miles from feeding to breeding grounds.



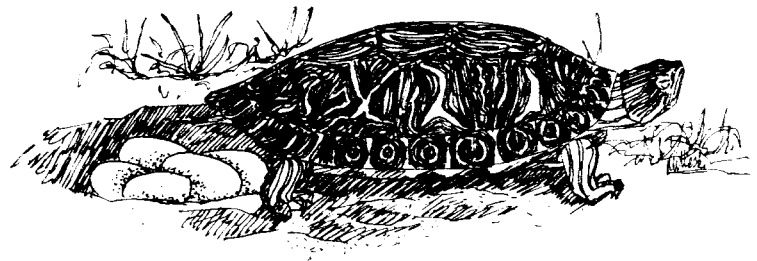
The feet of marine turtles are like broad flippers, while non-marine **species** have broad, webbed feet with nails, or claws. Turtles have thicker skulls than other reptiles and very small brains.



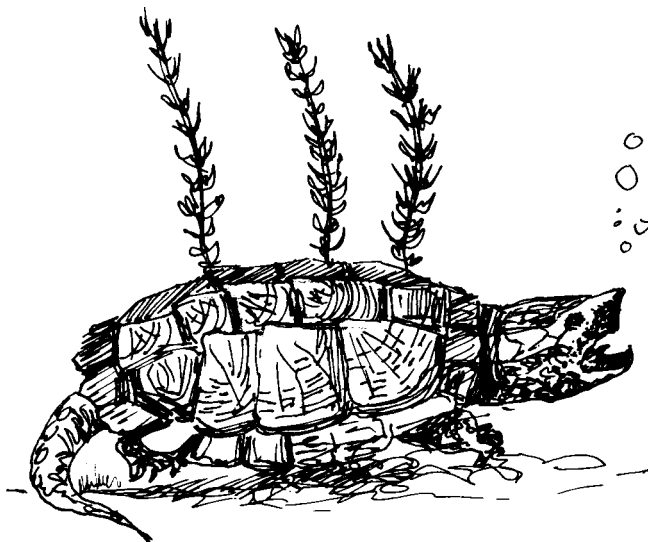
Depending on the kind of turtle, it may be, **carnivorous** (meat-eater), **herbivorous** (plant-eater), or **omnivorous** (eats both plants and animals). They don't have teeth, but their jaws have sharp edges for cutting. Insects, tadpoles, fish, snails, crayfish, frogs, salamanders, and worms are among the animals eaten by carnivorous turtles. This yellow mud turtle uses its sense of smell to find its dinner.



All Kansas turtles lay their eggs on lands, in sand or soft soil. The eggshell keeps the growing turtle from becoming too dry. From two to fifty eggs are laid in each **clutch**. The young of most turtles look for water after hatching.



The alligator snapping turtle has been added to the Kansas SINC list (Species in Need of Conservation). Pesticides and flood control projects have reduced their numbers in the state. The alligator snapping turtle is the largest reptile species in Kansas. It can reach a weight of over 230 pounds and a shell length of 32 inches. The leatherback turtle is the world's largest. It lives in warm seas and can grow to be a ton in weight and be eight feet long!



by Dana Eastes

ALLIGATOR SNAPPING TURTLE

Macrolemys temmincki (Troost)
The rare reptile relic of Kansas

The alligator snapping turtle is the largest of all turtles in Kansas. It is known to weigh more than 230 pounds and have an upper shell length in excess of 30 inches. A durable critter, the alligator snapper can live to be 200 years old.

The alligator snapping turtle can be identified by its long, saw-toothed tail; upper shell with three rows of ridges; small lower shell; and large, hooked beak. The lower shell is gray and the rest of the body is a uniform brown or gray.

This turtle heavyweight lives in deep waters of large rivers and lakes. Only the female leaves the water to nest and lay eggs. The alligator snapper is no ninja but could inflict a nasty wound to anyone in reach of its large jaws. Its eating habits vary from night

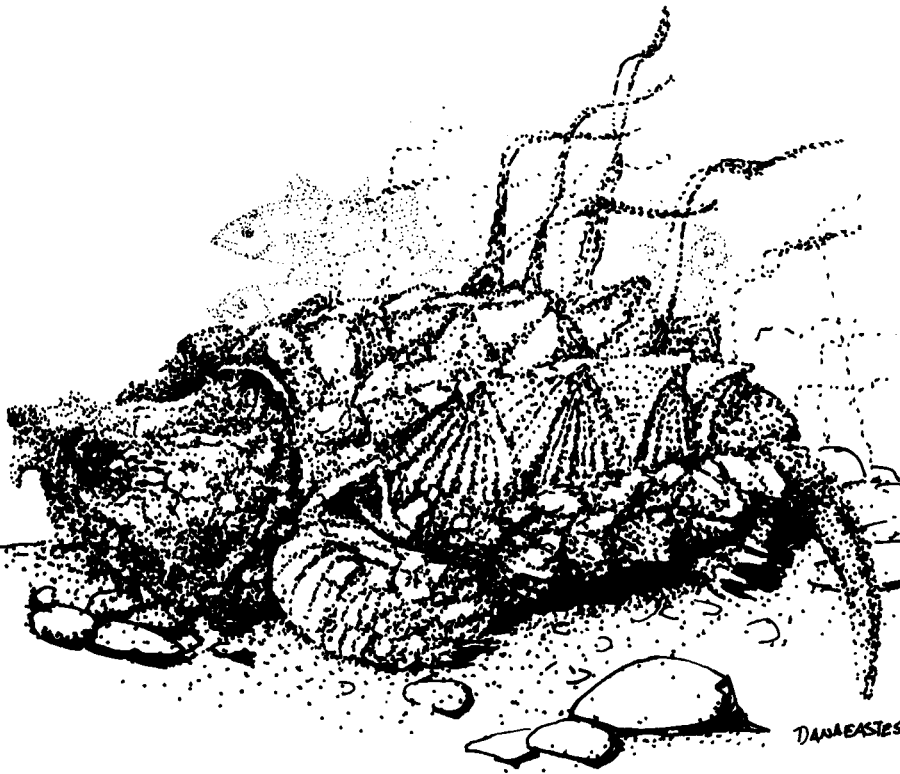
to day. Excluding pizza, it eats almost anything. By night, it stalks and overpowers its victims. During the day, the turtle becomes a fisherman, so to speak. It lays on the bottoms, motionless, with its mouth wide

Not only is this the largest turtle in Kansas, but also the rarest. Kansas is the northern edge of this species' range. Preferring a warmer climate, few alligator snappers have been found in the state. What

few alligator snapping turtles we do have may also be affected by pesticide use and flood control projects in our southeastern Kansas Rivers. It is currently on the SINC (Species in need of Conservation) list.

In May 1991, Doug, Greg, and Scott Larkin of the Tyro area, caught an alligator snapping

turtle while baiting lines along Onion Creek, a southeast Kansas stream. This relic was only the fourth recorded find in the state since 1886. Attached to the turtle was a radio transmitter, so the brothers turned their rare



open. Blending into the mud bottom the turtle wiggles its tongue, (the fleshy part resembling a worm), waiting for an unsuspecting fish. When the fish comes in for a closer look, the turtle slams the trap shut and has a meal.

catch over to Wildlife and Parks.

This turtle happened to be one caught five years ago by Wildlife and Parks supervisor Doug Blex. (The transmitter quit not long after it was released and he lost track of the turtle) The turtle weighed 60 pounds and is thought to be more than 50 years old. David Edds, a biology professor at Emporia State University was also in the area doing research on the alligator snapper at the time of its capture. Edds and Blex reattached two radio transmitters to the turtle and released it back into

the wild to further their study of this elusive creature.

If you would like to observe an alligator snapping turtle, visit the Topeka or Sedgwick County zoos.

If you happen across an alligator snapping turtle, this is what you should do: First of all, give it plenty of room; its bite can be dangerous. Second, inform a parent or guardian of your sighting. And third, call the Wildlife and Parks office in your area.

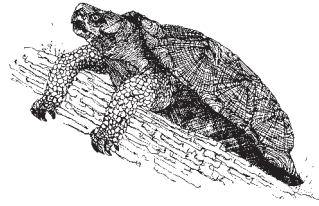


Take the TURTLE TEASER

See how much you've learned about the alligator snapping turtle by answering the following questions.

1. The alligator snapping turtle is common to all waters of Kansas. True or False.
2. The alligator snapping turtle can live over _____ years. a. 50 b. 100 c. 200
3. During the daytime, the alligator snapper lies on the bottom of deep water and wiggles its tongue like a worm to attract fish into its mouth. True or False
4. There have been only _____ documented sightings of the alligator snapping turtle in Kansas. a. 2 b. 4 c. 10
5. This reptile prefers warm temperatures. True or False.
6. The alligator snapping turtle is at the southern tip of its range in Kansas. True or False.
7. Alligator snappers eat pizza like the turtles on TV. True or False.
8. If you happen to sight or catch an alligator snapping turtle call a Wildlife and Parks office in your area. True or False

TURTLE I.D.



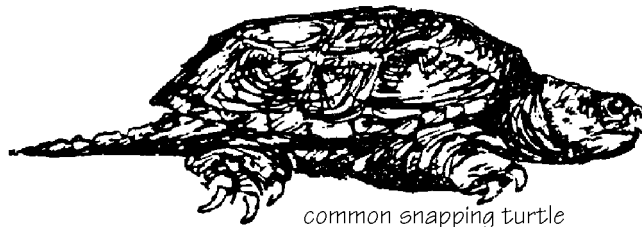
by Joyce Harmond Depenbusch

To simplify identification of turtles, follow this simple key.

Class Reptilia
Turtles - Order Testudines

Family Chelydridae
(snapping turtles)

common snapping
alligator snapping



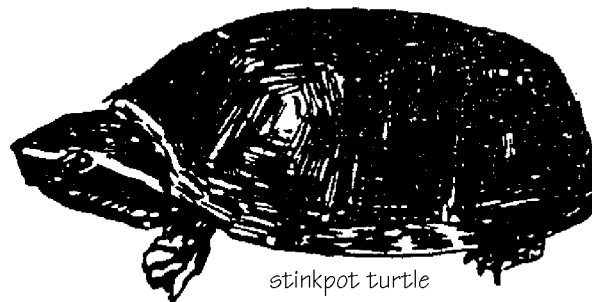
common snapping turtle

Characteristics:

Each species features a large head, strong, hooked beak, long tail, uniform color, small lower shell, and can get quite large (up to 200 lbs.).

Family Kinosternidae
(musk turtles)

yellow mud turtle
stinkpot



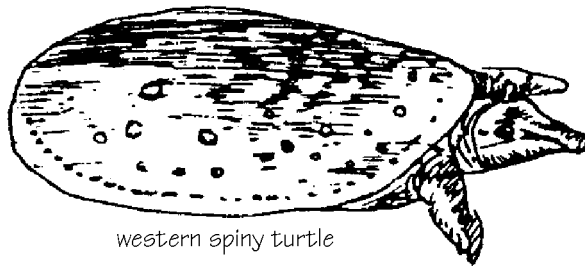
stinkpot turtle

Characteristics:

Each species features an oval shaped shell, dull color, and musk glands that can release a bad odor.

Family Trionychidae
(softshell)

western spiny
midland smooth



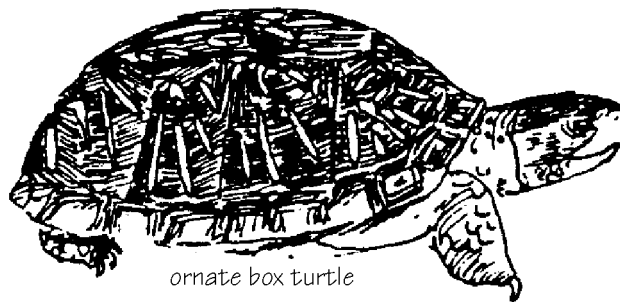
western spiny turtle

Characteristics:

Both have flexible, leathery upper shells. Their lower shells are much smaller, and they have a long and slender nose. They are well adapted to water.

Family Emydidae

ornate box
3-toed box
map (common, Miss-
issippi and Ouachita)
basking (Missouri
cooter, western painted,
red-eared slider)



ornate box turtle

Characteristics:

Most spend some time in water, but a few are land animals. They have well developed lower shells, compared to other Kansas turtles.

Find a turtle near your home and see if you can correctly identify it. The book, *Amphibians and Reptiles In Kansas* can assist you in identifying your turtle. You will learn more about turtles in futures issues of *Nature's Notebook*.

Hi! Ho! A Herp'n we will go!

Yo, it's herp'n time!

Those of you who have done some herp'n know how much fun it is. You may have been herp'n and not even known it. It's an exciting thing to do outdoors, and you'll learn lots of neat stuff in the process.

Definition: Herp'n - The act of rollin' over rocks to discover cold slithery things (i.e. Lizards, snakes, frogs, salamanders, turtles, etc.)

Herp'n Rules

1. You must return every rock you roll over to exactly the way you found it.
2. Try not to injure the critters in the process of check'n 'em out.
3. Ask permission before you herp on private property.
4. Keep a diary of the herp dudes and dudets you find. When, where, what, size, weight, etc.
5. Be aware of poisonous snakes, scorpions, and other dangers in your neck of the woods or prairies.
6. Release all "prisoners" to their natural habitat when you're done lookin' 'em over.

Herp'n Equipment

Long stick with hook to flip rocks. Pillow cases to carry captives. Pencil, paper, herp book (*Amp-hibians and Reptiles of Kansas* is a good one).

Dress appropriately - good boots, jeans, sun-screen, etc.



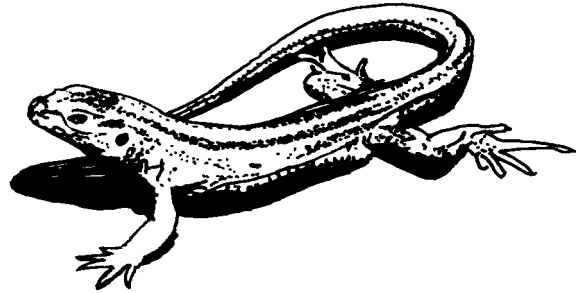
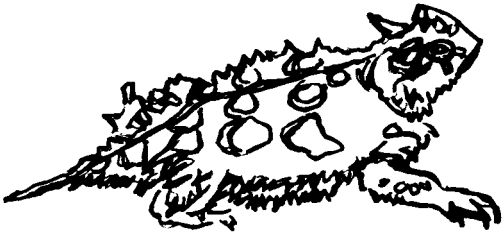
Helpful Herp'n hints

Herp'n is best in early morning or late at night when it's colder and the herps are slower. A lot of herps are nocturnal, meaning they only come out at night.

To understand the reptiles and amphibians in the area where you'll be herp'n, read your herp book to learn about the habitat (the places where they live) and behavior (what they eat, how they act, when they're most active).

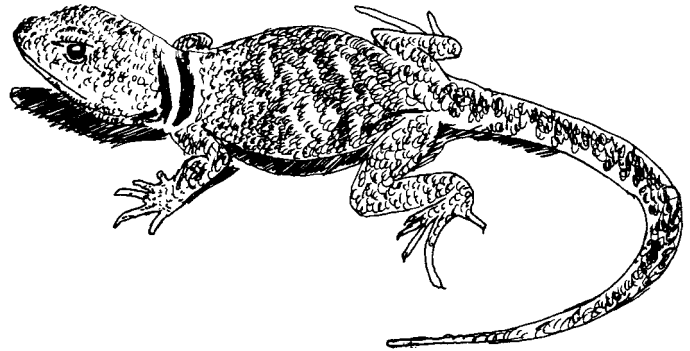
It's a lot of fun, and tiles and amphibians of Kansas. Contact the
the information you Kansas. Kansas Herpetological Society
gather could be useful For more information 1650 Melrose Lane
to the research of rep- about herps and herping in Wichita, KS 67212.

Can you identify and color the reptiles and amphibians in this picture?



Texas horned lizard

Collared lizard



Bullfrog

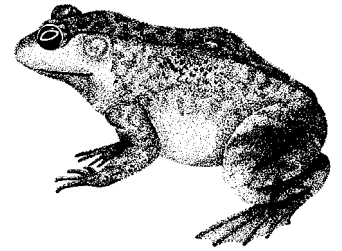
Ornate box turtle

Five-lined skink



by Mark Shoup

The Original TRANSFORMERS



If you were asked to recall one sound of summer nights, what would it be? Chances are, it would be the singing of frogs. Frogs have great voices, ranging from the high-pitched chirping of tree frogs to the deep bellow of the bullfrog. In fact, it is thought that the first animal ever to sing was the frog.

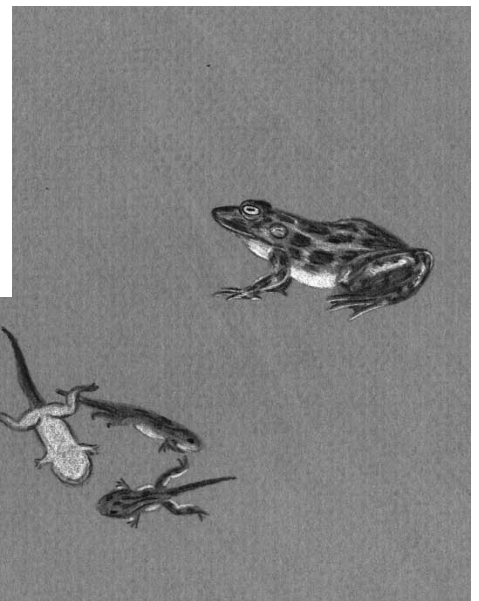
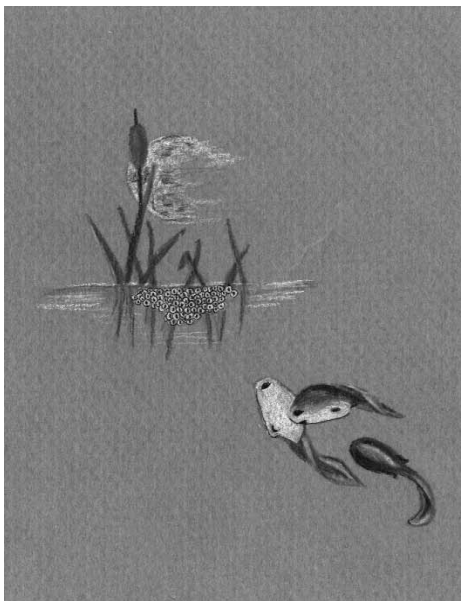
Like other amphibians

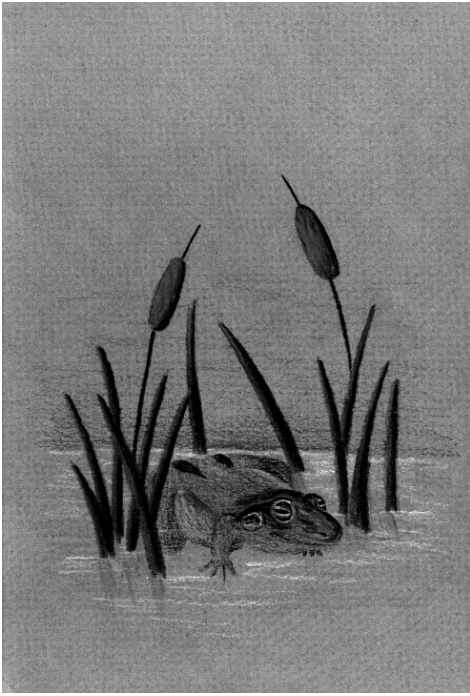
such as toads and salamanders, frogs start out life in a big way. A female bullfrog may lay as many as 50,000 eggs at a time. The male clasps to her back and fertilizes the eggs as they are spread into the water. Once the eggs hatch, one of the most amazing events in nature begins — metamorphosis.

(In the January/February issue of **Kansas Wildlife and Parks** [Page 43], you can read about metamorphosis in insects, but amphibians are the only animals outside the ins-

ect world that go through metamorphosis.)

In metamorphosis — which means, “change” — an animal transforms. For frogs, this begins when the eggs hatch into tadpoles, sometimes called polliwogs. The tadpole has a round head and a long tail, but no legs. It also has gills instead of lungs. Then the back legs appear,





followed by the front, and the frog body begins to form. Gills are traded for lungs. In its final stage, the tadpole looks just like a grown frog with tail. When the tail falls off, we have a full-grown frog, the original “Transformer.”

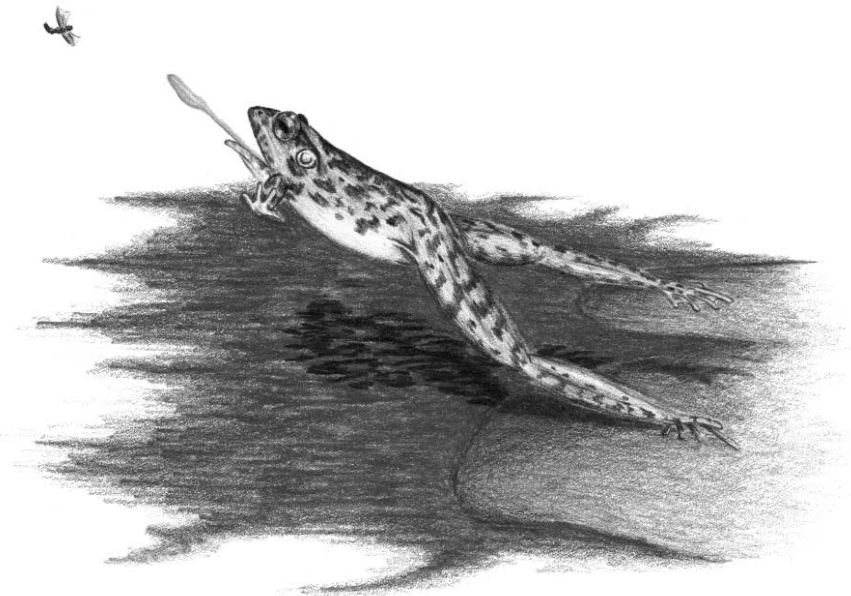
Frogs are fierce predators, and many can flash out their tongues several times the length of their own bodies to snatch prey. Insects are the preferred dish for frogs, but they will eat anything that moves, including small mammals like mice. Although they can go for

days or weeks without eating, when the bugs are around, frogs will eat constantly. This makes them very beneficial to man.

And yes, frogs can jump. Unlike their close relative, the toad, frogs’ legs are long and highly developed for jumping. A bullfrog — the largest frog in Kansas — can jump as far as three feet.

In Kansas, there are 16 species of frogs. Eight of these are tree frogs, and six are aquatic frogs. Two are microhylid, or narrow-mouthed, frogs.

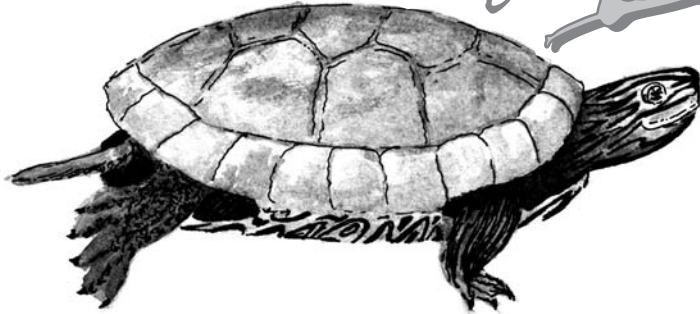
The bullfrog is probably the most well-known and popular frog in Kansas. As with all frogs, it is the male bullfrog that sings — primarily to attract a mate. In his case, however, the “singing” sounds more like a warning from a mad bull than a serenade. Besides its vocal strength and size, bullfrogs are also loved for their meat, especially the legs, which make fine eating. In fact, late summer and early fall — July 1-Oct. 31 — is bullfrog season.



by Mark Shoup

TURTLE

on ICE



The painted turtle gets its name from the colorful red markings on its lower shell. It is native to Kansas, but its range extends farther north than any other land or freshwater turtle. It survives even in southern Canada in winter.

In mid-summer, a painted turtle female leaves the water, locates a sunny place where she can dig a hole, then lays a "clutch" of about 10 eggs. The eggs hatch in two to three months. If the eggs hatch in the late fall when the weather is cold, the hatchlings do not dig themselves out of the nest. They stay put until the next spring. By staying hidden in the nest,

they avoid a harsh season of little food and hungry predators. However, they are not buried deep enough to avoid freezing ground temperatures.

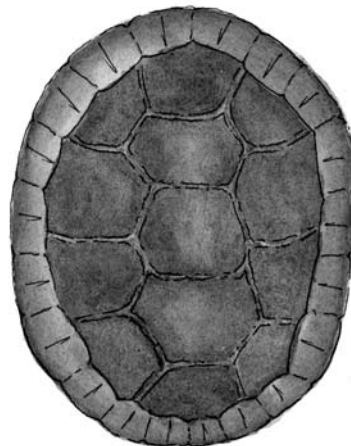
So how do hatchling

As the temperature drops, the turtles lose circulation. There is no muscle movement, breathing, heart-beat, or blood flow.

Special biochemical actions save the turtles at this time. Jagged ice crystals forming inside cells would tear them apart, but sugars within cells concentrate to form a natural anti-freeze. Outside the cells, the blood plasma is encouraged to freeze, but the inner cells remain healthy



BOTTOM



TOP

painted turtles survive freezing temperatures? Strangely enough, they freeze, but it doesn't kill them. Their body fluids stay liquid until it falls to 26 degrees Fahrenheit.

down to 18 degrees Fahrenheit. Amazingly, soon after thaw all the turtle's vital signs will return. After the hatchlings emerge and find their way to a river, pond or lake, they will never again be able to with-

stand such cold temperatures.

Adult painted turtles will spend the winter lying on the bottom or buried in the mud. They prefer water temperatures close to 40 degrees and shallow areas that warm quickly in spring. If the temperature falls too low, they will swim under the ice to a deeper pool and may bury themselves in 18 inches of mud.

Like other mammals that hibernate, adult turtles can slow their body functions to a fraction of their active state to survive the harsh winter environment. This reduces the use of body fuel to about one-tenth its normal rate. But even hibernating animals burn some energy, and most require oxygen to stay alive.

How do turtles get oxygen when they can't swim to the surface for a breath of air? Like frogs, aquatic turtles can get oxygen without breathing by direct exchange of oxygen from the water through their skin. There are times, however, when oxygen is absent under the ice or in the mud where the turtle is buried.

Then a different energy-generating system takes over the turtle's body. This

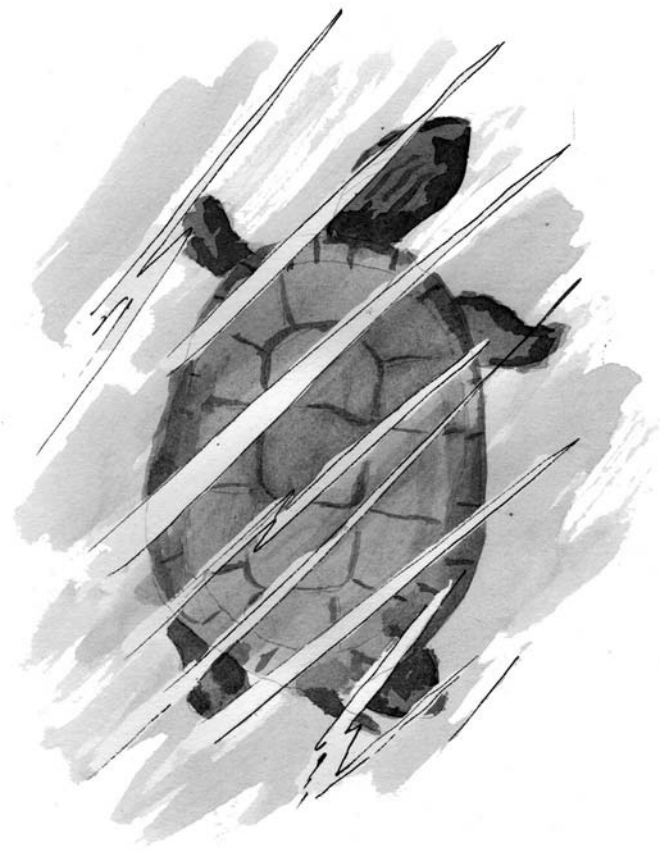
system doesn't require oxygen. It uses a fuel called glycogen that is stored in the turtle's organs.

Glycogen provides energy. In the process, lactic acid builds up in the muscles. This lactic acid can actually poison the turtle's cells. The turtle avoids this cell damage by releasing calcium and magnesium from its shell and bones into its bloodstream. These elements buffer the acid and prevent it from becoming poisonous.

The painted turtle's winter adaptations are of interest

to medical researchers who are trying to find ways to keep human organs healthy when they are being saved for transplant to other humans. They also hope study of painted turtles might reveal ways to treat humans who have become exposed to the cold too long (called hypothermia).

This winter, look closely when you are near a pond covered with clear ice. You might get lucky and see the rare under-ice movement of a creature that can survive where you can't.





nature's notebook

CHAPTER TWO

AQUATICS

WATER...

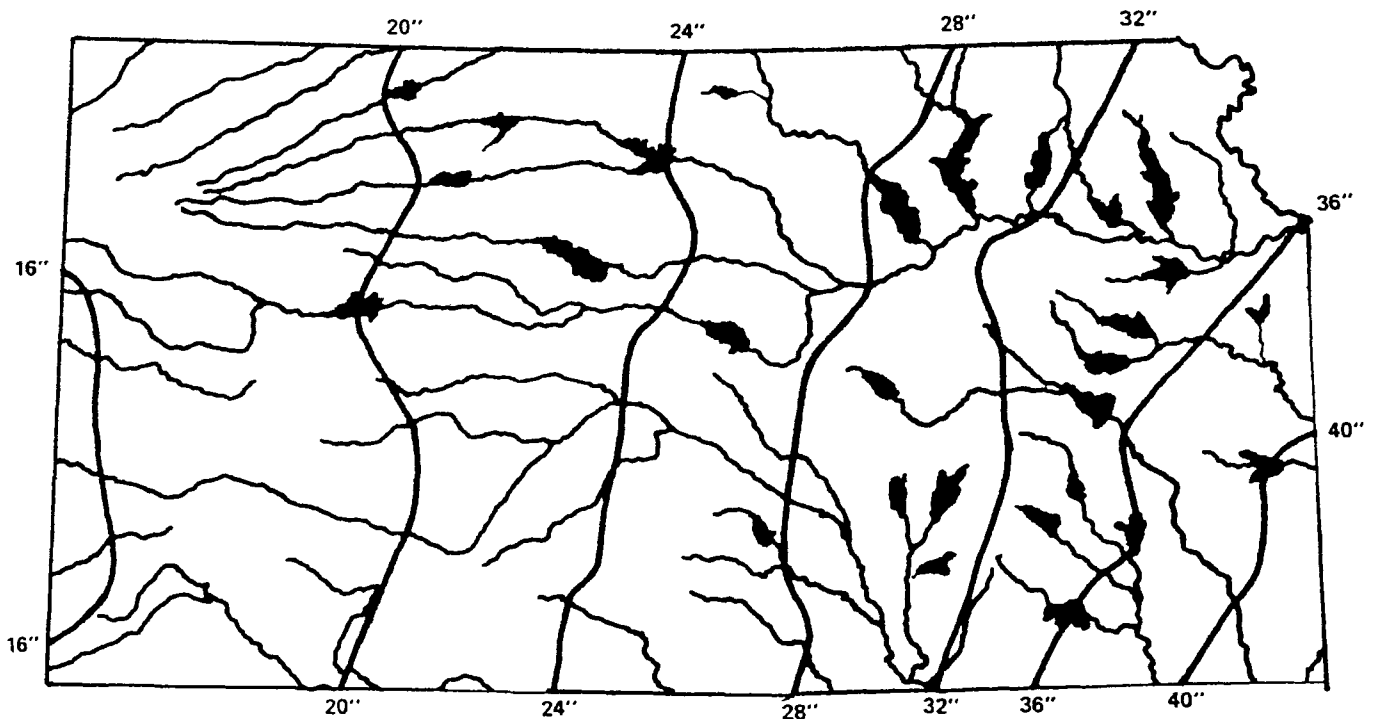
WATER- a resource essential for all life.

Kansans are growing more concerned about the availability of water in many parts of our state. Take it upon yourself to learn as much as possible about Kansas water concerns and possible solutions. **June is Kansas Rivers Month.**







Considering that Kansas was once described as "the great American desert", the state has a large number of rivers, creeks, lakes, and reservoirs. Label as many of these as possible. Investigate the quality and quantity of water in your county. What can and should be done to ensure

an adequate water supply for the future?

Rainfall distribution in Kansas varies considerably from east to west. The solid lines roughly designate, in inches, the amount of annual rainfall across the state. What other factors, besides rainfall, can affect the local water supplies?



JUNE



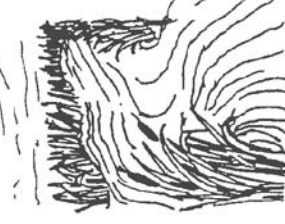

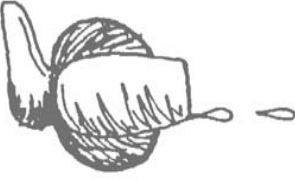
<p>"The frog does not drink up the pond in which he lives." -Indian Proverb</p>	<p>Nonrenewable natural resources - Resources that are not naturally replenished within the limits of human time. Is water a renewable or nonrenewable resource? Why?</p>	<p>June 8, 1908 President Roosevelt appointed a 49-member National Conservation Commission. The commission was charged with making a detailed inventory of the nation's forests, waters, lands, and minerals.</p>		<p>Renewable natural resource- Resources that are naturally replenished.</p>	<p>The Kansas Department of Wildlife and Parks sponsor a voluntary Boating Safety Education program. This program increases awareness of boating laws, safety, and ethics.</p>		<p>Ground water - Water found below the surface of the earth. How does ground water affect people and wildlife?</p>	<p>June 5, 1877. 100,000 shad were delivered to Topeka for distribution in the Kansas (Kaw) River. Trace the route of the Kansas River.</p>	<p>Aquifer - An underground layer of sand, gravel, or rock through which water can pass. Aquifers are recharged from percolation of surface waters. The Ogallala Aquifer underlies the High Plains.</p>	<p>June 14, 1867. Officials from Ellsworth and Salina reported major flooding of the Smoky Hill River. Which reservoirs are fed by the Smoky Hill River? What affects does flooding have on wildlife habitat?</p>	<p>June 20, 1782. The bald eagle was chosen as our national symbol. Where and when can bald eagles be found in Kansas? What is their major source of food?</p>	<p>June 30, 1903. Pratt County donated 12 acres for a fish hatchery. Individual donations were added later. Locate Pratt County. What species of fish are managed at the present Pratt Hatchery?</p>
<p>June 8, 1908 President Roosevelt appointed a 49-member National Conservation Commission. The commission was charged with making a detailed inventory of the nation's forests, waters, lands, and minerals.</p>	<p>Interbasin transfer - An expensive technique used to transfer water from an area of greater water supply to an area of lesser water supply.</p>	<p>Irrigation - Application of water to lands for agricultural purposes. Some different types of irrigation systems are: drip, fur-row, sprinkler, gravity, and surface.</p>	<p>Center-pivot irrigation - An automated sprinkler which irrigates a circular area by means of rotating pipe. This technique is common in Kansas.</p>		<p>The Kansas Department of Wildlife and Parks sponsor a voluntary Boating Safety Education program. This program increases awareness of boating laws, safety, and ethics.</p>		<p>Acid rain - Rain formed from two kinds of pollutants - sulfur dioxide and nitrogen oxides, which are primarily emitted from smokestacks and tailpipes. Burning of fossil fuels is the root of the acid rain problem.</p>	<p>June 26, 1804. Lewis and Clark reached the junction of the Kansas and Missouri Rivers, where they gathered information about the area. Mark this location on a map.</p>	<p>June 29, 1541. Spanish explorer Coronado crossed the Arkansas River near present-day Dodge City. How has the Arkansas River changed since 1541?</p>	<p>June 20, 1782. The bald eagle was chosen as our national symbol. Where and when can bald eagles be found in Kansas? What is their major source of food?</p>	<p>June 30, 1903. Pratt County donated 12 acres for a fish hatchery. Individual donations were added later. Locate Pratt County. What species of fish are managed at the present Pratt Hatchery?</p>	
<p>June 8, 1908 President Roosevelt appointed a 49-member National Conservation Commission. The commission was charged with making a detailed inventory of the nation's forests, waters, lands, and minerals.</p>	<p>Limnology - The study of the physical, chemical, and biological components of fresh water.</p>	<p>Hydroelectric - Having to do with the production of electricity by waterpower.</p>	<p>Center-pivot irrigation - An automated sprinkler which irrigates a circular area by means of rotating pipe. This technique is common in Kansas.</p>		<p>The Kansas Department of Wildlife and Parks sponsor a voluntary Boating Safety Education program. This program increases awareness of boating laws, safety, and ethics.</p>		<p>Acid rain - Rain formed from two kinds of pollutants - sulfur dioxide and nitrogen oxides, which are primarily emitted from smokestacks and tailpipes. Burning of fossil fuels is the root of the acid rain problem.</p>	<p>June 26, 1804. Lewis and Clark reached the junction of the Kansas and Missouri Rivers, where they gathered information about the area. Mark this location on a map.</p>	<p>June 29, 1541. Spanish explorer Coronado crossed the Arkansas River near present-day Dodge City. How has the Arkansas River changed since 1541?</p>	<p>June 20, 1782. The bald eagle was chosen as our national symbol. Where and when can bald eagles be found in Kansas? What is their major source of food?</p>	<p>June 30, 1903. Pratt County donated 12 acres for a fish hatchery. Individual donations were added later. Locate Pratt County. What species of fish are managed at the present Pratt Hatchery?</p>	

A WORD TO THE WISE

Twelve (12) months of calendars can be found thought out the pages of *Nature's Notebook*. Several vocabulary words will be discussed. See how much you know, before you read the entire book, by completing the exercise below. Check your answers with the calendars.

- | | | |
|-----------------------|---|--|
| A. Aquifer | ___ Living on or in an organism of another species. | ___ The study of fishes. |
| B. Arboreal | | ___ Ducks that prefer shallow water. They are surface feeders and take off nearly vertically. Also called dabbling ducks. |
| C. Bag limit | ___ Ducks that prefer deep water as in lakes and bays. They feed by going below the surface and take flight from a running start. | ___ The place in which an animals lives. It must include food, water, and cover. This involves escape cover, winter cover, cover to rear young, and space to move about. |
| D. Carrying capacity | | ___ The higher ground of a region; above the level where water flows. |
| E. Conservation | | ___ The study of insects. |
| F. Diving ducks | ___ A place where water is collected and stored for use. Kansas has approximately 25. | ___ Water found below the surface of the earth. |
| G. Entomology | | ___ The number of animals of a species that can be supported in a particular habitat at any given time. This number will change with the season, and from year to year. |
| H. Evapotranspiration | ___ The area drained by a stream. | ___ Wise use of natural resources. |
| I. Fossorial | ___ A wildlife sanctuary. | ___ Living in a marsh. |
| J. Ground water | ___ Living in or among trees. | ___ An underground layer of sand, gravel, or rock through which water can pass. |
| K. Habitat | ___ The study of birds. | ___ The study of reptiles and amphibians. |
| L. Herpetology | ___ The process of evaporation from the soil, plants, and animals, by which water is returned to the atmosphere. | ___ Living underground in a burrow or tunnel. |
| M. Ichthyology | ___ Living on the ground. | |
| N. Limnology | ___ The number of animals that may be harvested legally in a twenty-four hour period. | |
| O. Migratory | ___ Birds and other animals that make an annual trip to a different area. | |
| P. Ornithology | ___ The study of animals. | |
| Q. Palustrial | | |
| R. Parasitic | | |
| S. Puddle ducks | | |
| T. Refuge | | |
| U. Reservoir | | |
| V. Terrestrial | | |
| W. Upland | | |
| X. Watershed | ___ The study of the physical, chemical, and biological components of fresh water. | |
| Y. Zoology | | |

JULY

<p>"Drought, waste, and pollution threaten a water shortage whose impact may rival the energy crisis." - February 23, 1981 Newsweek "The Browning of America"</p>	<p>In some parts of the nation the quality of available water is of greater concern than quantity. We are only beginning to learn how to solve problems of surface water pollution.</p>	<p>"Water, water everywhere, but no a drop to drink." - The Ancient Mariner</p> 	<p>Water table - The upper limit of the ground water, or that level below which the soil is surfaced with water.</p>	<p>Water vapor - Tiny particles (molecules) of water in the air.</p>	<p>Hydrologic cycle - The process involving the circulation and distribution of fresh water on earth. Diagram this process.</p>
<p>Precipitation - Forms of water vapor heavy enough to fall to the earth's surface, such as rain, snow, sleet, hail, and fog.</p> 	<p>Transpiration - The evaporation of water from the leaves of plants.</p>	<p>Evaporation - The changing of water into vapor. Condensation - The changing of water vapor into liquid.</p>	<p>Evapotranspiration - The process of evaporation from the soil, plants, and animals, by which water is returned to the atmosphere.</p>	<p>Percolation - The downward movement of water through soil, or the passing of liquid through a porous, solid material, other than soil, such as limestone.</p>	<p>Infiltration - The process by which water seeps into the soil.</p>
<p>Wetland - Land areas saturated or covered by water at least part of the year.</p>	<p>River - A natural stream of water larger than a creek and emptying into an ocean, lake, or another river.</p>	<p>Pond - A small, enclosed body of shallow water permitting the growth of rooted plants across the entire bottom.</p>	<p>Marsh - A tract of low wetland supporting cattails, other reeds, and wetland wildlife. Bog - An area of wet, spongy, acid soil covered largely with peat and moss.</p>		<p>Prairie Pothole - Small marsh formed in shallow depressions left by glacial action.</p> 
<p>Desalination - The conversion of salt water to sweet water. A technique used to produce more drinkable water. Investigate other techniques, such as cloud seeding and iceberg harvesting.</p>	<p>Artesian water - Underground water trapped under pressure in a porous layer between non-porous rock layers.</p>	<p>The demands on water are numerous. Make a list of major uses. List them in order of importance in your opinion. Then list them in order of quantity of water demanded. How do your lists compare?</p>		<p>List as many uses of water as you can think of. How many of these are essential for your survival? What water conservation practices can you apply in your life?</p>	<p>"When the well is dry, we know the worth of water." - Benjamin Franklin Review the vocabulary words on both June and July calendars.</p>

by Joyce Harmond Deppenbusch

WETLANDS ARE NOT WASTELANDS



Contrary to popular belief, wetlands are not wastelands. The image of stagnant, mosquito-infested marshes that should be avoided has long plagued wetlands. Consequently, they have been drained, filled and rearranged to allow agriculture, industry, housing, and businesses to expand. Drought has also caused a reduction in the quantity and quality of wetlands.

Wetlands come in a variety of forms. They vary from cranberry bogs to prairie potholes to hardwood swamps. Some wetlands are wet only during part of the year. The appearance of the wetland depends on the environ-

mental conditions of the area. All forms of wetlands are essential wildlife habitat. In Kansas, wetlands such as Cheyenne Bottoms are home to a variety of plants and animals. Red-winged blackbirds perched on cattail stalks are a common sight, but there is so much more. Muskrats, mink, ducks, geese, deer, beaver, hawks, pheasants, bald eagles, falcons, bullfrogs, turtles, snakes, and salamanders are just a few of the wildlife species living in or near marshes.

Besides being valuable for wildlife, wetlands help people by reducing water pollution and soil

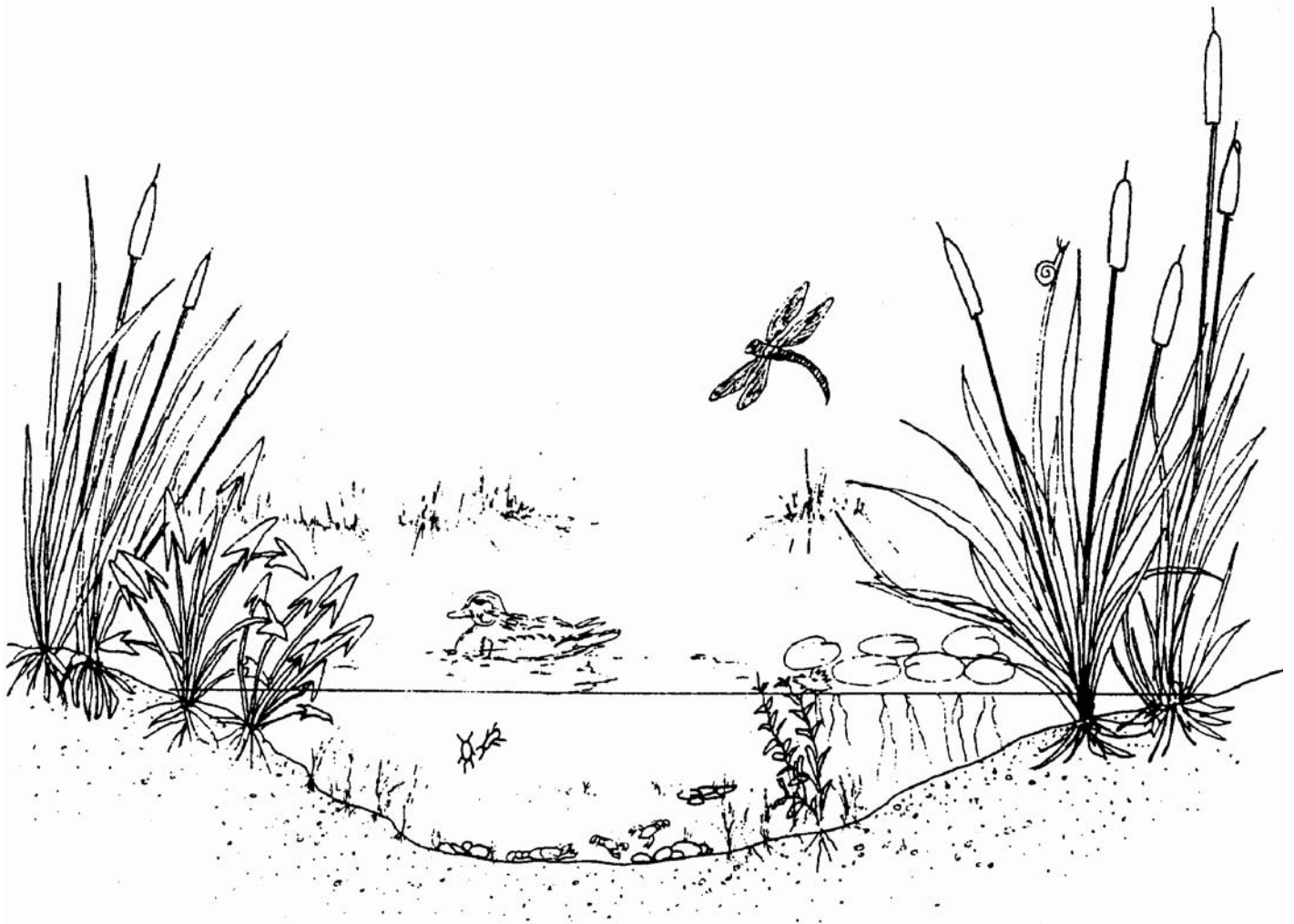
erosion, replenishing underground water levels and providing people a chance to see aquatic wildlife.

Managing a wetland such as the Cheyenne Bottoms Wildlife Area is a difficult balancing act between having too little or too much water, doing what's best for game and non-game species, trying to please all wildlife enthusiasts and staying within a limited budget. It's not an easy task, but an interesting one.

It is essential that the public be aware of how valuable wetlands are. You can help by telling people, including your legislators, more about this valuable natural resource.

WILDLIFE & WETLANDS

Color the wetland scene. Try to learn more about wetlands and the species that live there. Visit a wetland and see how many wildlife species you can find.



by Pat Silovsky

Spring and Summer at the Pond



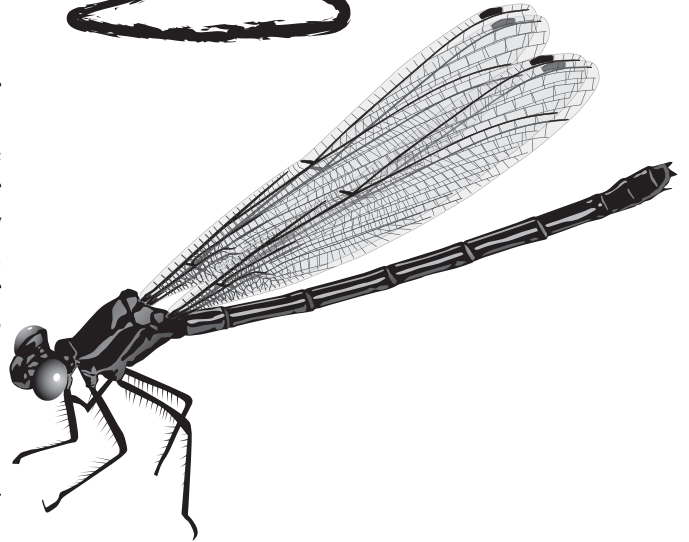
As winter comes to a close, the days start to get longer and daily temperatures rise. Increasing day length (photoperiod) is perhaps the strongest factor in bringing about the rebirth of spring. For some animals, the activity begins as early as February.

As the day gets longer, the pond's water slowly warms from the sun's rays. Activity abounds, and the pond becomes a musical theater as male amphibians and birds call to their mates. Photosynthesis begins again in earnest, and plants begin to grow. Microscopic invertebrates, such as daphnia, hatch from their wintering egg stage. Aquatic insects, including dragonflies, damselflies, whirligig

beetles, and water spiders reappear. Their presence means food for other hungry animals. Crayfish, salamanders, garter snakes, and others emerge from burrows.

Leopard frogs, bullfrogs, red-eared sliders, and painted turtles dig out from the mud. Crayfish and turtles begin to feed on dead plant and animal material, cleaning up the pond.

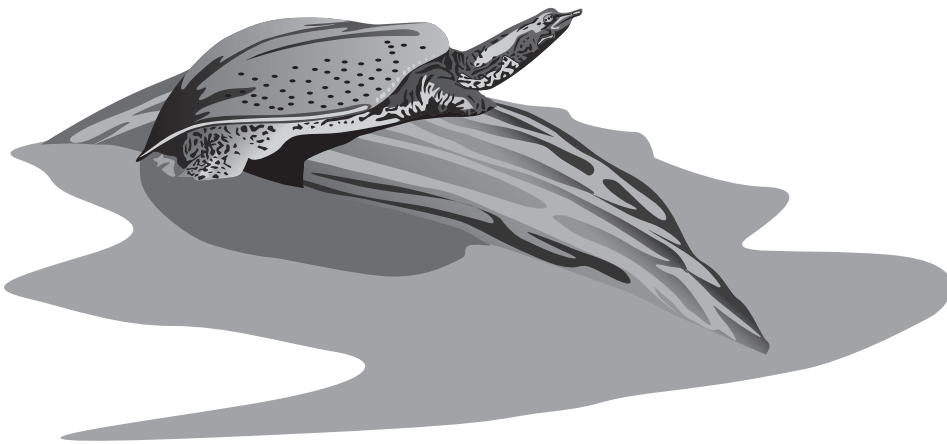
Migrating waterfowl and shorebirds return for the summer or just for a brief visit on the way to their summer range. Muskrats and rac-



coons enjoy the new variety of food the emerging life adds to their diets, including the sunfish that move from the deeper water to the warmer, shallow waters to feed and set territories for breeding.

Spring is the time when many animals mate and have young. With most of their food stores depleted by the winter's end, a warm spring with abundant food is essential for animals to survive the energy drain of reproduction.

As spring progresses, you can walk the shores of the pond and listen to the birds calling while you spot fish guarding their nests, frogs hiding among the aquatic plants, and turtles sunning on logs. Look closely; these animals are well camouflaged in their habitats because they are darker on top and lighter on bottom. The darker top makes it hard for a



predator looking down on the animal to see it against the dark pond bottom. Likewise, a predator looking up through the water cannot easily distinguish an animal with a light underside against the sun.

Even a turtle on a log can be hidden unless you pay close attention. They use the sun's rays to help them digest food. The warmth of the sun speeds digestion for the cold-blooded creatures. You can feel the energy of the sun much like a turtle does by sitting on a bench warmed by the sun, closing your eyes, and turning your face to the sun. Even on a cool spring day, you can feel the sun's warming energy.

Pick up some algae from the pond and swirl it around in a jar of pond water, remove the algae, and let the water settle. You can see the tiniest of the pond inhabitants that have emerged from their winter sleep: daphnia, rotifers, scuds, planaria, larval dragonflies and damselflies, and others. Some are easy to see with the naked

eye; others require close attention to spot their movement. Aquatic invertebrates (animals without backbones) may also be found on rocks or sticks. The pond teems with these tiny creatures, upon which so much other life depends.

When summer comes to the pond, the busy activities of food gathering and reproduction continue. Frog eggs can be found and birds can be seen on their nests or feeding their young. Goslings, hatched from a nest hidden in the tall grass, can be seen closely guarded from predators by the goose and gander.

Summer can be a very productive time for the plants and animals of the pond, but just as a very cold winter can mean death, so can a summer that is hot and dry. In the pond, drought and oxygen depletion spell disaster. Problems can occur when the sun's rays uniformly warm the pond's water. Warm water holds less oxygen than cool water. A lack of fresh water from little or no rain and uniform warming can

lead to an oxygen deficiency in the water.

This can be compounded by two other activities. As aquatic plants can become overgrown, the amount of dead plant material in the water increases. The microbes that help break down the dead plants use more oxygen, depleting the water's oxygen. The result is a stagnant, unproductive pond, and this may trigger a fish kill. Animals able to travel may leave the pond to find fresher waters.

To beat the heat of summer, some animals may enter "estivation," a type of summer hibernation in which body processes slow, requiring less oxygen and energy for survival. Turtles, frogs, and some invertebrates may bury themselves in the cool mud. Many insects with water-dependent larval forms will complete metamorphosis to the adult form. Many other animals will become nocturnal, coming out only at night. This allows animals such as snakes or lizards to hunt in cool twilight conditions.





n a t u r e ' s n o t e b o o k

CHAPTER THREE

BIRDS

BIRD ADAPTATION

What are birds? They are warm blooded animals with feathers for body covering. Their body temperature is much higher than man, about 104 degrees F. Their forelegs have evolved into wings and their bones are hollow and air-filled to reduce their weight to make them lighter for flight. The young are hatched from eggs.

Where do you find birds? Look for birds in wooded park areas, in bushes, trees, near hedges and on or near bodies of water. Certain birds can best be seen in the early morning, others in the early evening. Bird viewing requires patience and silent, slow movement. Sensitive ears and eyes are also essential. Beginners should learn from someone who knows birds by sight and sound.

In relation to their size, birds consume large quantities of food. What kind of food they eat is partially controlled by the shape of the bird's feet and beak. Here are a few examples. Can you match the description given below to the pictures of beaks and feet on the following page?



Seed Eaters:

Heavy, thick beaks for cracking seeds. Feet for perching. (junco, cardinal, and sparrows)

Peck and Pullers:

Sharp, slightly hooked beaks, more slender than Seed Eaters. Feet for perching. (robin and thrushes)

Mud Probers:

Slender, sensitive beaks. Long legs. (plovers and sandpipers)

Nectar Suckers:

Slender, tube-like bill. Feet for perching. (hummingbird)

Prey Catchers:

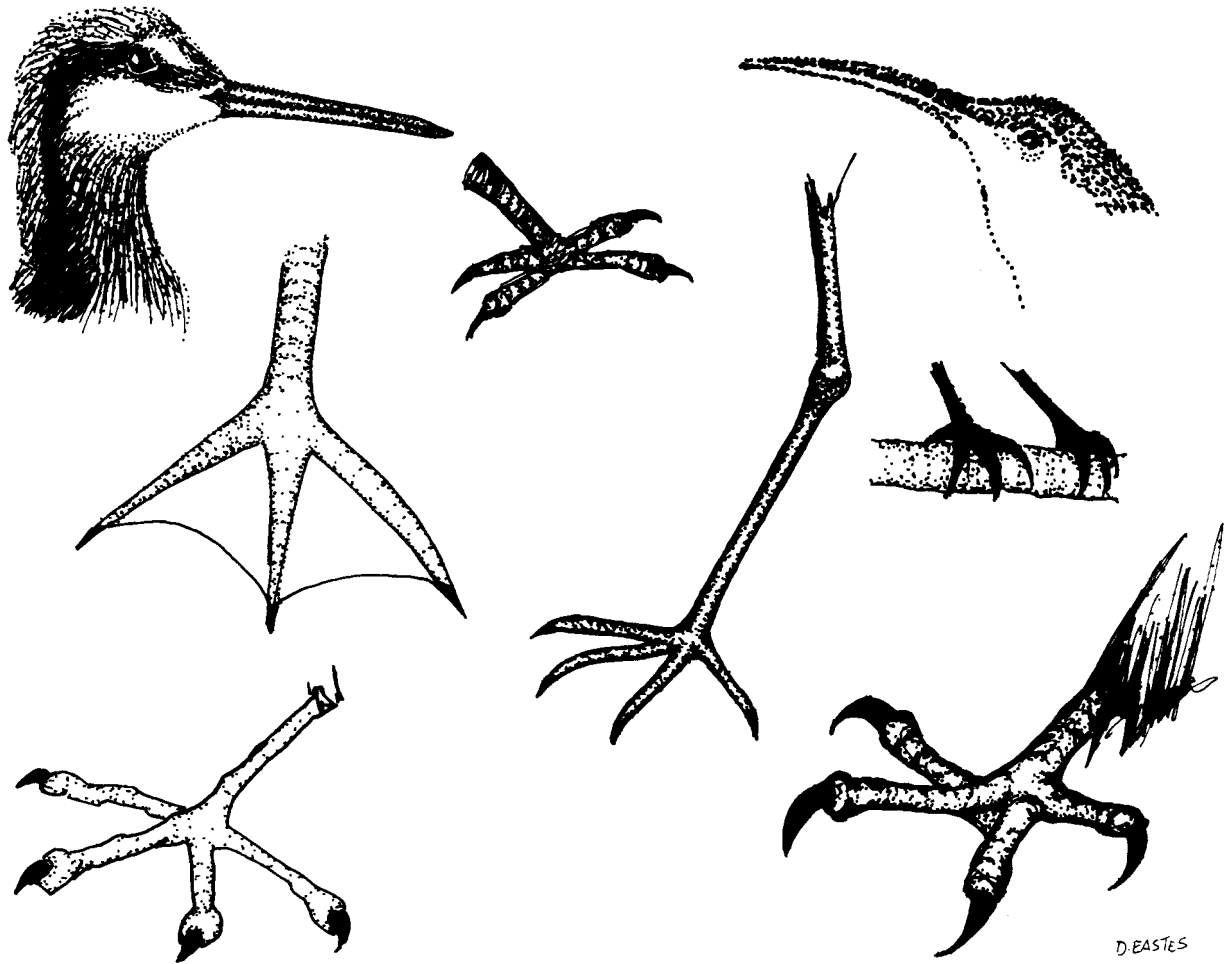
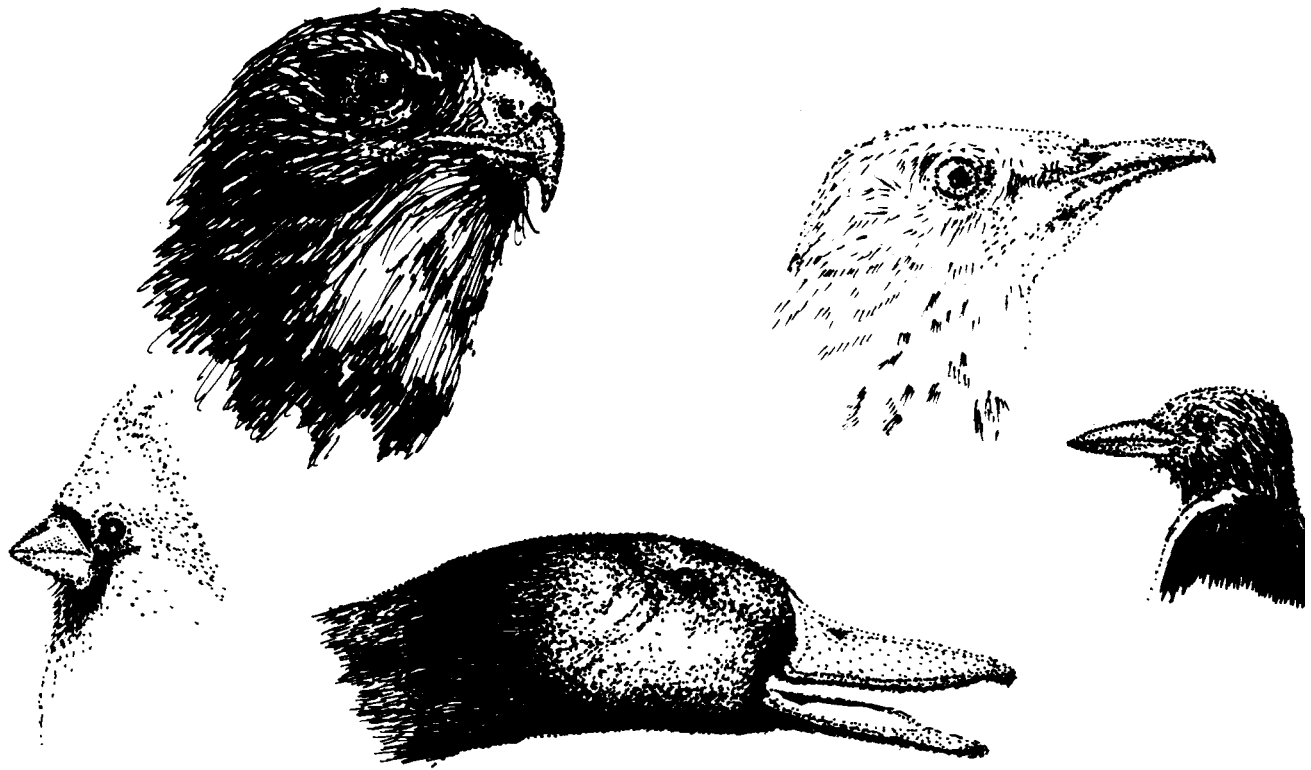
Strong hooked beaks for grasping and tearing flesh. Heavy claws and talons. (hawks, owls, and eagles)

Scoopers and Strainers:

Broad beaks notched at edges. Feet webbed for swimming and wading. (ducks, geese, and swans)

Drillers:

Chisel-shaped, sharp, strong, pointed beaks. Feet for climbing, two toes front and two rears. (woodpeckers and nuthatches)

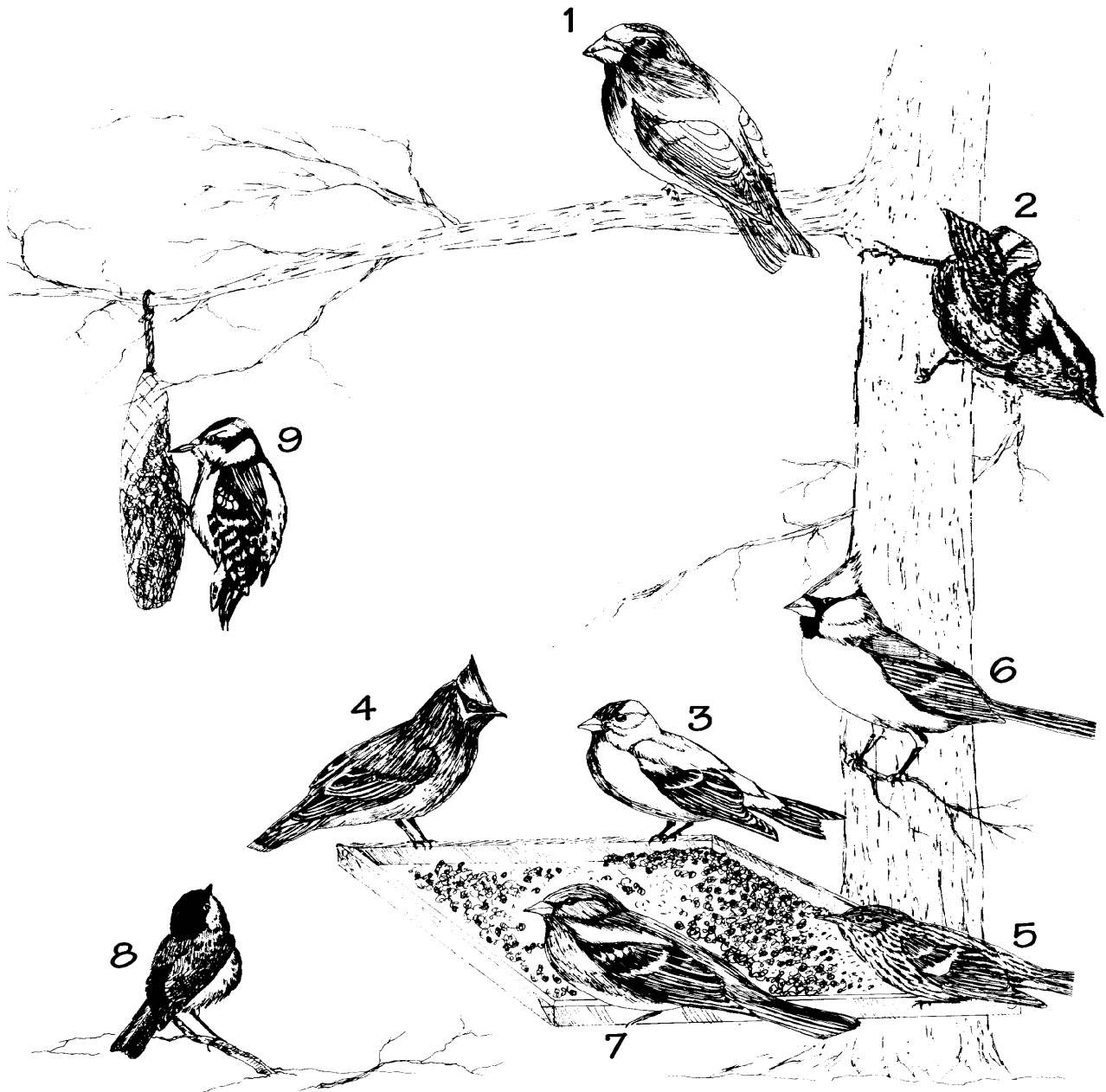


D. EASTES

BIRD FEEDER IDENTIFICATION

by Joyce Harmond Depenbusch

Identify the birds below. See how many of these birds can be found near your feeder. Check your answers by reading the next page.



1. Evening grosbeak

The male evening grosbeak has a bright yellow forehead and eyebrows with a gray body and white wing tips. The female is similar but grayer. The grosbeak has a short, heavy beak that is used to crack seed shells. Grosbeaks can be attracted to feeders with sunflower seeds.

2. Red-breasted nuthatch

The red-breasted nuthatch has a black cap on its head and a black band running through its eye. The upper body is blue-gray and its breast is pale rust. It often creeps downward headfirst on tree trunks while looking for food.

3. American goldfinch

The male goldfinch is bright yellow with a black crown, wings, and tail in the spring. In the winter, both male and female are grayish in color. They eat dandelion, thistle, and other plant seeds. The call is a cheerful *per chicoree*.

4. Cedar waxwing

Cedar waxwings are brown with a black mask. They get their name from the hard, red wax-like tips on the secondary wing feathers. They eat mostly fruit and insects and almost always feed in flocks.

5. Pine siskin

Pine siskins have brown streaked bodies with yellow patches on the wing and tail. They eat insects in the summer and seeds during the winter. Pine siskins emit a *tit-a-tit* call as they feed in small flocks.

6. Cardinal

The cardinal or “redbird” is the most readily identified songbird. The male is bright red with black around its beak. The female is yellow-brown. The cardinal has a heavy beak and eats insects, fruit, and weed seeds. Sunflower seeds at a feeder will attract cardinals.

7. Slate-colored junco

The junco is slate-gray on its back and upper breast. The lower breast is pale gray. In summer, the junco eats insects but changes to weed seeds in the winter. Its nickname is “snowbird” because blizzards don’t seem to bother them at all.

8. Black-capped chickadee

The chickadee’s crown, throat, and back are black. The outer margins of the wings are white. Insects and insect eggs are its main food. The bird is a common visitor to feeders, and its *chick-a-dee-dee-dee* call will help you pick it out in a crowd.

9. Downy woodpecker

The downy woodpecker is black-and-white streaked with black bars on its outer tail feathers. The male has a red spot on the back of its head. The downy looks much like its larger cousin, the hairy woodpecker. Downy woodpeckers eat insects but can be attracted to a feeder with suet.

by Roland Stein

Bird Feeders



In recent years, more and more people are discovering the simple joy of feeding birds. Ironically, as this public interest in feeding birds grows, more and more habitat for birds is being lost. Because of lost habitat, it becomes even more important for people to help supply food for birds during the fall-winter months.

Where to put the bird feeder? You need to place your feeder where there is shelter -- places where birds can remove themselves from the wind, rain, snow, and their natural enemies. Shelter can include natural trees, shrubs, thickets, brush, evergreens, and the remains of an old garden. It is best to have several feeders of various types in your area. Larger feeders are generally better than smaller ones. They can accommodate more birds, reduce territorial disputes and need not be filled as often.

What to feed the birds? A variety of food should be offered to birds. If you include most of the following in your feeder, the birds will receive the vitamins, proteins, fats, carbohydrates, and minerals to enable them to survive the cold months. You will also attract a greater variety of birds to the feeder. Once you start feeding birds, you must continue to do so until the natural foods, such as

insects, fruits, and grains become available again.

Yellow corn:

Crushed or cracked - supplies vitamin A and carbohydrates.

Millet, Sorghum, and Wheat:

Energy produces vitamins and carbohydrates.

Peanuts or Peanut Butter:

For protein. Too much peanut butter ingested at one time can suffocate some birds. Peanut butter should be mixed with suet (animal fat) using a one-to-one ratio.

Sunflower and Sunflower Seeds:

High in protein.

Bread:

For salt.

Grit and Crushed Eggshells:

For calcium and phosphorus.

A good seed mixture should include sunflower seeds in larger quantities than other seeds. It is the favorite of many birds. Watch out for some commercial mixes; they can be too high in millet and cracked corn.

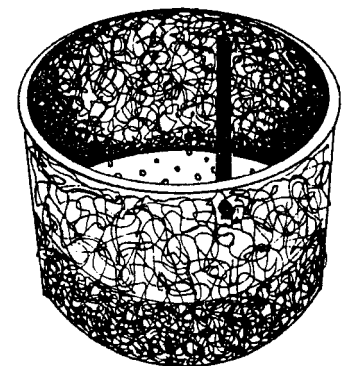
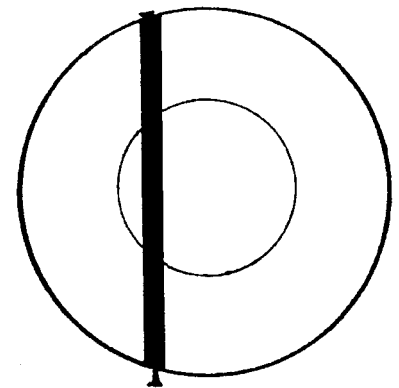
Here are some simple bird feeders you can construct from commonly discarded household items. Caution: children constructing these feeders should always be under adult supervision.

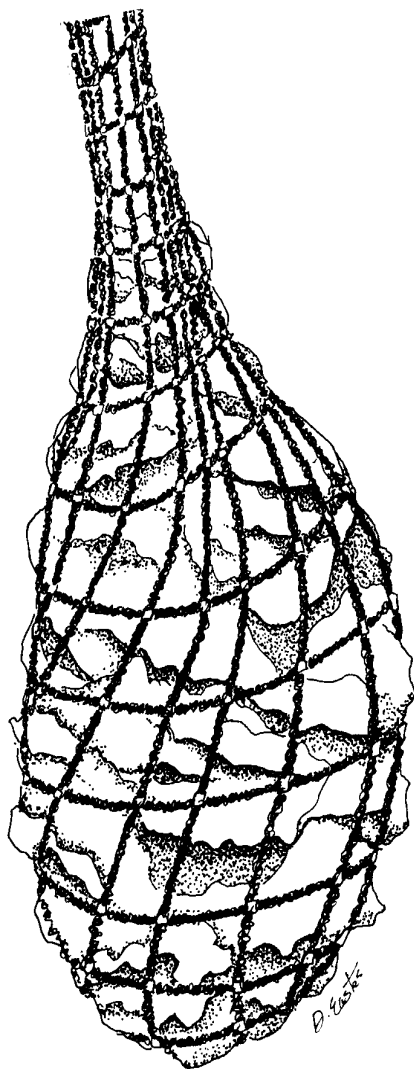
GRUB TUBS

Margarine or Butter Tubs

Larger tubs work best. Measure the distance across one-third of the tub. Cut a section of a dowel rod (one-fourth inch) the same length.

Attach the dowel rod inside the tub (about one-half inch down from the top) with screws. This simple feeder can be attached to most anything -- trees, windowsill, or bird houses.





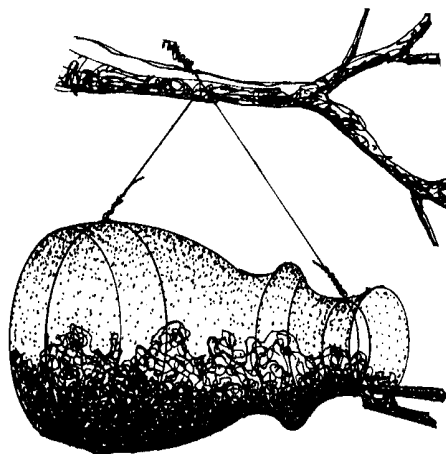
SUET SACK

Place suet (animal fat) into the sack and hang from a branch or attach to a tree. Plastic mesh bags from onion, garlic, and orange sacks work the best.

GENEROUS JAR

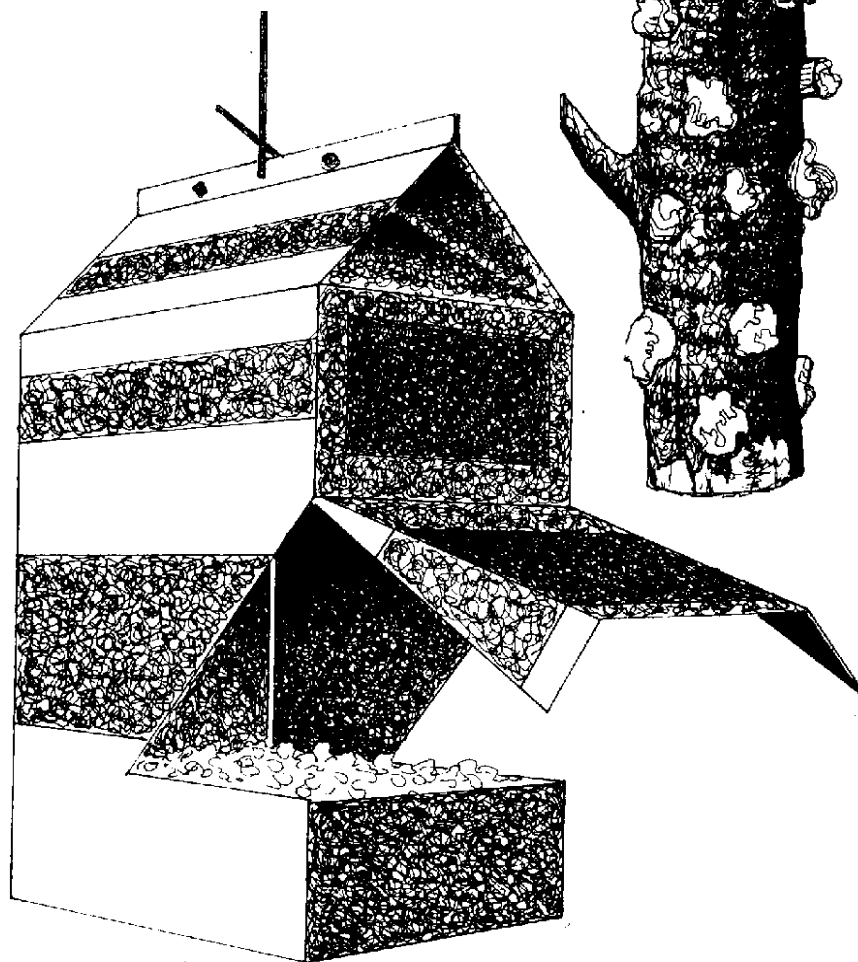
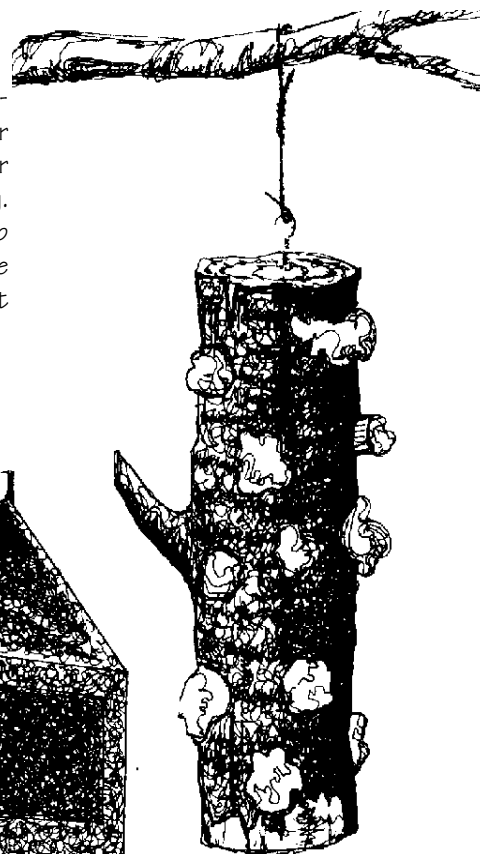
Fruit Juice Jar

Obtain a half-gallon fruit juice jar. Cut four-foot length of soft wire. Fasten one end around the neck of the jar. Use pliers to twist the wire tightly around the neck. Use the other end of the wire to wrap around the other end of the jar. Shape the hanger so the front of the jar tilts up slightly. Snap a clothespin to the lip of the jar for a perch. Fill the sunflower seeds and hang from a tree branch or roof overhang within viewing distance of your window.



LARD LOG

Obtain a three-to four-inch approximately two feet long. Either drill or chisel one-inch holes into the log or glue plastic bottle caps onto the log. Leave bark on so that birds can grip while climbing. Holes or caps can be filled with peanut butter and suet (one to one ratio).



MIGHTY MILKER

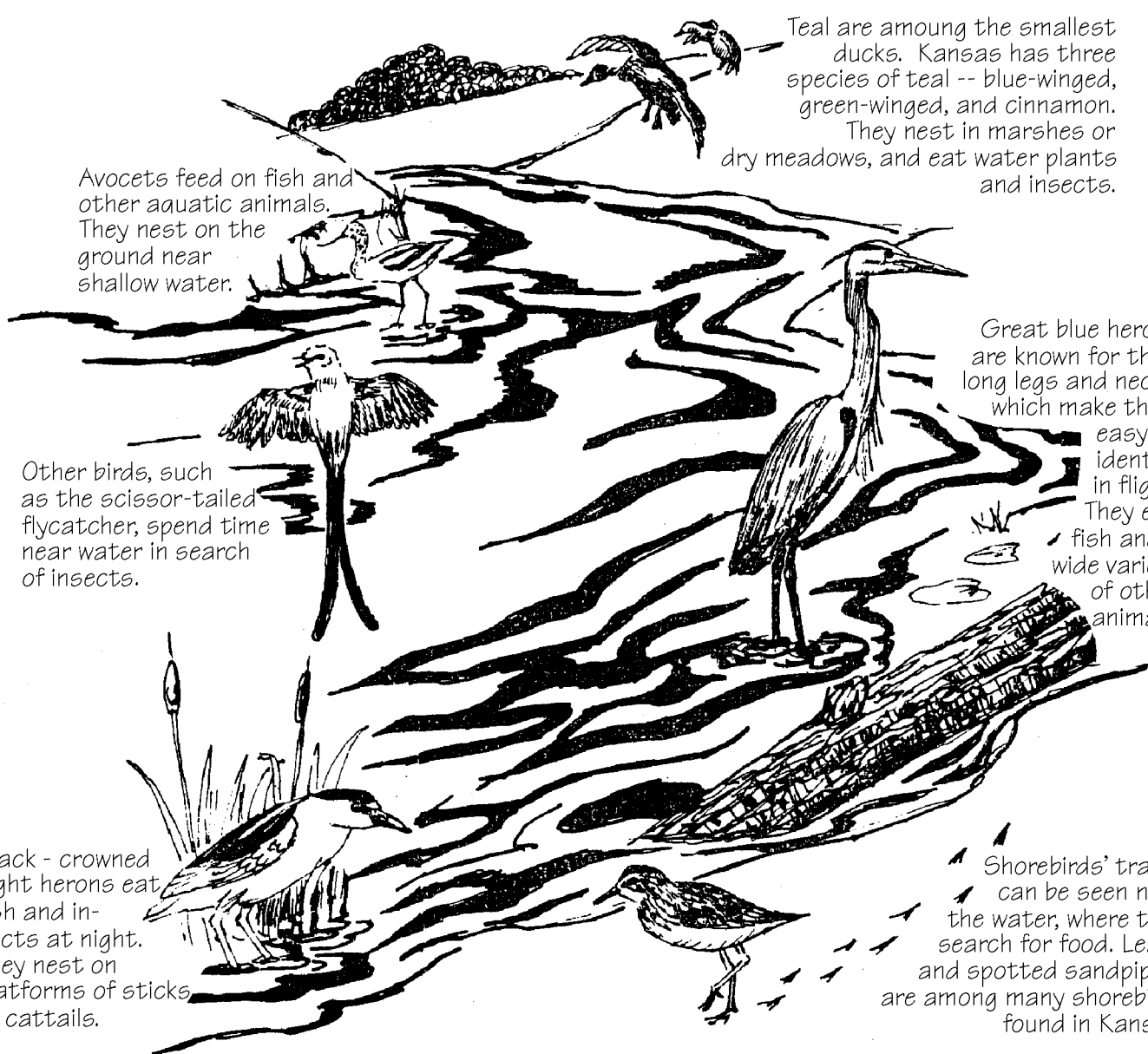
Half-gallon Milk Carton

Two inches from the bottom, cut across one side of the carton. Then, cut halfway through the carton on both sides of the original cut. From here, cut an angled slice back to a point six inches above the original cut. Make this cut on both sides. You now have a flap to lift and hook with a paper clip or wire. Stable top shut. Small holes in bottom will allow water to drain. Hang with a wire from branch or other handy spot.

by Joyce Harmond Depenbusch

BIRD WATCHING

By studying a small part of nature, we often can learn more than if we try to understand all of it. These pages focus on birds. Try the activities and see how much you can learn about the birds of Kansas. You may want to include reptiles, mammals, and other kinds of animals in your nature study.



Avocets feed on fish and other aquatic animals. They nest on the ground near shallow water.

Teal are among the smallest ducks. Kansas has three species of teal -- blue-winged, green-winged, and cinnamon. They nest in marshes or dry meadows, and eat water plants and insects.

Other birds, such as the scissor-tailed flycatcher, spend time near water in search of insects.

Great blue herons are known for their long legs and necks, which make them easy to identify in flight. They eat fish and a wide variety of other animals.

Black-crowned night herons eat fish and insects at night. They nest on platforms of sticks or cattails.

Shorebirds' tracks can be seen near the water, where they search for food. Least and spotted sandpipers are among many shorebirds found in Kansas.

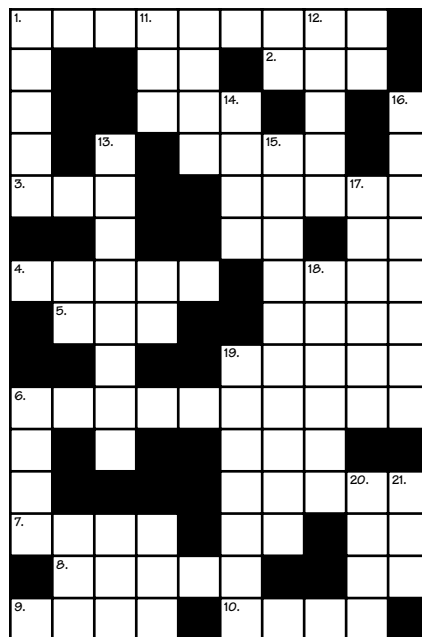
PUZZLED BIRDWORDS

ACROSS

- Another name for birds that spend time near the water's edge.
- A structure built from wood for birds to nest in.
- Birds, like other animals, use their eyes to _____.
- When the chick inside is ready, it will _____ from its egg.
- Most birds use their wings to _____.
- An instrument used by people to watch birds and other wildlife closely.
- A kind of bird found in Kansas. There are two species of this bird.
- Another name for a soaring hawk with broad, rounded wings and a broad, fanned tail.
- Some birds of prey, such as hawks and owls, eat _____, and are nature's traps.
- The place birds incubate their eggs is called a _____.

DOWN

- How a bird communicates.
- Another name for a bird bill.
- What a bird lays.
- A red-breasted bird we often see in towns.
- A young bird, not old enough to leave the nest, is called a _____.
- Birds eat seeds, insects, worms, mice, fish, or other plants and animals for their _____.
- The state bird of Kansas is the western _____.
- A bird's body is covered with _____.
- A bird of prey is called a _____.
- A large enclosure in which birds are kept.
- The American naturalist who is famous for his paintings of birds.
- To shed feathers.
- A nocturnal bird noted for its ability to turn its head 270 degrees.



Answers: Across (1) shorebird, (2) box, (3) see, (4) hatch, (5) fly, (6) binoculars, (7) kite, (8) buteo, (9) mice, (10) nest. Down (1) sings, (2) beak, (3) egg, (4) robin, (5) nestling, (6) food, (7) meadowlark, (8) feathers, (9) raptor, (10) avian, (11) owl, (12) owl, (13) owl, (14) owl, (15) owl, (16) owl, (17) owl, (18) owl, (19) owl, (20) owl, (21) owl.

by Mark Shoup

FEED me



Ever wonder what to do with yourself in winter?

Whether you live in a small town or a big city, you might like to spend some time behind a cozy window pane watching the antics of house finches, cardinals, bluejays, woodpeckers, and many other wild birds -- right in your own backyard.

Most people know that the easiest way to attract birds is to feed them. So this fall put up a few bird feeders to pass the time in winter. A few seeds and a little suet is all you need to start, and if you live near woods or brushy fields, you might lure a few birds the first day.



What you feed and how you feed it are important. Birds that feed on the ground -- such as finches, towhees, mourning doves, and juncoes --- like to pick through seed scattered on a bare spot in your lawn. You can scatter seed or let the birds do it when you put out a feeder.

Swinging feeders are okay for tree-feeding birds, but most prefer a sturdy feeding station. A gravity-fed feeder on a heavy metal "T-post" will work fine, but you might need Dad or Mom's help for this. Place the feeder within a few feet of trees or shrubs, especially evergreens, but not so close that cats and other predators can lie in ambush.

You can make one of the simplest bird feeders with a plastic

milk jug. Cut openings on each side and put a wooden perch through one corner. To make sure rainwater won't collect in the jug, you may have to poke small drain holes in the bottom. Fill this feeder with wild birdseed and hang it from a tree.

For smaller birds, coffee-can feeders work well. They keep the bigger birds and squirrels from hogging all the grub. Cut the bottom of the can out so that it's a hollow tube. Take two plastic coffee can lids, trace a 50-cent coin on each lid, and cut out the holes. Put the lids on the can and hang the feeder with a piece of coat hanger. Add a perch if you want.

Suet, or animal fat, is an important winter food for insect-

eating birds such as woodpeckers. Get beef suet from your local grocer. One of the simplest suet feeders is a plastic mesh bag from your grocery store. Just fill it with suet and hang it from a tree limb. You can also put suet in pinecones or in holes on a log. Or you can melt the suet and mix it with birdseed and oatmeal to make little cakes. For this, use the bottom



of a two-liter pop bottle for a mold.

When it comes to birdseed, it's hard to beat black-oil sunflowers. They're inexpensive, packed with protein, and loved by most songbirds. Combined with millet, another inexpensive grain, you have a near-perfect mix. Both can be bought at most local grain elevators in 40- or 50-pound bags. This is the cheapest way to buy seed.

Although not necessary, occasional raisins, apples, and other fruits will enhance your feeding operation.

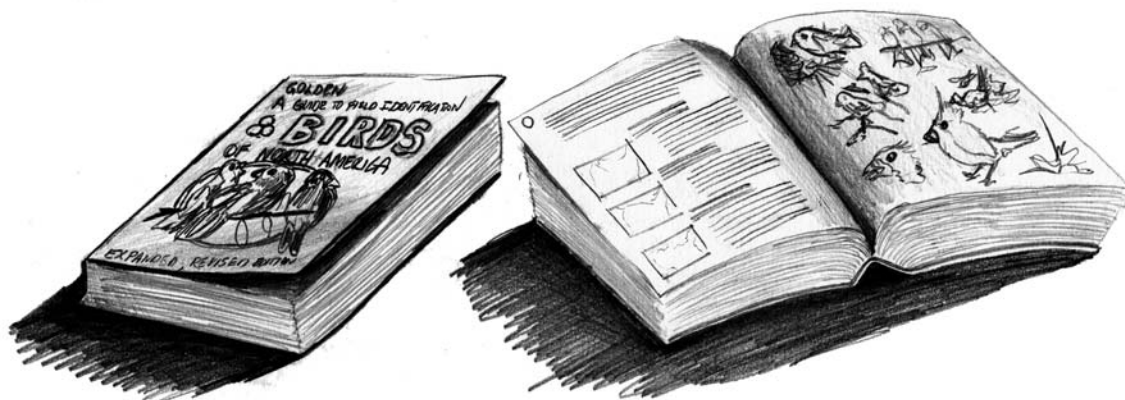
Whether you use store-bought or homemade feeders, keep the operation clean. Clear feeders and feeding areas of droppings every week or so. This will help keep the feeding area from spreading disease.

Birds were in Kansas long before humans, and they don't really need feeders to get them through the winter although feeding can help during really bad snowstorms. Mainly, we feed birds because it's fun and it gives us a great opportunity to learn



wild bird identification. The more wildlife species we can name, the more we appreciate them.

So put a few feeders out this spring and get yourself a bird identification book. Two good ones are Peterson's Field Guides: Eastern Birds and Golden Books' Birds of North America. Won't it be great next spring when you can amaze your friends by naming all those little birds that most people can't tell apart? And if you keep feeding through summer, you'll have year round entertainment.

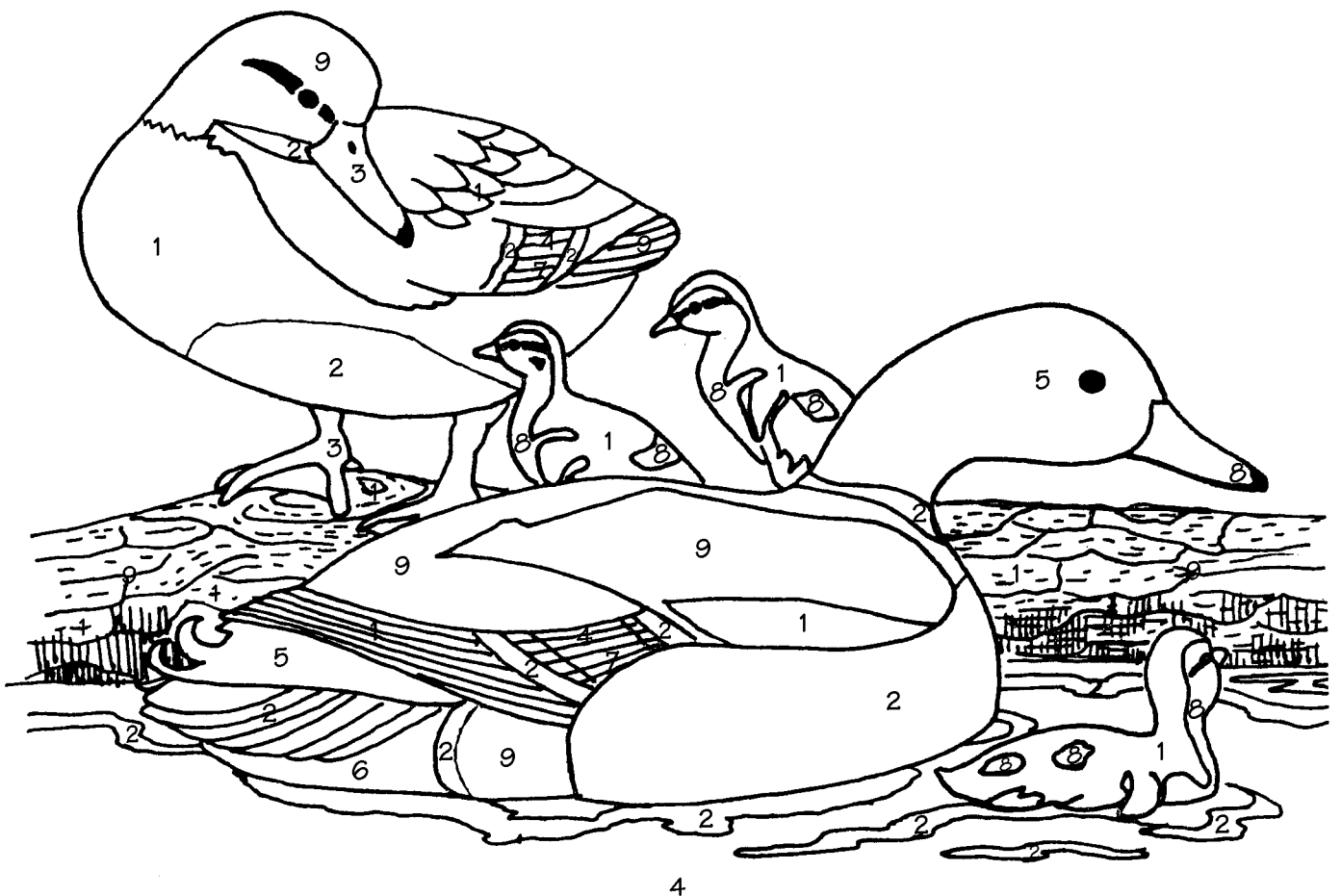


by Joyce Harmond Deppenbusch

THE MALLARD PATROL

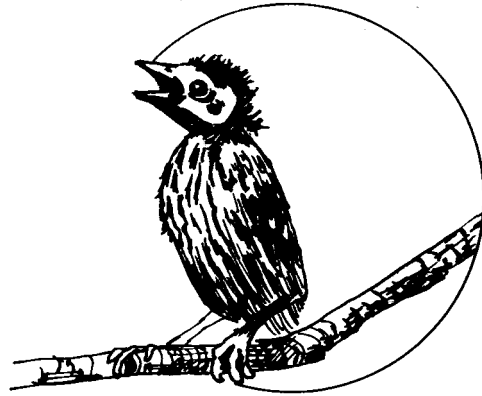
Color the mallard duck family by following the key below. The male, or drake, has bright colored feathers to attract a mate. The drab feathers of hens and checks make them difficult for predators to see.

- | | |
|-----------|-----------------|
| 1: brown | 5: green |
| 2: white | 6: black |
| 3: orange | 7: purple |
| 4: blue | 8: yellow |
| | 9: tan or beige |



ABOUT BIRDS

You may have been told that you eat “like a bird” because you didn’t eat very much, but some birds eat half their weight in food each day and baby birds eat more than their weight in one day. So, if someone tells you that you eat like a bird, you must have a really big appetite.

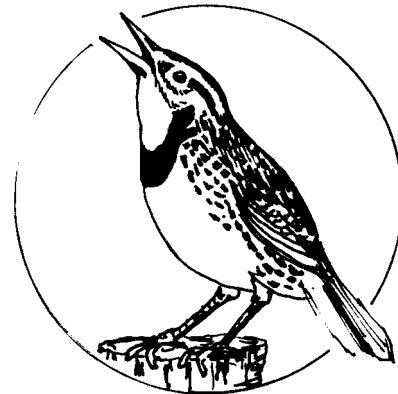


You may find a young bird that has fallen from its nest. And you might think that once you’ve touched it its mother will never return. That isn’t true.

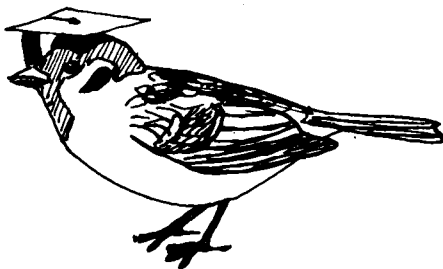
Carefully replace the bird in its nest. If you can’t find the nest, make one of grass near where you found it, and keep cats and dogs away from it.



In late winter, when the days slowly grow longer, we begin to hear birds singing. You might think it’s a sign of good weather. Actually it is the long days, with more hours of sunlight that cause the birds to sing.

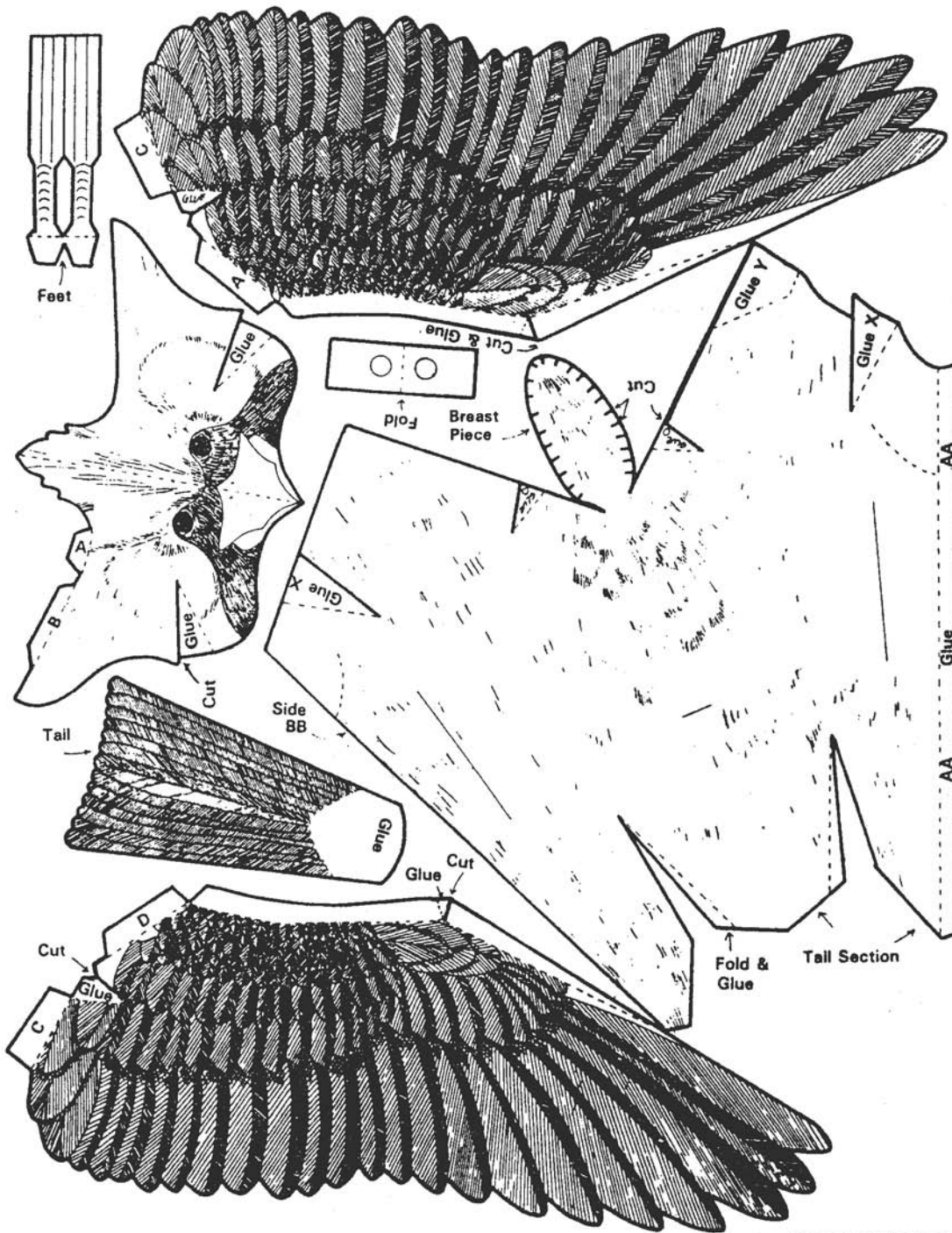


If you’ve ever been called a “bird brain”, you probably were insulted. You could take it as a compliment because birds have large brains for their small bodies.



by Joyce Harmond Depenbusch

CARDINAL



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CARDINAL MODEL

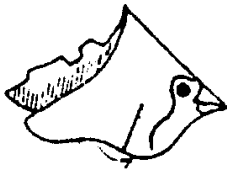
INSTRUCTIONS

1. Paste bird parts onto a piece of white construction paper.
2. Color or paint pieces of the model.
3. Following the Assembly Directions listed below. Construct your model. *Please be sure to read all of the Directions before you do any cutting or pasting.*

Assembly Directions

(Special Note: When working with the model pieces, cut along the solid black lines; fold the dotted lines.)

1. Fold headpiece on dotted line. Glue "cheek" tabs over the dotted line.



2. Glue back of neck of headpiece to tabs A and B carefully. It will form of curve. Keep a finger inside head to help hold the glued piece stable.

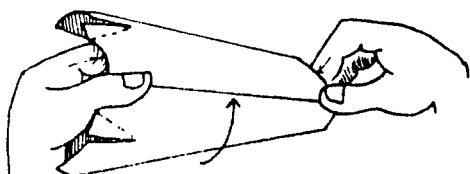


3. Fold tabs of feet down and curl feet with scissors or roll tightly around a pencil.

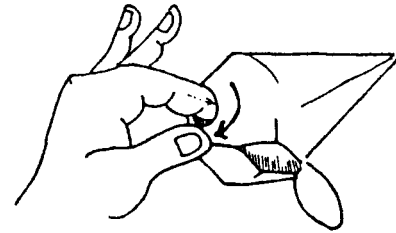


4. Fold dotted lines on wing carefully. 'Score' or draw on the dotted lines with a pencil first to make folding easier. Glue areas that are cut over to the dotted line. Tabs C and D fold under the wing. Wing will be curved.

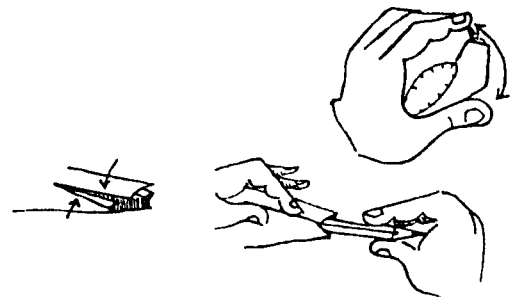
5. Roll body piece so that side 'BB' is glued over side 'AA' to the dotted line. Use both hands to hold piece until glue holds.



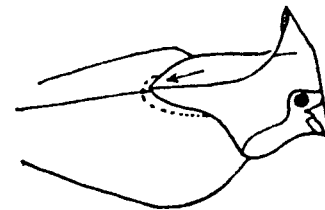
6. Glue tabs marked 'X' over the dotted line.
7. Glue the 'O' tabs same as 'X' tabs.
8. Glue corner flap over 'Y'. Body will form a cone shape.



9. Clip solid lines on breast piece and glue piece over the hole. Clipped edges allow for 'shaping'. You may have to squeeze the body gently until edges are glued tightly.
10. Fold tail sections on dotted lines and glue them to edges of upper tail. You may need to use a pencil to help hold the parts together.



11. Slide tail in and glue top to tail matching the shape of dotted line. Glue bottom section to tail also.
12. Glue headpiece to body. Match the back neck section to the dotted lines on the back.



13. Glue wing tabs 'C' and 'D' to solid line on the back. Press gently (tabs under wing) until glue holds. It may take a few minutes.
14. Glue the feet tabs to the solid line on the cardinal belly.
15. Fold hanging tab, punch holes, and glue tab to the back right behind the headpiece. Let glue dry completely before hanging.

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by Joyce Harmond Depenbusch

DUCKS AND DECOYS

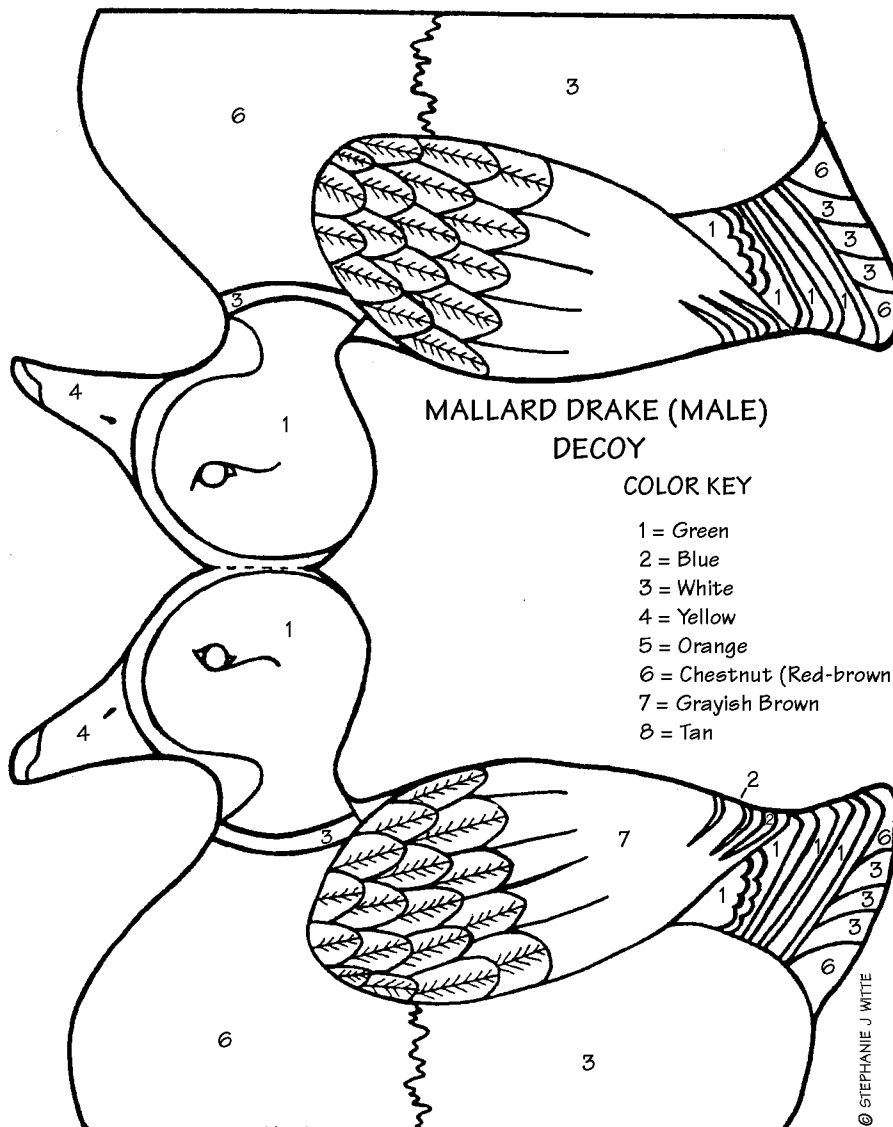
Decoys are duck likenesses that are used to attract birds into an area. American Indians made the first known waterfowl decoys over 1,000 years ago. The head and body were made of woven and tied bulrushes and reeds colored with pigment. Feathers were tucked

into the body to make a fairly lifelike canvasback duck. These first decoys were found in Lovelock Cave, Nevada in 1924.

Decoys have advanced from reeds, mud and skins to wood and plastic, but they still attract ducks. Decoy carving has expanded to an art with

beautiful models of birds as the end product. Below are two duck decoy models that can be colored to look like the live bird. Trace or make duplicate copies of the decoys and reinforce the back of the model with construction paper if necessary.

The male mallard is nicknamed "Greenhead." Mallards are the most common kind of duck, and are found in all flyways. The adults weigh about 2 3/4 pounds and are about 24" long. Mallards often feed in flocks in early morning and late afternoon in farm fields, spending nights in marshes and creeks. They eat insects, grain, and other vegetation.

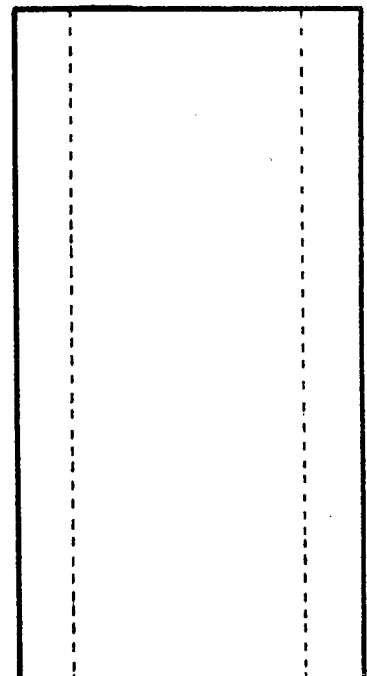


MALLARD DRAKE (MALE)
DECOY

COLOR KEY

- 1 = Green
- 2 = Blue
- 3 = White
- 4 = Yellow
- 5 = Orange
- 6 = Chestnut (Red-brown)
- 7 = Grayish Brown
- 8 = Tan

BASE FOR MALLARD

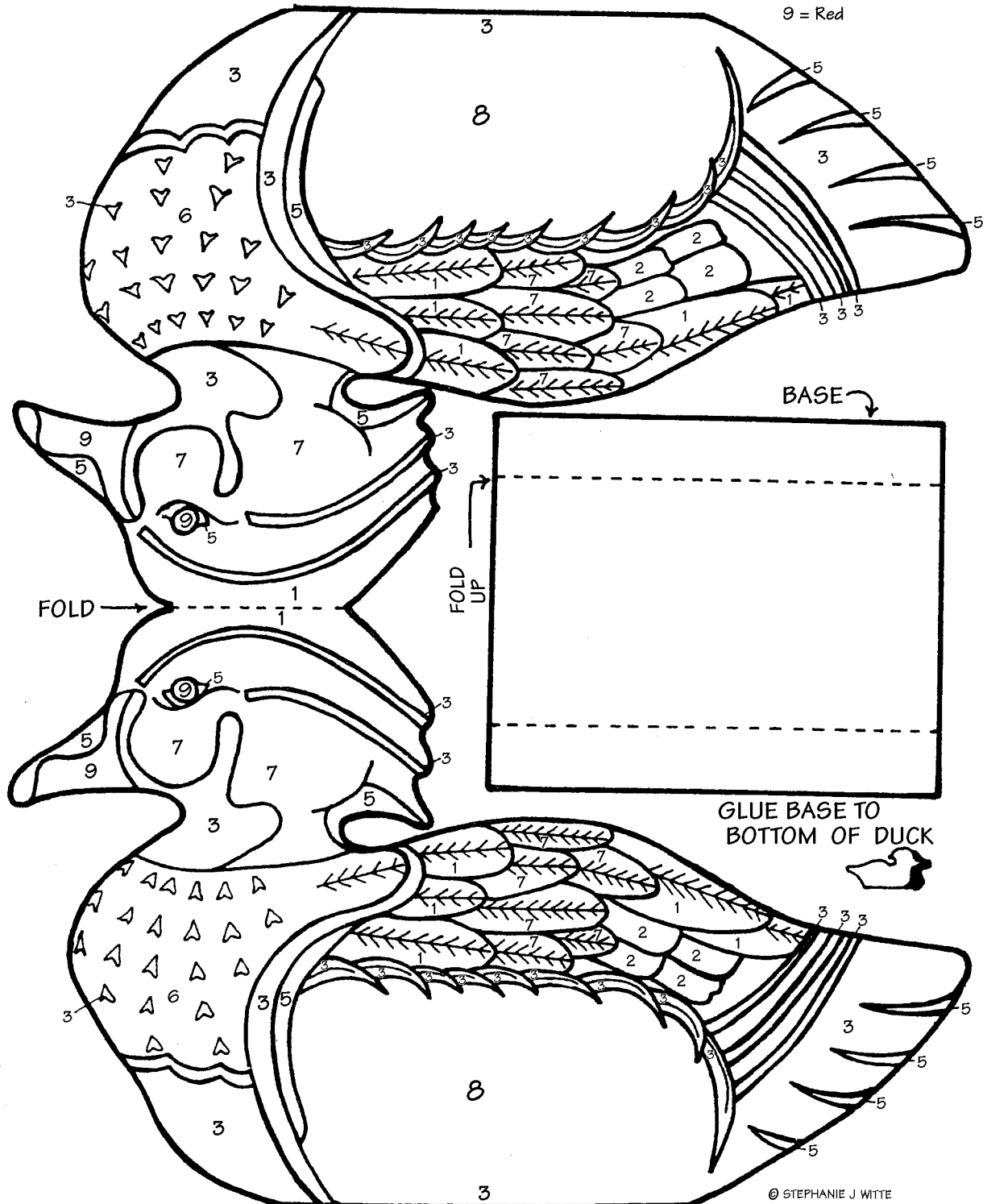


Wood ducks have beautiful plumage and are nicknamed "Woody." They can be found in all flyways, often near wooded streams and ponds. They are able to fly through thick timber easily. Food for the wood duck includes acorns, insects, berries, and other vegetation. The average adult weighs about 1 1/2 pounds and is 18 1/2 inches long.

WOOD DUCK DRAKE (MALE) DECOY

COLOR KEY

- 1 = Green
- 2 = Blue
- 3 = White
- 4 = Yellow
- 5 = Black
- 6 = Chestnut (Red-brown)
- 7 = Purple
- 8 = Tan
- 9 = Red



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Ducks

by Mark Shoup



Probably no group of birds is more fun to watch than ducks. These playful, sociable creatures have inspired great naturalists like John James Audubon as well as cartoonists such as Walt Disney. Of all birds, ducks are perhaps the most “cuddly.”

But it is duck behavior that is most fascinating. Just the fact that they congregate in large groups makes them fun to watch. Anyone who has ever hidden in a marsh at dawn knows what it is like to be surrounded

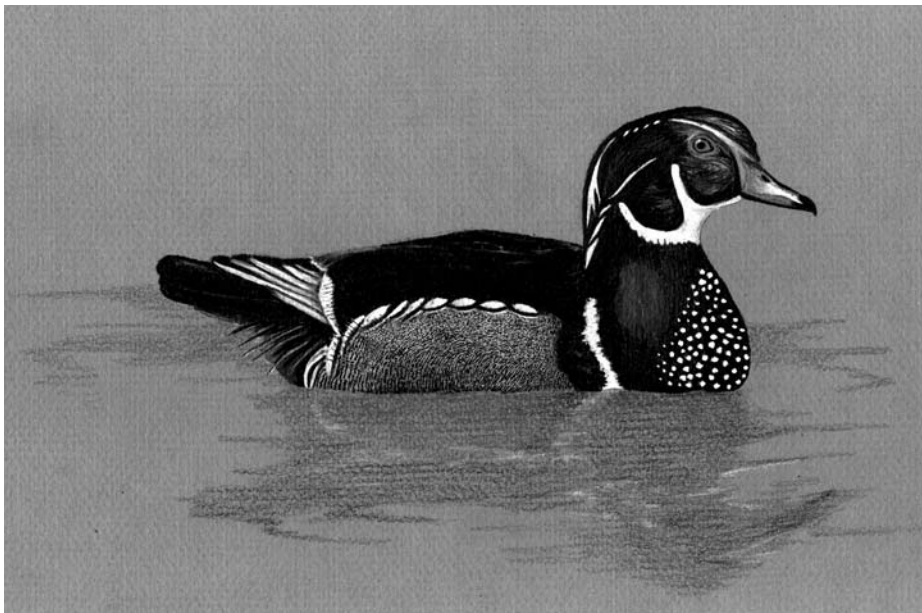
by mallard cackles, wigeon whistles, gadwall quacks, the busy splashing of wings, and the constant rush of wing beats overhead.

Perhaps the most amazing duck behavior, however, is migration. Each fall and spring, ducks migrate thousands of miles. In winter, they spend their time in the warmer climates of Central America. As the weather warms, they head north for breeding grounds in the northern United States and Canada. It is during this time of migration that duck habitat -- places with food,

water, and cover -- may be most important. Migration takes an incredible amount of energy, and if food supplies are not plentiful during these journeys, ducks may die or lack the strength to breed.

Kansas is very important for migrating ducks in the Central Flyway. Our state is the halfway point on their journey. Kansas also has many temporary wetlands, called playa lakes, which provide necessary food and resting places, especially in wet years.

In late summer, just before they gather in groups to fly south (called “staging”), ducks molt. They lose their primary flight feathers and actually go through a short period when they cannot fly. While this is a dangerous time for them, it also gives them stronger new



Puddle Ducks



feathers for the flight south and the return flight in spring. For several weeks after the molt, the male and female of a species will look very much alike.

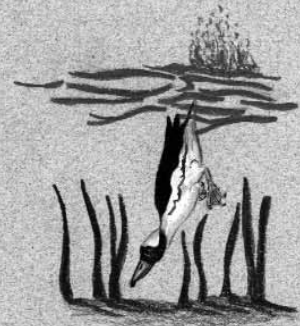
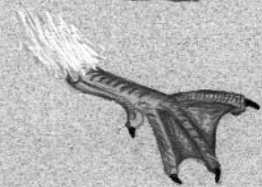
Another thing that makes ducks so cool is their variety of species. In the Central Flyway, there are two basic kinds of ducks -- puddle ducks and diving ducks. Like their names suggest, puddle ducks like shallow water and diving ducks prefer deeper ponds. Puddle ducks tip their bottoms up to feed and rarely dive. Diving ducks, on the other hand, will disappear beneath the surface for several seconds before re-appearing, perhaps several yards away.

Puddle ducks include mallards, wigeon, pintails, and teal. Diving ducks include redheads, canvasbacks, and buffleheads.

In the late 1800s, hunting was not controlled, and ducks were slaughtered for large markets in the eastern U.S. and Europe. Because of this, some hunters helped pass conservation laws in the 1920s and 1930s that helped protect ducks from over-hunting. However, destruction of wetlands proved to be just as great an enemy of ducks, and in the 1970s and 1980s, their numbers dropped again.

In the past two years, however, duck populations have skyrocketed. The reason? Heavy rains in their northern breeding grounds combined with new habitat. A government program called the Conservation Reserve Program created most of this habitat. However, this program has not guaranteed that duck populations will remain strong. This year, the U.S. Congress will decide whether to continue this important program.

Diving Ducks



by Mark Shoup

Birds of a Feather



MALLARD WING
(SPECULUM) FEATHER

Everyone loves to watch birds fly. Everyone knows that feathers make flight possible, but did you know that birds lose some or all of their feathers each year? This is called “molt,” and some birds may molt two or three times a year.

All adult birds molt at least once a year, and new feathers are grown. This is called a “pre-basic” molt and usually occurs after the breeding season. In

most birds, molting feathers are lost a few at a time, allowing the bird to continue flying. Ducks and other waterfowl, however, lose all their basic feathers at once, leaving them flightless for three to five weeks each summer.

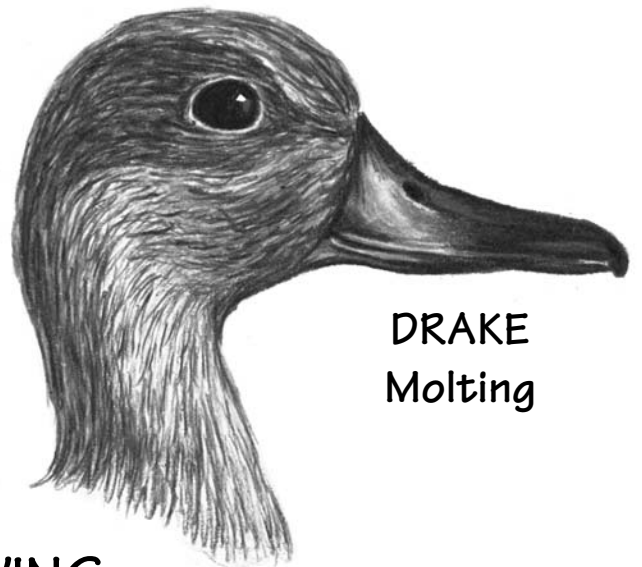
Their more colorful body feathers are also lost, leaving males and females looking much the same. Some biologists believe the dull feather color of this period makes it easier for

both male and female ducks to hide from predators.

There may be a good reason that ducks molt after breeding. Feathers weigh as much as 12 percent of a bird’s body weight, so it takes a lot of energy to replace them. Ducks usually breed in late spring, and during the summer molt, there is always plenty of food around. Also, they have already spent the energy necessary for breeding and raising a brood.



DRAKE
Breeding Colors



DRAKE
Molting

GREEN-WING
TEAL

TURKEY Wing Feathers



But why do birds molt in the first place? The answer may be simpler than you think. Throughout the year, the tips of feathers wear away or break off as they rub against trees, grass, the ground, and other things in the environment. Entering and leaving a nest also causes wear and tear on feathers. Thus, replacement feathers become as necessary as changing worn out tires on a car.

Now we know that ducks and other birds lose their feathers, and why. But what triggers the molting process? Biologists believe there may be several things that cause a duck's body to begin molting feathers. Changes in the length of the day may be one factor. Longer days, when birds are exposed to more light, may cause glands inside the body to produce hormones that trigger molt. Sex hormones may also play a part because waterfowl molt after breeding. In fact, birds that fail to breed successfully often molt early.

Because feathers are so important for insulation and flight, birds spend a lot of time caring for them with their bills. This process, called "preening," cleans and straightens the feathers as they get dirty or bent. Ducks and other waterfowl have especially active oil glands just above the tail that they use to waterproof their feathers, an important feature

for a bird that spends most of its time in the water.

Despite all the preening and waterproofing a duck can do, its feathers still get ruffled. Worn out feathers are replaced each summer, and healthy new ones are grown for the long migration to wintering grounds in the south. Once spring rolls around, the birds are in full color as they migrate back north to breed.

BLUE-WING TEAL





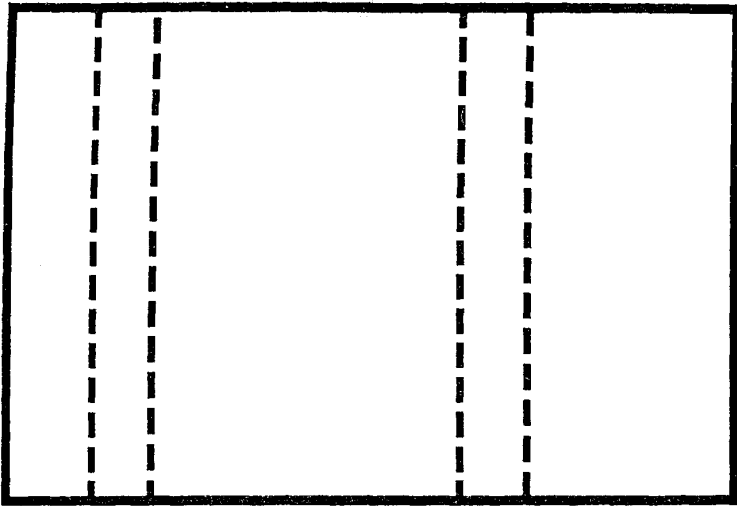
MAKE A MOVING PICTURE OF DUCK IN FLIGHT
BY FOLLOWING THE DIRECTIONS BELOW.

MATERIALS NEEDED: SCISSORS, STRAW OR PENCIL, TAPE, EMPTY
MATCHBOX, OR PATTERN ON FOLLOWING PAGE.

REINFORCE THE PICTURES
WITH TAB BOARD OR HEAVY CONSTRUCTION PAPER.

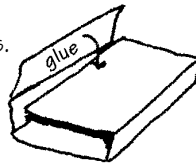
DIRECTIONS:

1. Cut out all picture cards along the thick black lines.
2. Put the pictures in order from one to ten as shown in Diagram 1.
3. Tape the pictures in place with two strips of tape. Make sure the tape is pressed firmly in place.
4. Firmly tape a straw, pencil or stick to the back of Picture Number One.
5. Carefully slide the taped cards into the matchbox, or assemble the container on the following page by cutting on solid lines, folding on dotted lines.
6. Tape Picture Number 10 onto the box as seen in Diagram 4.
7. Use your moving picture by pushing the handle up and down.
Can you see the duck flying high?



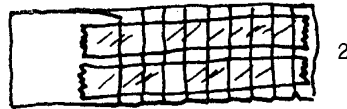
matchbox pattern

Cut around black lines and fold outward on dotted lines.

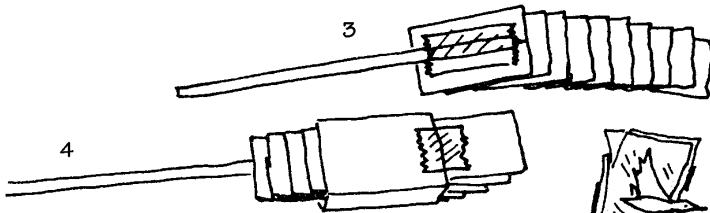


HOW TO MAKE IT FLY:

1. Cut out all ten picture cards along the thick black lines.
2. Line them up carefully in order from one to ten, as in this picture.

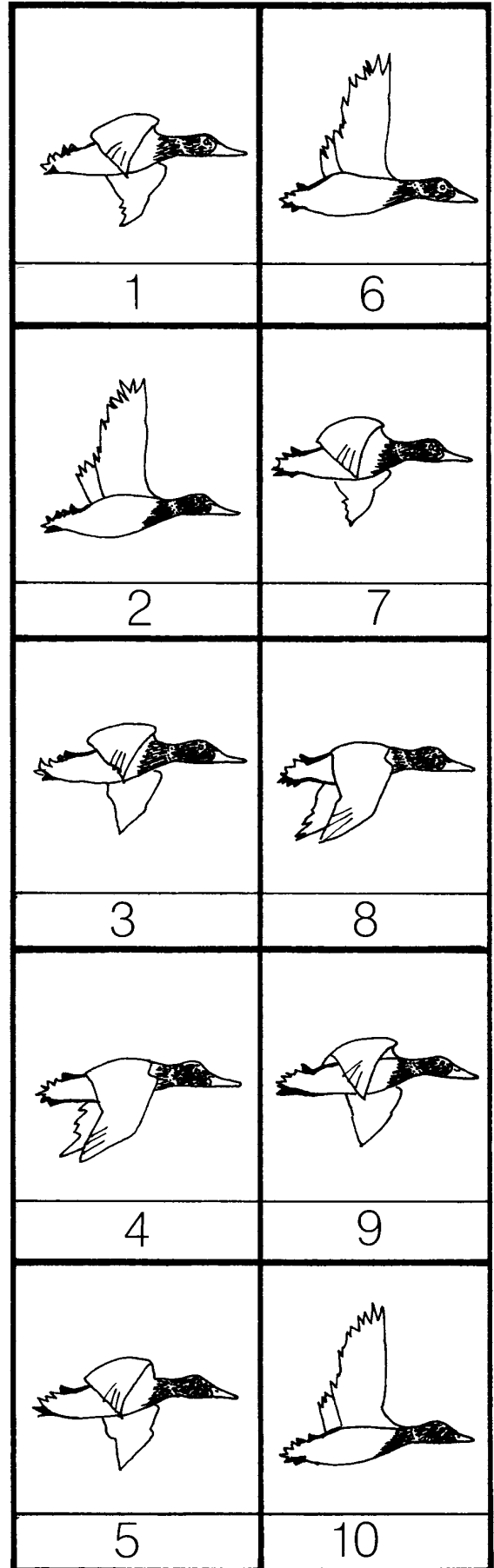
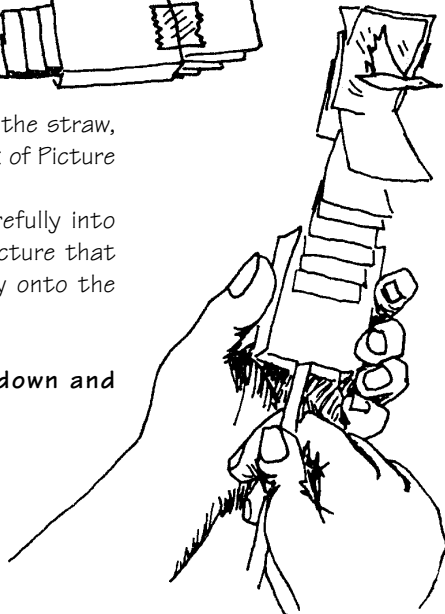


3. Hold the left side down with one hand as you place a strip of tape down the right side of the cards. Then tape the left side. (Use your fingertips and nails to press the tape firmly, especially where the pictures join one another.)



4. Turn over and firmly tape the straw, stick, or pencil to the back of Picture No. 1.
5. Slip the taped cards carefully into the box. Tape the first picture that comes out (No. 10) firmly onto the box, as in the picture.

Push the handle up and down and watch the duck fly.

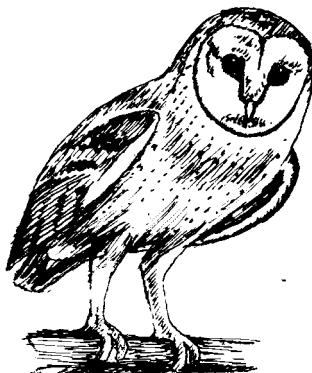


by Joyce Harmond Deppenbusch

FLYING MOUSETRAPS

They don't call owls "Mother Nature's mouse traps" for nothing -- their massive beaks and powerful talons allow them to catch their **prey** with ease. Special wing feathers with soft-fringed edges make their flight silent. This helps owls to sneak up on their meals without being heard. They have specially shaped flat faced that funnel sound to their ears. Some species have one ear opening lower than the other for better direction sensing.

Owls are able to turn, or **rotate**, their heads about 270 degrees. This lets them see a wide **spectrum** from



their **perches**. How far can you turn your head with moving the rest of your body? About how many **degrees** is that?

Many owls' species are **nocturnal**, or active at night, and so are most of their prey **species**. Owls have large eyes that allow them to use all available light, even at night when very little is present. Burrowing owls, on the otherhand, are **diurnal**,

or active during the day. They make their homes in old prairie dog or badger burrows, and eat mostly insects and other small animals.

Kansas has about ten species of owls. The great horned owl is the largest and most common. They nest earlier in the year



than most other birds in Kansas. The great horned owl doesn't really have horns, but tufts of feathers on its head. Screech owls and saw whet owls are the smallest Kansas owls. The barn owl is nicknamed "monkey face", because it has a heart-shaped, white face. They help people by reducing rat and mouse **populations**.

BUNDLE OF BONES

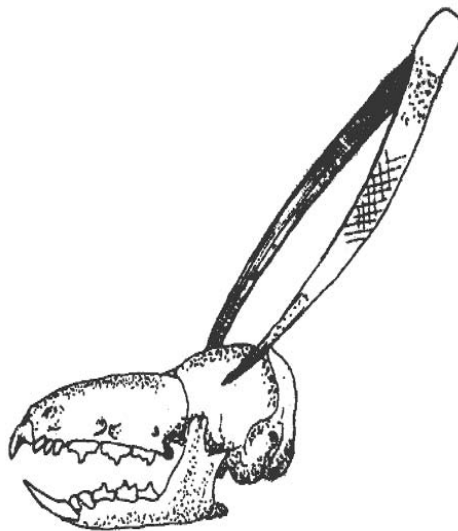
Owls and hawks eat voles, mice, shrews, and other small animals. They eat their food whole or partially torn apart. The portion of the food that is **indigestible**, or can't be eaten, is **regurgitated** in small pellets. A **pellet** is a gray mass of fur, bones, and feathers. Pellets may differ in size and content from one species of owl to another. Hawk pellets tend to be more loosely packed than owl pellets. These bundles of "leftovers" can be found under nest sites or in areas where the birds **roosted**, or rested, during the day.



A pellet can be taken apart with tweezers to discover what the **predator** caught for its meal. **Dissecting** the pellet can be made easier if it is soaked in warm, soapy water for an hour.

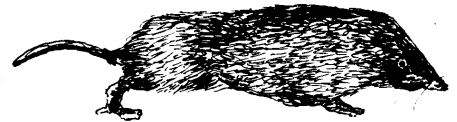
To do this, carefully sort the contents of a pellet into groups. The group may include: **skulls**, **vertebrae**, **pelvis**, miscellaneous bones, feathers, hair, etc. Bird bones

are different from those of mammals because they are hollow (that makes the bird lightweight for flight). Skulls will be the easiest of the pellet contents to identify. Further sort the skulls by the kind of animals they belong to. A field guide to Kansas's mammals will help you identify, or **key**, these species.



The remains of white-footed mice, deer, mice, voles, and shrews are frequently found in pellets. The skull sizes vary from about 28 millimeters long and 14 millimeters wide for mice, to 28 millimeter long and 16 millimeters wide in voles, and 16 millimeters long and 7.5 millimeters wide in shrews. Mice are **herbivores**, or plant eaters. Voles and shrews are **omnivorous**, meaning they eat both plants and animals.

Voles are generally larger than mice. They are stocky, with small eyes and large heads. Kansas has prairie, meadow, and woodland voles. The least shrew is the smallest mammal in Kansas, with a total body length of about 78 millimeters.



OWL PELLET ALERT

In a recent article in the Environmental Education Newsletter from Iowa, it was brought to our attention that some owl pellets may carry a pathogen called psittacosis, also known as Parrot Fever. This pathogen can cause upper respiratory problems. It should be pointed out this disease is usually confined to domestic birds and rarely is found in wild bird populations. Microwaving the pellets (30 seconds on high) is effective in killing the pathogen. UV light and placing the pellets on an old cookie sheet and baking for 20 minutes at 350 degrees should also be effective in killing the pathogen.

by Joyce Harmon

GREENER PASTURES

Birds much the same way use flyways as people use highways. Travelers can get from one point to the next, entering and leaving at their choosing. North America has four waterfowl flyways labeled for administrative and biological purposes. The Pacific, Central, Mississippi and Atlantic flyways have characteristic waterfowl species that take these routes when migrating. Kansas is in the Central Flyway. This flyway is noted for mallard, pintail, teal, and white-fronted geese.

Migration requires some preparation. Just as we prepare for trips, so do birds. Birds add fuel in fat layers, as we would fill our gas tanks. Flight feathers must be in repair similar to the condition of our car body and tires.

The promise of better days ahead keep birds headed south looking for a good winter's supply of food. Breeding grounds and summer territory lure birds to make the spring flight north. Migration times can be approximated for many species of wildlife. Weather, day length, the lack of favorite food and sort of internal clock seem to trigger activity.

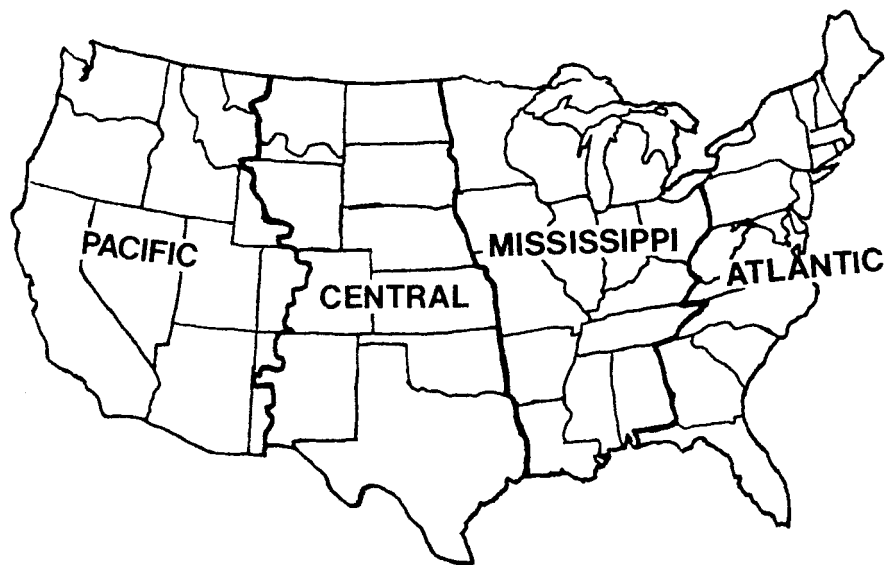
Birds are not the only wildlife that migrates. A few insects such as butterflies, and green darner dragonflies, along with some fish and mammals, join the crew headed for greener pastures. Waterfowl migration is often used as an indication of a change in seasons

because it is so visible, but hawks, eagles, and many smaller birds also migrate. The migration schedules vary between species. Have you ever paid attention to what birds hang out around your home? Notice that the species can vary dramatically throughout the year.

This annual trip may be long or short, depending on the species. Sandhill cranes migrate through Kansas on their way to Texas for the winter and Canada

depends on the outcome of this trip. That would be more than enough motivation for me!

When traveling long distances, we depend on maps to show us the best route. Waterfowl and other migratory creatures use maps of the landscape, along with the position of the sun and stars to cue them towards their destination. Wind and the earth's magnetic field may also be used in navigation.



for the summer. Migration can be a change from one climatic zone to another in the same hemisphere. But other species travel from one hemisphere to the other. Think of how many miles they cover for better grub and warmer temperatures. Their survival

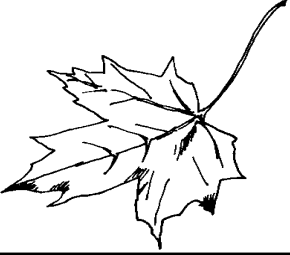


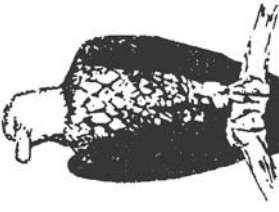

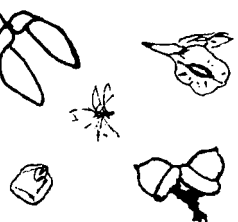

Waterfowl are known as precise navigators. The homing instincts of mallards, black ducks and Canada geese are especially noted for their accuracy. They rely on this ability to return to the same breeding, migration, and wintering areas each year.

The autumn sky will be graced with migratory birds. They may fly in pairs, loose groups, or compact flocks. Canada geese are famous for their ever-fluctuating "V" formations and snow geese for the "U" shaped. Take time to look skyward and remember that the birds have their work cut out for them, but they'll be back again come spring.



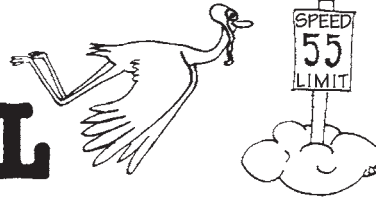
OCTOBER

How much can you learn in a month?

<p>1st week</p> <p>Observe the vibrant autumn colors. Why do the leaves change colors and fall?</p>		<p>Around 1882, German carp were stocked in Kansas's ponds. They were considered the best introduced pond fish of the day.</p>		<p>What fish do we stock now? What role do carp play in ponds today? Why do we stock fish?</p>	<p>Kansas Wildlife and Parks currently have four (4) hatcheries: Pratt, Milford, Meade and Farlington.</p>	<p>Fish hatchery - A place where fish eggs are raised. Locate the four (4) Kansas hatching sites on a map.</p>
<p>2nd week</p> <p>October 10, 1877 100,000 California salmon eggs arrived by train in Ellsworth, Kansas. They were placed in hatching boxes and those that survived lived in Kansas's waters a short time.</p>	<p>Would you expect to find salmon in Kansas today? What's your favorite kind of fish?</p>		<p>Kansas has both bald and golden eagles. How many different kinds of eagles are there in the world?</p>	<p>Since 1911, eagles have been protected from hunting in Kansas. What is the current status of eagles in Kansas and the U.S.?</p>		<p>The Endangered Species Preservation Act was passed on October 15, 1966. A list of threatened and endangered species was made. Can you name the Kansas endangered species?</p>
<p>3rd week</p> 	<p>Furbearers are a special group of mammals. They have high quality hair and fur which can be used for fur garments.</p>	<p>Fur harvester Education classes are being held in your area. If you want to learn more about hunting and trapping furbearers, check with your local Kansas Wildlife and Parks office.</p>	<p>Make a list of all the Kansas mammals that are considered "furbearers".</p>	<p>There are 3 aquatic furbearers (mink, muskrat, and beaver) and 9 terrestrial furbearers (bobcat, red fox, gray fox, swift fox, opossum, raccoon, badger, striped skunk, weasel) in Kansas, which have trapping or hunting seasons.</p>	<p>Regulations are set to guide sportsmen in the harvest of game animals. List other reasons for wildlife regulations.</p>	<p>Sportsmen - A person who is active in sports such as hunting, fishing, etc. and who is fair, courteous, and ethical.</p>
<p>4th week</p> <p>October 1963 Kansas Fish and Game adds the Cheney Wildlife Areas to its acres. Locate Cheney on a map.</p>	<p>How many wildlife areas and reservoirs can you located on a Kansas map? What's your favorite?</p>	<p>Reservoir - A place where water is collected and stored for use. Kansas has approximately 25 reservoirs, such as Cheney, Wilson, and Clinton.</p>	 <p>D5</p>	<p>Seeds can travel or be dispersed by wind, water, or animals. Some plants have special tools to help spread their seeds.</p>	<p>Make a collection of seeds and divide them into groups based on their means of seed dispersal.</p>	<p>What can you find out about a wildlife species that is a symbol of Halloween?</p> 

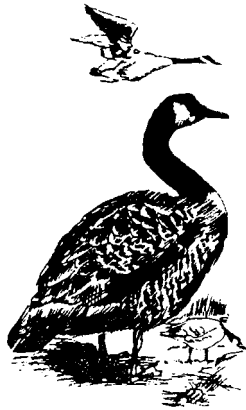
by Joyce Harmon

CRUISING PATROL



CRUISING SPEED -----
For waterfowl species varies.
Ducks and geese generally move
about 40 to 60 miles an hour.

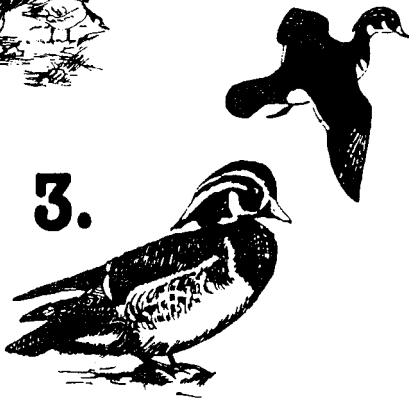
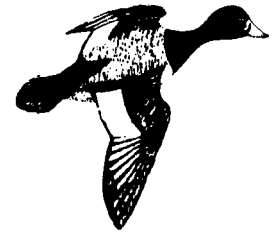
If the waterfowl species illustrated below were cruising over your head, how many could you identify? Check your answers with the key.



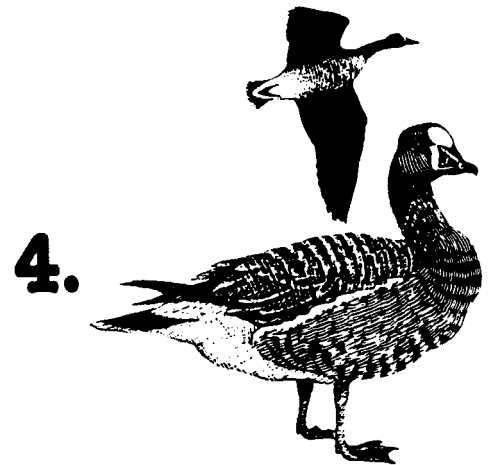
1.



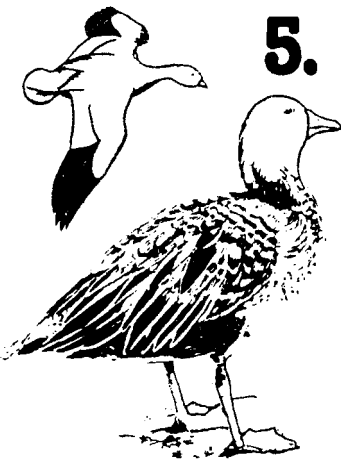
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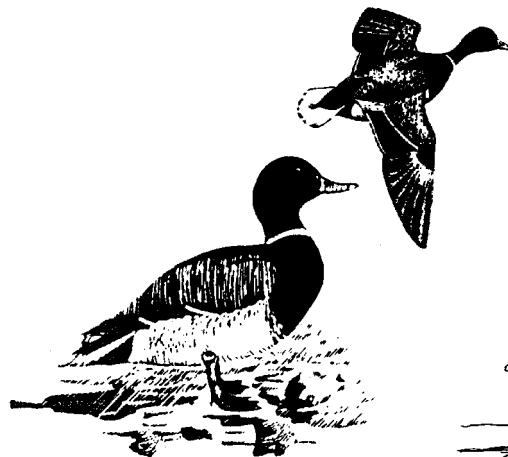
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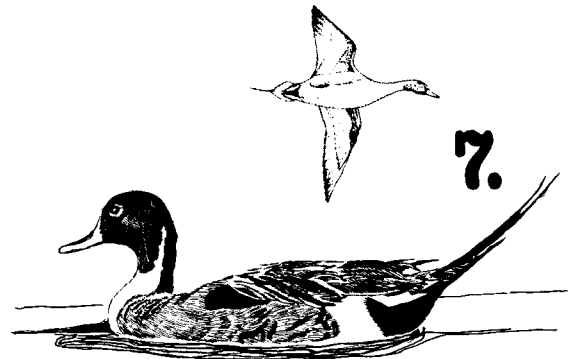
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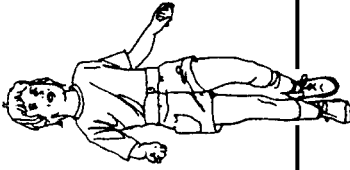



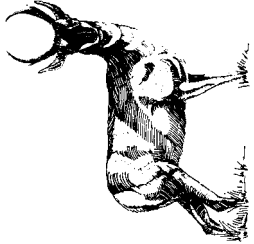
6.



7.

KEY: 1. Canada Goose; 2. Greater Scaup; 3. Snow Goose; 4. Mallard; 5. Pintail; 6. White-fronted Goose; 7. Canada Goose

NOVEMBER

<p>1st week</p> <p>UNLESS someone like you cares a whole awful lot, nothing is going to get better. It's not.</p> <p>- Dr. Seuss, from The Lorax</p>	<p>As wildlife and people ready themselves for winter, make observations of the changes.</p>		<p>Buffalo herds can be found in several locations in the state. Visit the Garden City, Maxwell, Pittsburg, Hays, or Kingman herds.</p>		<p>November 6, 1806 Pike's travels took him near the Garden City area. He noted that "... The face of the prairie was covered with them (animals), on each side of the river, their numbers exceeded imagination."</p>	<p>Research past and present Kansas wildlife and habitat. How have things changed since 1806?</p>
<p>2nd week</p> <p>Topsoil - Top layer of soil, about plow depth.</p>	<p>Humus - Dark part of soil formed by decayed plants and animal material.</p>	<p>Study the layers of soil where you live. Compare these to layers at other locations. Check the color and texture of each soil type.</p>	<p>November 11, 1933 First great dust storm in the Great Plains.</p>	<p>What measures have been taken to prevent the Dust Bowl from happening again? Observe these practices in use. What do you notice where the techniques are not used?</p>	<p>Erosion - Wearing away of soil by wind or water.</p>	<p>Terrace - A shallow channel used to control erosion.</p>
<p>3rd week</p> <p>Hunting season for many game birds species begin in November. Study the variety of Kansas's game species.</p>		<p>Carrying Capacity - The number of animals of a species that can be supported in a particular habitat at any given time. This number will change with the season, and from year to year.</p>	<p>Surplus - That quantity of wildlife above the carrying capacity. The surplus is removed by disease, starvation, hunting, and predation.</p>	<p>What can you learn about the animal that is a symbol of Thanksgiving? How did Ben Franklin show his value of this species?</p>		<p>Kansas has Eastern and Rio Grande turkeys. Where would you most likely find a wild turkey?</p>
<p>4th week</p> <p>Pheasants were introduced to the U.S. from Asia. They have adapted well to agricultural areas. They eat insects and seeds.</p>	<p>Adapt - To make suitable to environmental conditions; adjust.</p>	<p>Only male or cock pheasants are legal game in Kansas. More females are needed than males to produce future generations.</p>		<p>Pronghorn antelope belong to a family by themselves. They are not true antelope because they do not have true horns. Found only in North America. About 1900 antelope live in Kansas.</p>	<p>Historically, the western 2/3rds of the state were prime antelope habitat. Because of continuing conversion of agriculture, only a few scattered blocks of range capable of supporting antelope herds remain.</p>	<p>KDW&P began transplanting antelope to Kansas in 1965. The main herds are located in Logan and Wallace counties. Others have been transplanted to the Flint Hills and western counties.</p>

HONKER RESTORATION



by Joyce Harmond Depenbusch

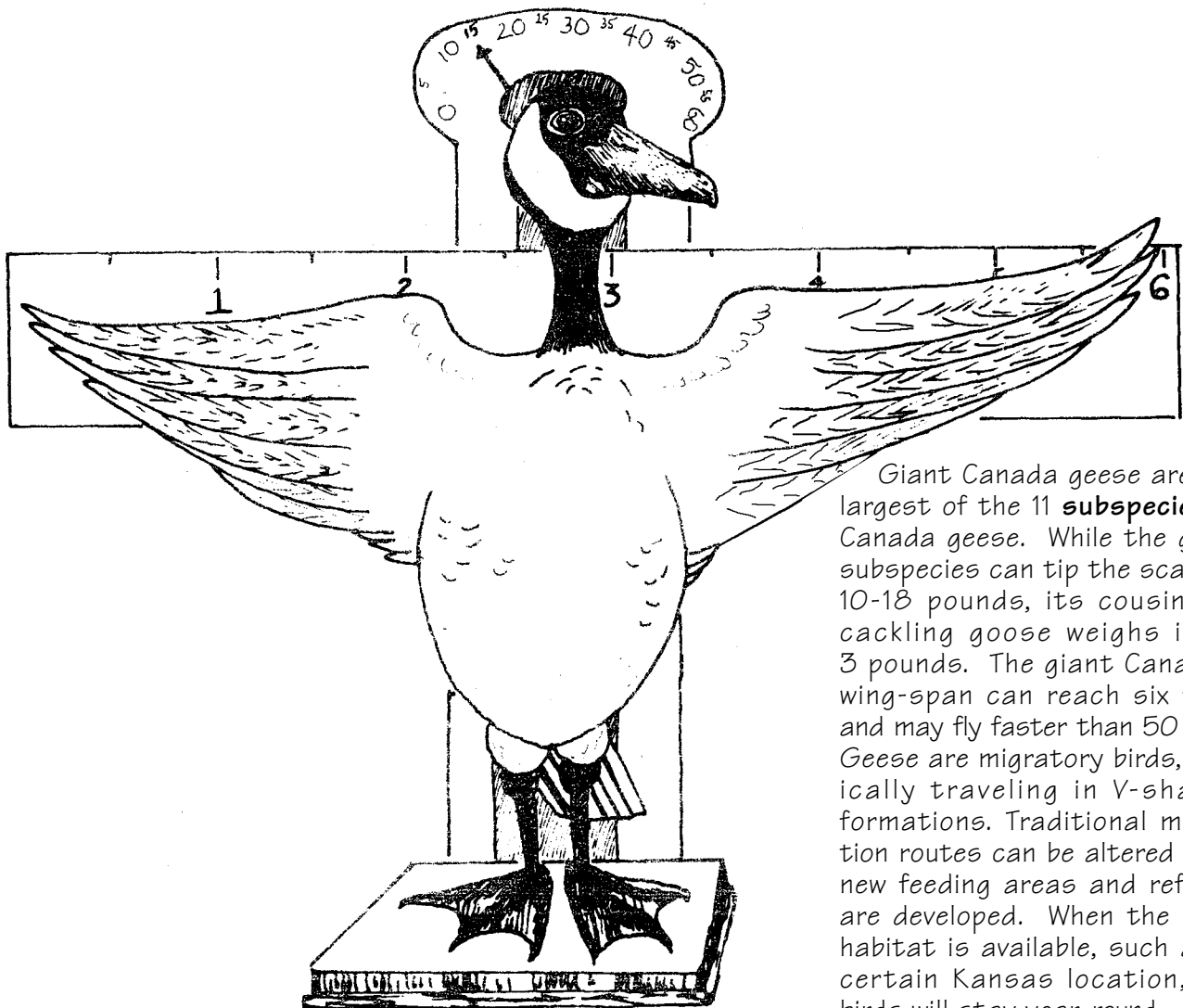
What do wildlife managers do when a species is extirpated (no longer living in an area, but found elsewhere)?

A species once believed to be **extinct** is alive and well in Kansas. Biologists have reestablished populations of giant Canada geese in several Kansas locations. These birds once nested over much of the Great Plains, including most of Kansas. Settlers captured the young

geese and raised them for food. Habitat destruction and year-round hunting also helped eliminate the giant birds from Kansas by 1906. Restoration flocks of giant Canada geese have been established in the Marais des Cygnes, Flint Hills, Cedar Bluff, Pratt, and the Mined Land Wildlife

areas. The young from several of these flocks are captured and released in the Flint Hills to restore the population in that area.

Why all the fuss over a bird that makes loud honking noises and provided the contents of feather beds? Read on . . .



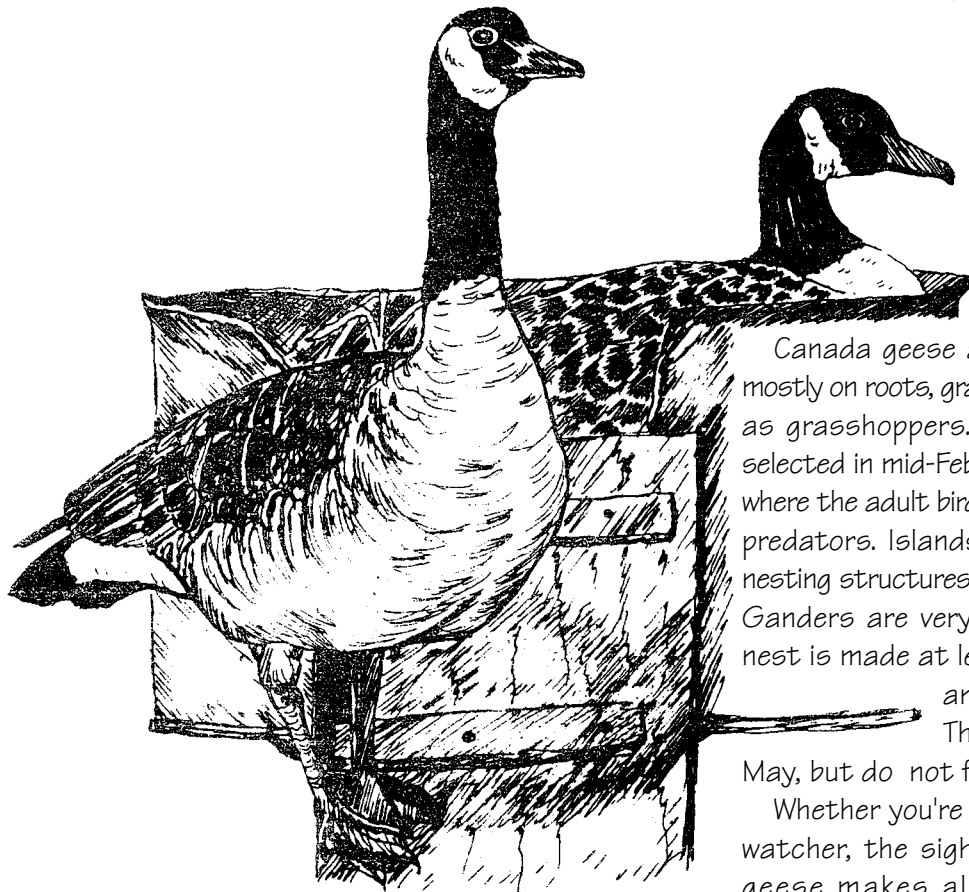
Giant Canada geese are the largest of the 11 **subspecies** of Canada geese. While the giant subspecies can tip the scale at 10-18 pounds, its cousin the cackling goose weighs in at 3 pounds. The giant Canada's wing-span can reach six feet, and may fly faster than 50 mph. Geese are migratory birds, typically traveling in V-shaped formations. Traditional migration routes can be altered when new feeding areas and refuges are developed. When the right habitat is available, such as in certain Kansas location, the birds will stay year-round.



Canada goose families could be excellent models for people. The adults select one mate for life. A new mate is accepted only if the old one dies. The

male adamantly defends the nest, watching over the female. The female does all the **incubating**, leaving the nest only to feed. Intruders discover that a

thrashing from the **gander's** bill and powerful wings is nothing to sneeze at. Both parents care for the family of five or six young **goslings**.



Canada geese are grazers feeding mostly on roots, grain and insects, such as grasshoppers. Nesting sites are selected in mid-February to late March where the adult bird can see approaching predators. Islands and human-made nesting structures are frequently used. Ganders are very territorial, so the nest is made at least 200 feet from another goose nest. The goslings hatch in May, but do not fly until July.

Whether you're a hunter or a bird-watcher, the sight of giant Canada geese makes all the restoration efforts worthwhile. Spend some time enjoying the sights and sounds of the honker.

by Joyce Harmond Depenbusch

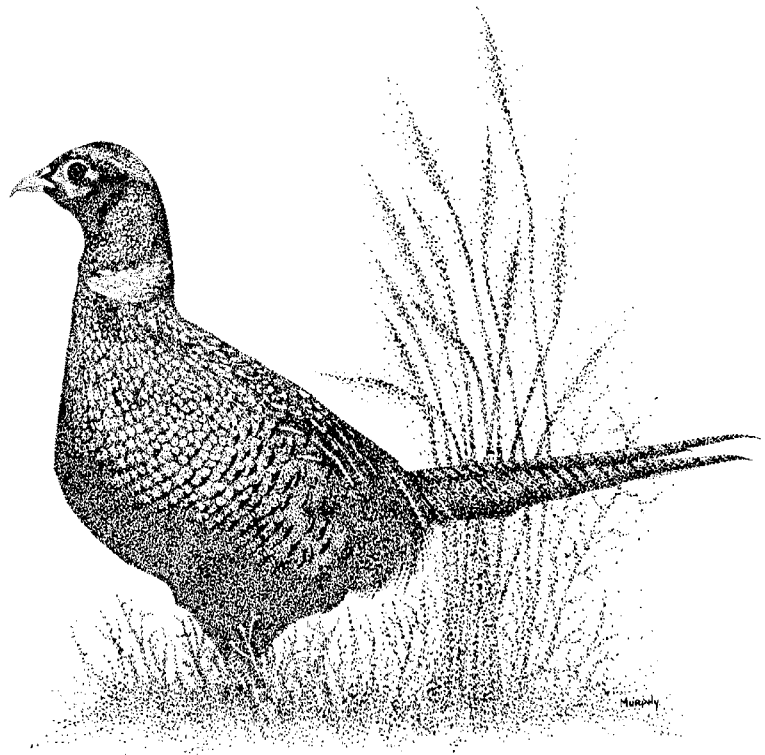
THE RING-NECKED PHEASANT

Have you ever seen a rooster pheasant? With its red eye patch, blue and green head, white collar, blazing bronze breast, baby-blue wing patches, gold sides and long, burnished tail it doesn't sound like a bird that should live in Kansas, does it? Actually, even though they are common today, ring-necked pheasants were transplanted in our state many years ago.

Hunters were responsible for bringing pheasants to this country in the late 1800s. Farming practices had pushed out some of the native birds such as grouse, and Kansans hoped that the Asian pheasant could survive.

Well, survive they did. Today, millions of these ground-nesters patrol fence lines, shelterbelts, and farm fields in all but the southeast corner of the state. The pheasant is very adaptable and hardy. It will eat almost anything, including wild berries, weed seeds, grasshoppers, and agricultural grains. If they have good cover such as tall grass and weeds, pheasants can survive scorching summer heat and winter blizzards. Many predators, including man, coyotes, bobcats, hawks, and owls, hunt the pheasant for food, but the smart and wary bird is no easy meal.

The hen, or female, pheasant is colored in drab brown and gray feathers and weighs about 2 pounds. Her color blends in well with the weeds and grasses she likes to nest in. The bigger rooster, or male, pheasant doesn't help with the nesting or brood-rearing chores so he doesn't need the camouflage feathers. The



rooster will crow and strut, calling attention to his good looks, to attract hens during the spring breeding season.

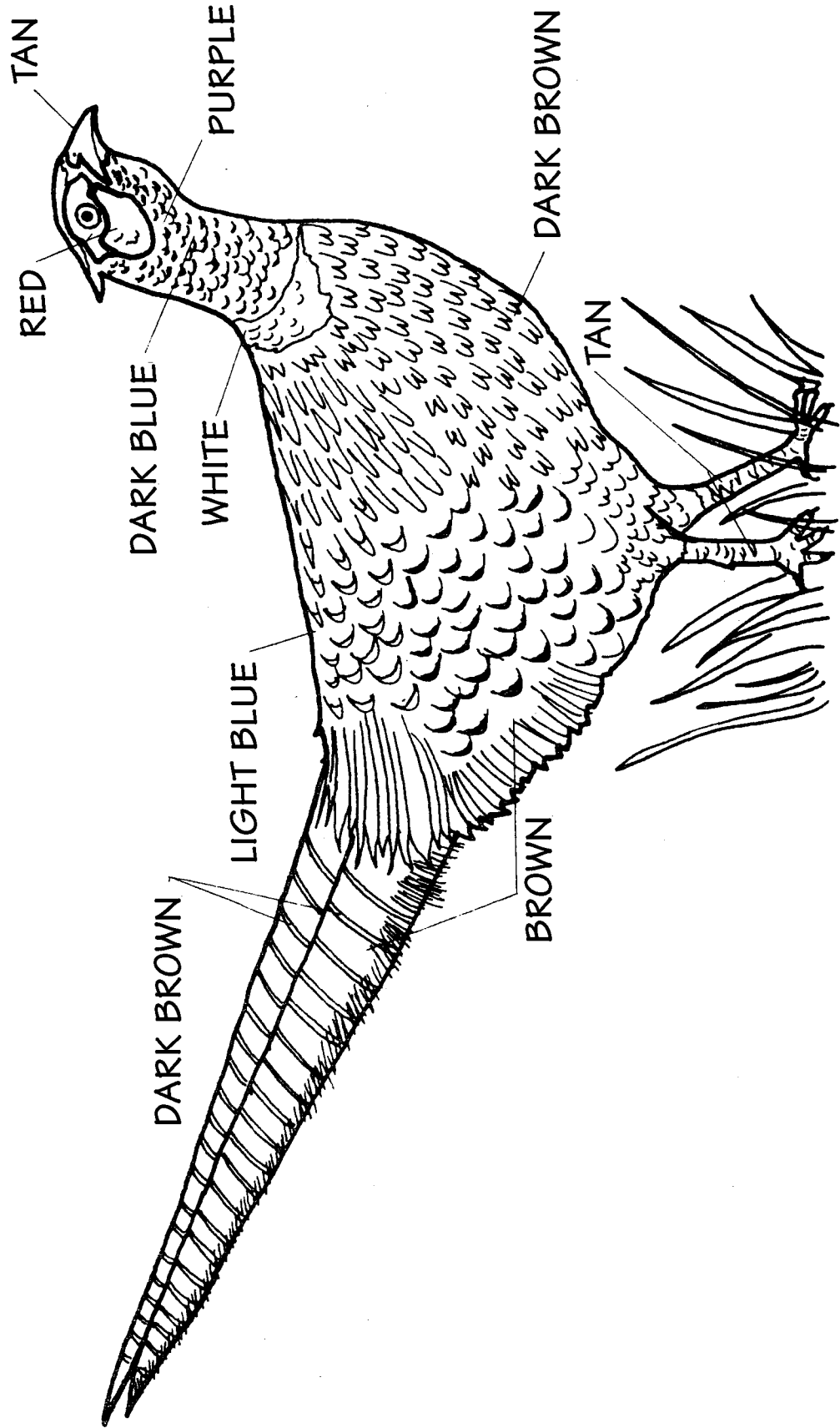
In April or May, the hen pheasant will lay six to 12 eggs in a grass-lined nest hidden in thick weeds and grass. Chicks hatch after 24 days in incubation. Within a day the chicks are following the hen, catching and eating small insects. When they are seven days old the chicks can already fly several feet. By October, chicks hatched in May and June are fully grown and fending for themselves.

If a flood, hailstorm or farm machine destroys a nest of eggs, the hen will nest again. She may make several attempts to nest, and you might see very young pheasants in the fall.

In November, many hunters pursue the rooster pheasant. Hunters come to Kansas from all over the United States to hunt pheasants. But after the opening day, pheasants become escape artists, often running out of one end of a field as hunters enter the other. Or in heavy cover, pheasants will sometimes sit tight and let unknowing hunters walk right past them. When they do flush, the birds can fly at speeds up to 35 miles per hour.

The middle of winter is the hardest time for the pheasant. Deep snows make it hard to find food and if there isn't enough weed and grass cover, snow, and sleet will kill pheasants. But the hardy pheasant will hunker down and survive winter storms if good habitat is available.

The brightly colored rooster pheasant is one of the most beautiful birds in Kansas. Use the colors listed to help you color in this Asian transplant.



STATE BIRD

by Joyce Harmond Depenbusch

Western Meadowlark*Sturnella neglecta*

Kansas school children selected the Western Meadowlark as the state bird on Kansas Day, 1919. The Kansas State Legislature made the election official in 1937.

The state bird's typical habitat is open fields, meadows, and prairie. They make saucer-shaped nests from grass, and lay three to seven spotted eggs.

The meadowlark's bright yellow breast with black "V" identifies it from other

prairie birds. When in flight, more typically seen is the white patch on either side of a short, wide tail of this brown bird. Several short, rapid wing beats alternate with short periods of flight. When walking, the western meadowlark nervously flicks its tail open and shut.

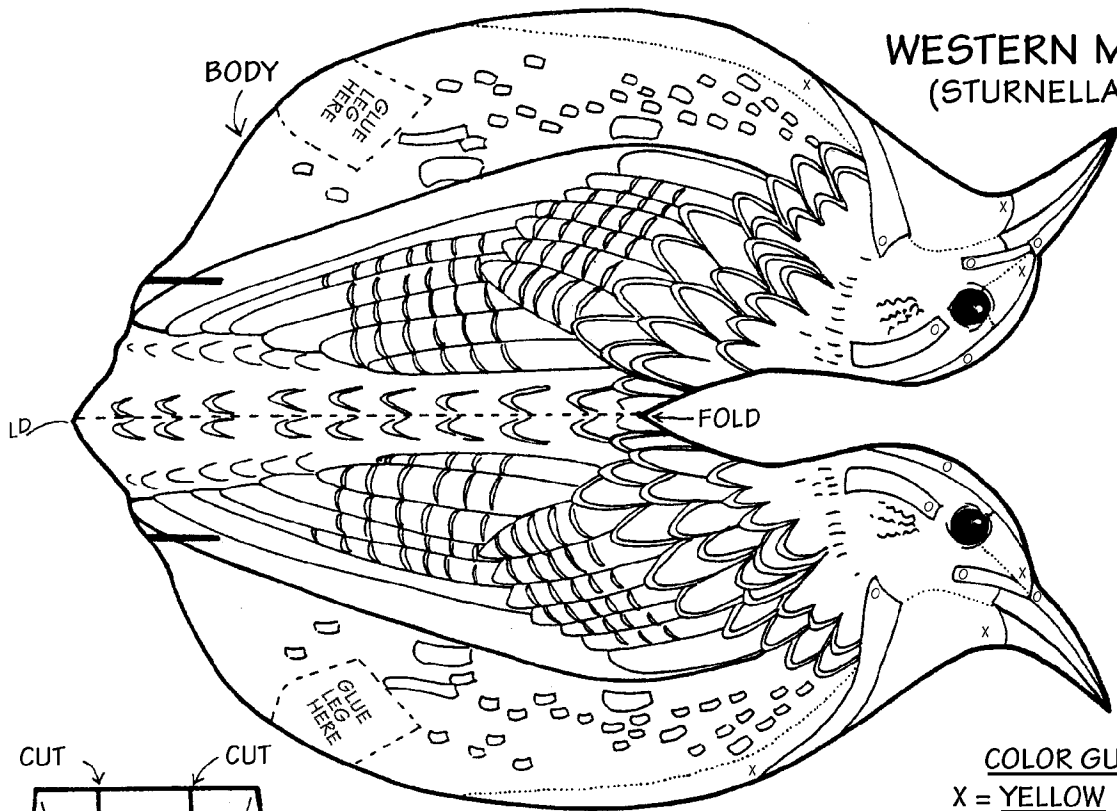
The song of the western meadowlark has seven to ten notes, is flute-like, gurgling and double-noted.



Make your own three-dimensional model of a meadowlark by following the directions below.

1. Trace or make duplicate copies of the models
2. Color the models with crayon or marker.
3. Reinforce the back of the model with construction paper, if necessary.
4. Fold on all dotted lines, cut on solid lines.
5. Use glue to assemble.

WESTERN MEADOWLARK (STURNELLA NEGLECTRA)



COLOR GUIDE

X = YELLOW

O = BLACK

∪ ← "V" OUTLINE IS WHITE
 "V" INSIDE IS DK.BROWN

∩ ← STRIPES ON THE WINGS/TAIL
 ARE BLACK

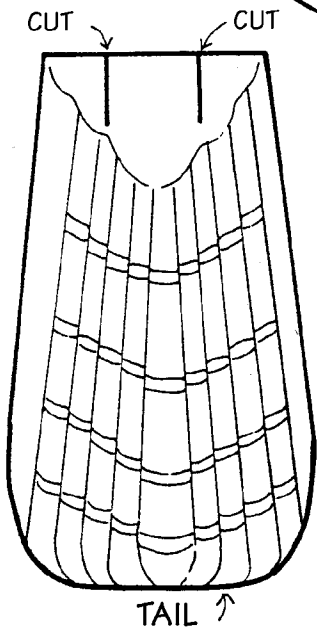
◻ ◻ ← SPOTS ARE BLACK
 & DK.BROWN

BREAST IS WHITE

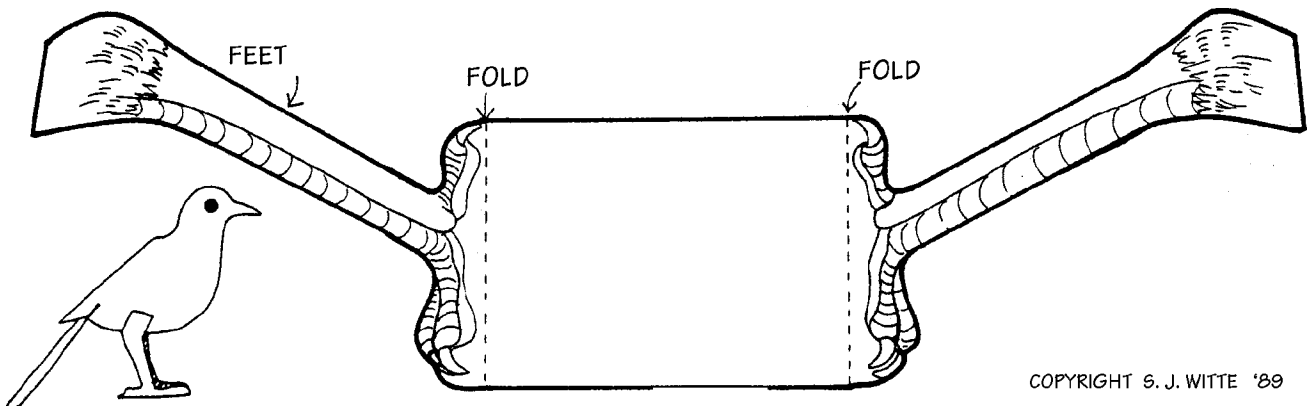
BEAK IS BLACK ON TOP
 & DK.GRAY BELOW

ALL ELSE IS BEIGE
 (VERY LIGHT BROWN)

FEET CAN BE LT.YELLOW
 OR BEIGE



1. AFTER COLORING & CUTTING OUT ALL PIECES, FOLD BODY IN HALF ON DOTTED LINE.
 2. CUT SLITS IN TAIL & TAIL SECTION OF THE BODY.
 3. SLIDE TAIL SLITS INTO BODY SLITS & GLUE IN PLACE CAREFULLY.
 4. FOLD LEGS ON DOTTED LINE. GLUE ONTO THE BODY WHERE INDICATED.
- *NOTE THE TAIL HELPS THE M.LARK TO STAND.



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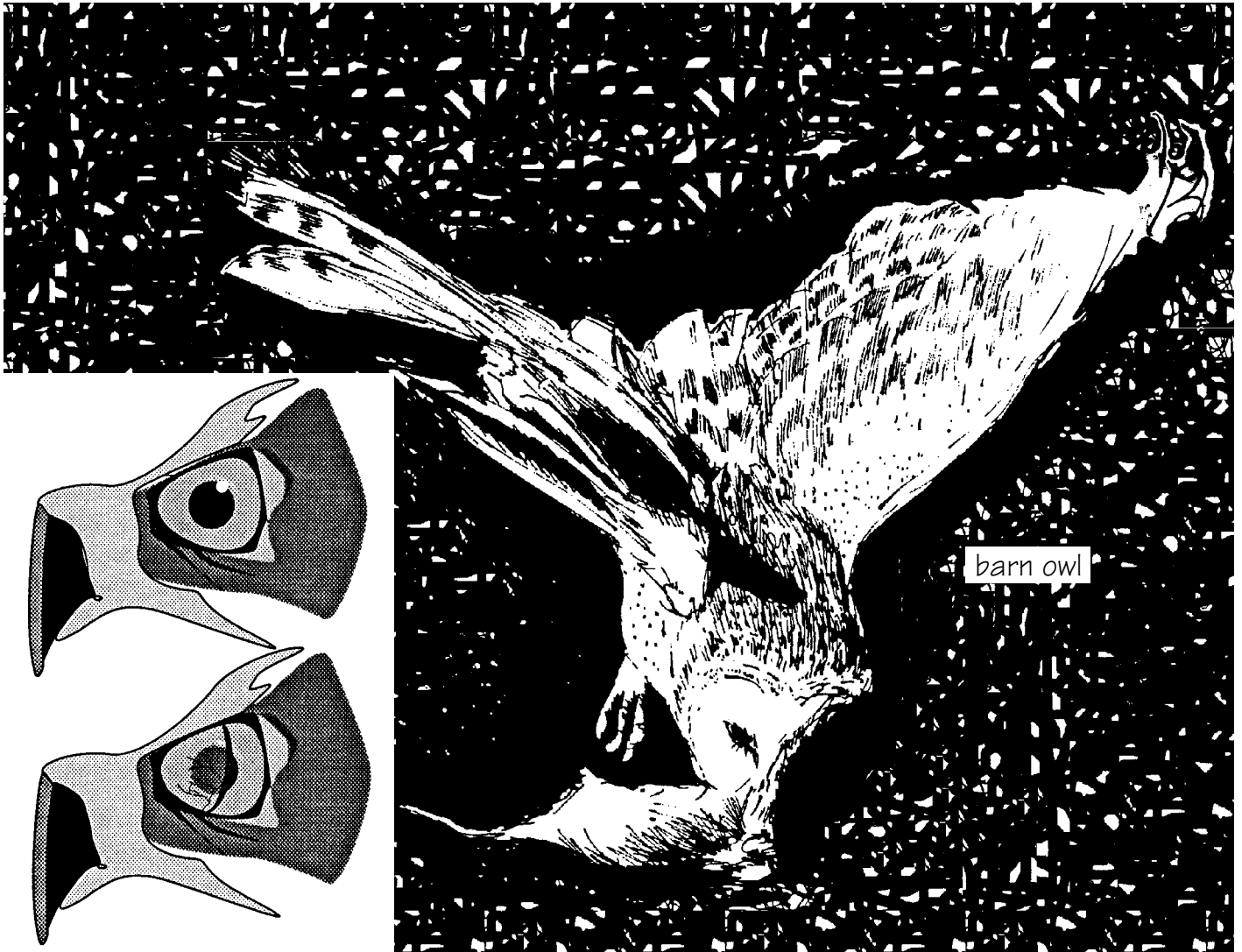
OWLS

What a hoooot!

Owls:

by Dana Eastes

Silent flight, heart-stopping calls, sizzling eyes, terrific senses. Owls add to the richness of Kansas's wildlife. The owl's flight is silent, making them an efficient and successful predator.



barn owl

All owls have a second eyelid called a **nictitating membrane** that cleans and protects their eyes.

Barn owls find cover in barns, abandoned farmhouses and city buildings. They are white-faced with brown

eyes. Their appearance is haunting and ghost-like. Excellent rodent hunters, they are equal to seven cats catching mice.

The long- and short-eared owls are sometimes winter residents of Kansas; both are secretive and rare. Snowy owls are also

rare in Kansas. It is estimated that only one to five visit the state annually. They live on the arctic tundra and eat small

white rodents called lemmings. When the lemming populations are low, the snowy owl will journey south to find food.

When young great horned owls feel threatened, they spread their wings and tail, hiss and snap their beaks while rocking back and forth.

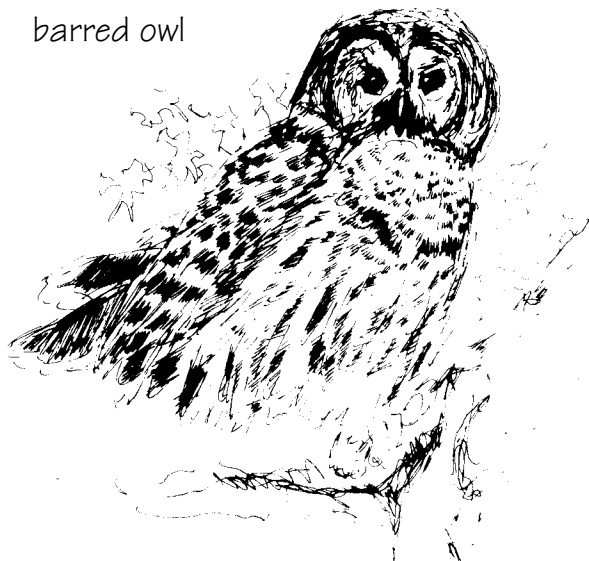
The loud squawking and diving activity of crows and other birds is usually a sign that a roosting great horned owl is near by.

The northern saw-whet owl is the smallest owl in Kansas. Although it can be found statewide, it is rarely seen. It gets its name from the saw-sharpening sound the male make during breeding season.



Young great horned owls

barred owl



The question awakes the night, "Who cooks for you, who cooks-for-you-all". It's the distinctive, rhythmic sound of the barred owl. You stop in your tracks, heart-beating, and return the call, "We eat out!" NOT! Hearing the barred owl call can be a very special and exciting experience. Barred owls like wooded areas and can be found mostly in the eastern part of the state. Barred owls are large like great horned owls, but have big, round heads without the "horn" tufts.



Whoooo cares about owls? You should! Not only are they fascinating birds, but their presence is an indicator of a healthy environment.

screech owl

Owls feet have four toes, two in front and two in back. Most owl feet are used for grasping and their talons are razor sharp.

by Ed Miller

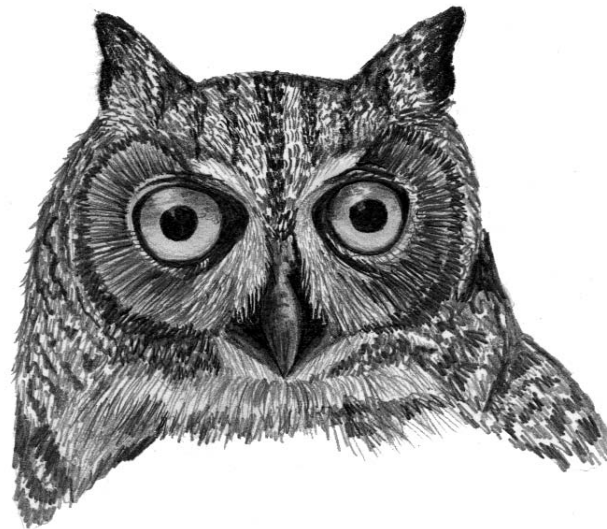
The HAUNTING OWLS

There once was a woman who was afraid of owls. When asked why, she would say that a hooting owl on a roof top predicted that someone in the house would soon die. Superstitions like this are common for any of the mysterious creatures of the night. The owl is no exception.

Fear of the owl and hooting is ancient. Roman history claims that three of the Caesars had their deaths foretold by the hooting of owls in daylight. This old attitude toward the owl as a bad omen continued through

the Dark Ages and still endures in some people's minds.

Owls are not night creatures (called "nocturnal") because they've been cursed, hunting in



the dark is very successful for owls. Most rodents are active at night, and owls are equipped to take advantage of the darkness.

Owls have large eyes -- so large that they can't be moved in their sockets. To make up for this, owls can move their heads in a 270-degree radius.

Owls also have sensitive hearing -- so sensitive that barn owls can capture prey in complete darkness. One ear opening of an owl is higher on its head than the other. This allows the owl to be more accurate when pinpointing the sound of a mouse.

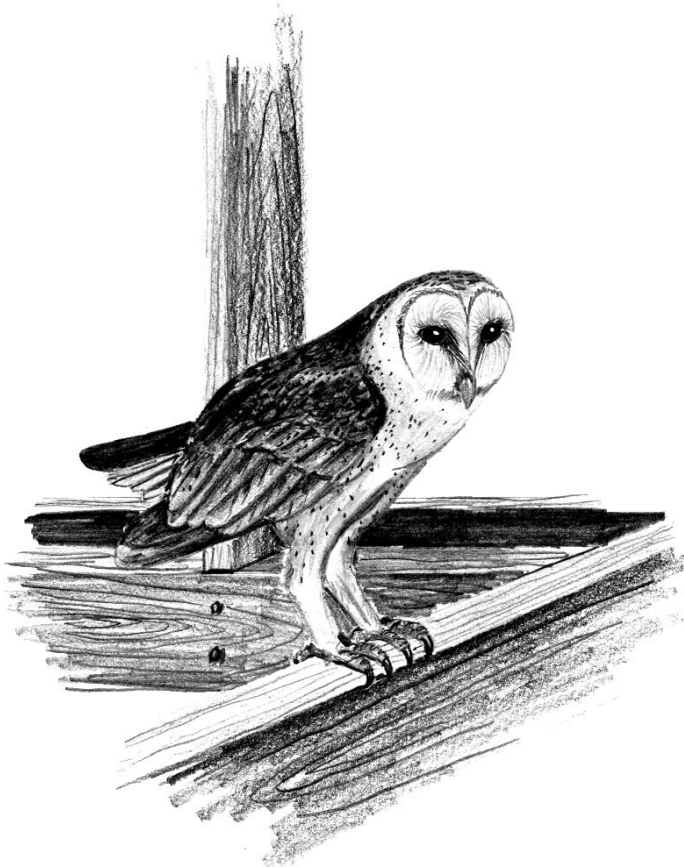
Also, owls have facial feathers that aid in directing sound to the ear. Their flight feathers are covered with a soft,

fuzzy down with a combed leading edge. This makes their flying completely silent. To these features, add sharp talons and a hooked bill, and you have a master hunter.

Owl calls are haunting, however. A barn owl's cry can make the hair on the back of your neck stand on end. These screaming calls are spooky enough to cause old abandoned houses to be declared haunted. Yet the calls are simply the owl's

means of communicating its location to mates and letting other owls know its territory is occupied.

Several owls nest in Kansas. They are the great-horned, barred, barn, screech, burrowing, long-eared, and possibly the short-eared. The short-eared owl is more commonly seen during the winter months hunting or perching along open grasslands.



The snowy and the saw-whet owls are winter visitors to Kansas, as well.

It is interesting to watch how Hollywood movies use the menacing calls of owls whenever some evil is lurking about. But once a person knows a little about owls and how they live, owls gain respect and lose some of their mystery. After, all owls are adapted to what they do best -- capture nocturnal rodents.

by Joyce Harmond Depenbusch

Scissor-tailed Flycatcher

Muscivora forficata

The scissor-tailed flycatcher is a beautiful and unusual bird, truly a gem among the many songbirds that make Kansas their summer home. Maybe you've seen this Kansas treasure sitting on a fence along a highway or country road?

It's also known as the Texan bird of paradise and swallow-tailed flycatcher, but never should be mistaken for the Edward Scissorhands flycatcher.

Because it opens and shuts its 9-inch tail like a pair of scissors when it flies, scissor tail is an appropriate name for this flycatcher. No other North American songbird, except the fork-tailed flycatcher, has such a proportionately long tail.

The scissor-tailed flycatcher spends its summer in the Great Plains, from Texas to Kansas and winters in the southern half of Florida, Mexico, Panama and sometimes wanders into southern California and Arizona. It can also be seen as far north as Canada.

Perching for hours on a fence post or limb of a tree along the

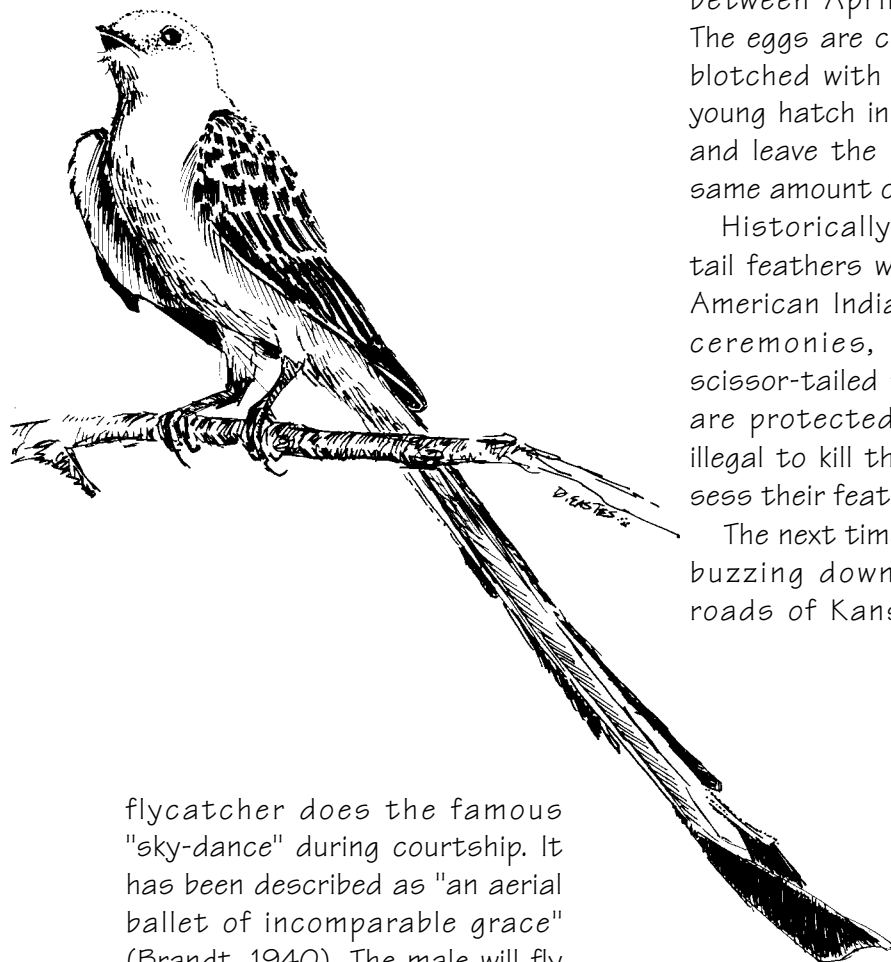
roadside, this flycatcher darts into the air to catch bees and wasps, or drops to ground to catch grasshoppers, crickets, caterpillars, spiders and an occasional dragonfly. It also eats small fruits, berries, and seeds.

The male scissor-tailed

high-pitched hand clapping, then rises straight up in air and topples over backward in two or three reverse somersaults. This sky dance continues throughout courtship and often until the eggs are hatched. The female lays as many as five eggs between April and July. The eggs are cream white, blotched with brown. The young hatch in 12-14 days and leave the nest in the same amount of time.

Historically the birds' tail feathers were used in American Indian religious ceremonies, however, scissor-tailed flycatchers are protected, and it is illegal to kill them or possess their feathers.

The next time you're out buzzing down the back roads of Kansas during



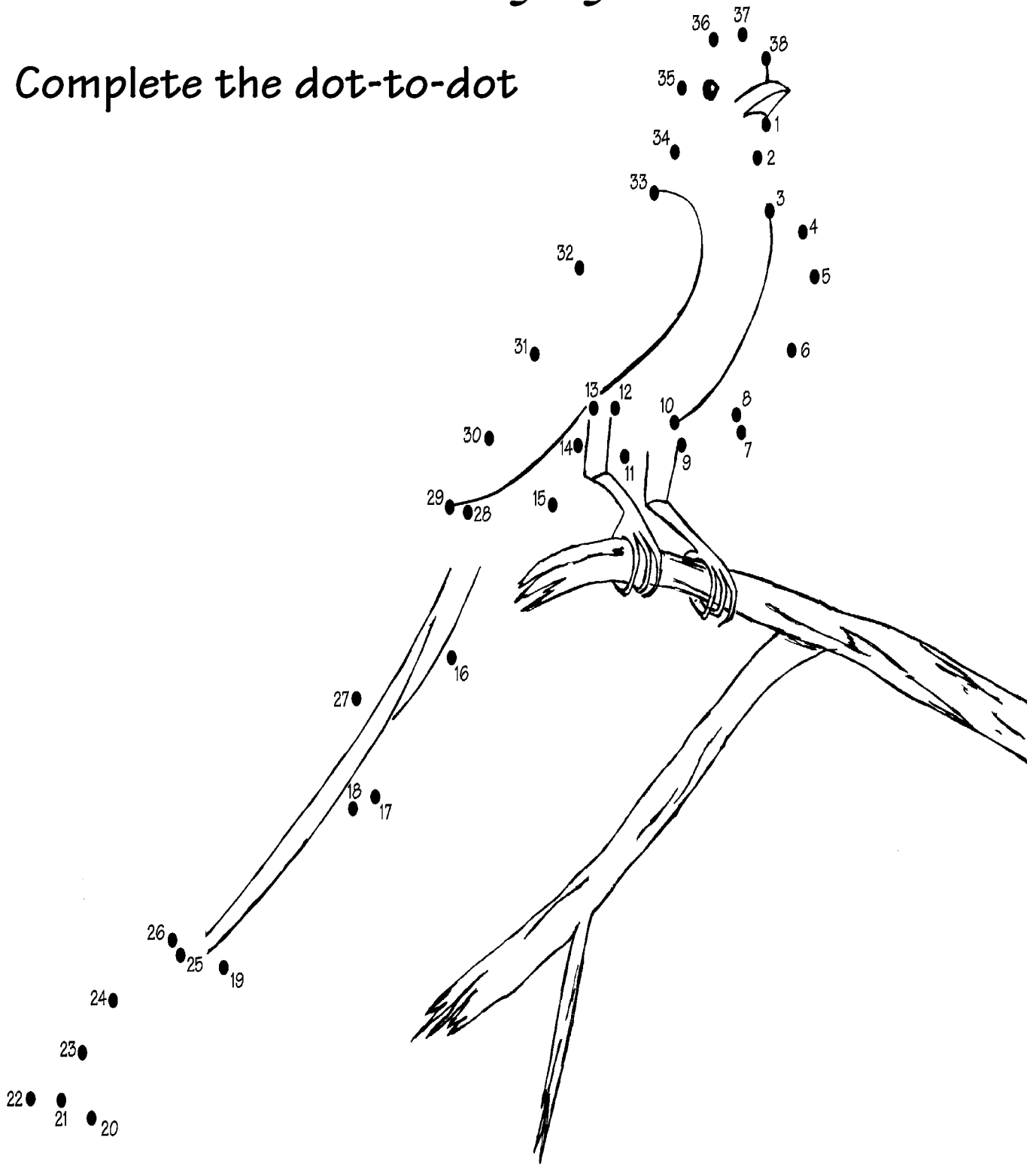
flycatcher does the famous "sky-dance" during courtship. It has been described as "an aerial ballet of incomparable grace" (Brandt, 1940). The male will fly about 100 feet in the air and plunge sharply down in a zigzagging pattern. While in flight, it utters a rolling cackle, like rapid,

the summer, slow down, you might catch a glimpse of this graceful and elegant creature, called the scissor-tailed flycatcher.

SCISSOR-TAILED FLYCATCHER

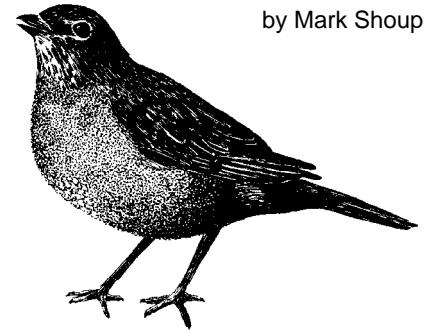
Muscivora forficata

Complete the dot-to-dot



by Mark Shoup

CROPS, STOMACHS, AND GIZZARDS



You probably haven't spent much time examining the innards of birds -- or any other critter, for that matter. But chances are you've learned a few things about them in school. For instance, everyone knows that birds have gizzards, right? But do they have stomachs?

A gizzard is actually a kind of powerful muscular stomach that scientists have compared to the grinding teeth and strong jaws of mammals. In some birds, such as ducks, this "stomach" is so strong that it can grind acorns

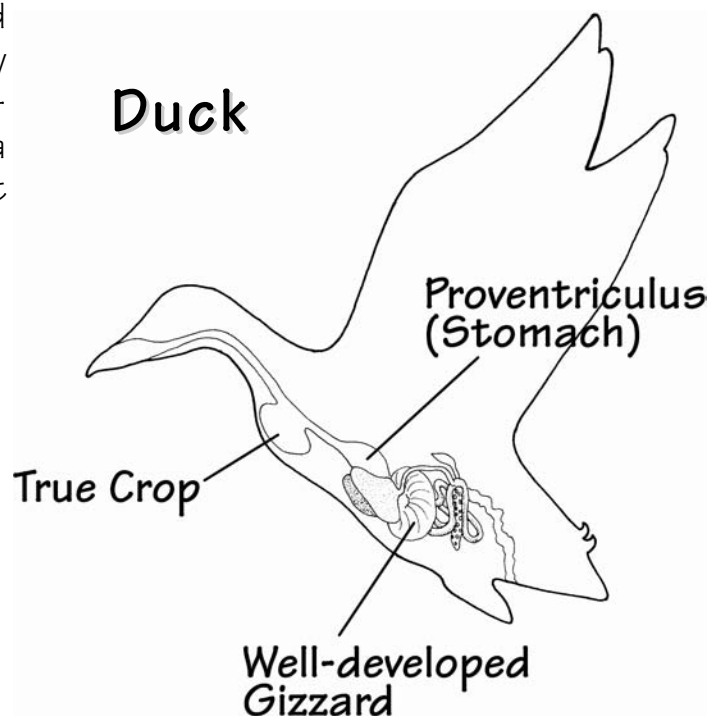
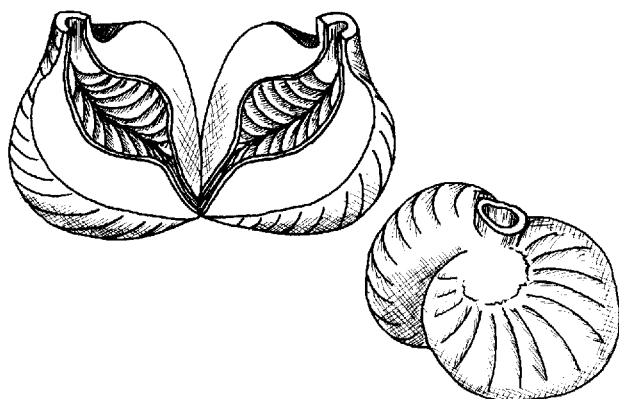
and even shellfish. Some birds swallow grit -- small pieces of sand or gravel -- which remains in the gizzard and helps with the grinding of food.

Many strange things have also been found in the gizzards of birds. In 1911, a small gold rush was started in western Nebraska when gold nuggets were found in the gizzards of ducks. Ruby mines in Burma were discovered when a ruby was removed from a pheasant

gizzard.

Ducks will also eat shot from shotgun shells. Because lead shot grinds up in the gizzard and causes lead poisoning, use of lead shot for waterfowl hunting has been made illegal throughout the United States.

In some birds, the gizzard is less developed. Meat-eating birds (called carnivores) have a gizzard that



is like a thin-walled bag. This type of gizzard just holds bones, feathers, scales, and other things the bird can't digest. This stuff is formed into a pellet that is later coughed up.

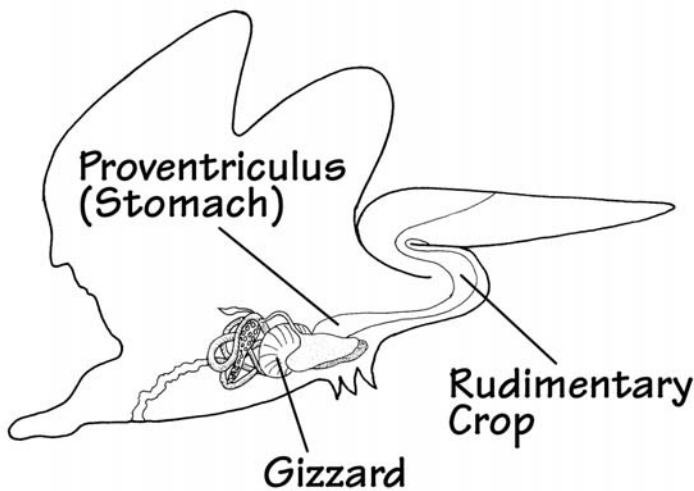
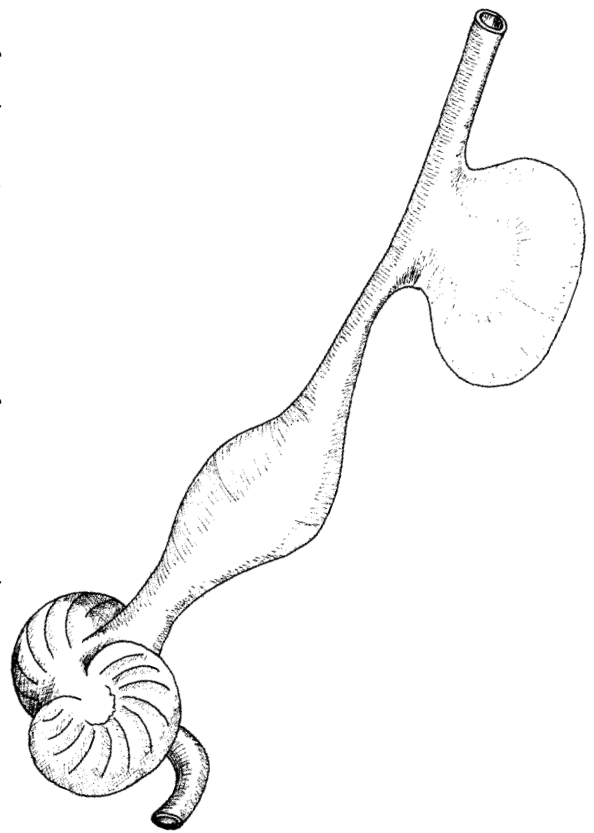
Some fruit-eating birds have no gizzard at all, which again leads us to the interesting question about birds having stomachs.

Surprisingly, the answer is "yes." Most birds have three stomach-like organs: a crop, a glandular stomach (called the proventriculus), and a gizzard. The crop is a place where food is stored temporarily before it moves on to the glandular stomach. But most insect-eating birds have no crop at all.

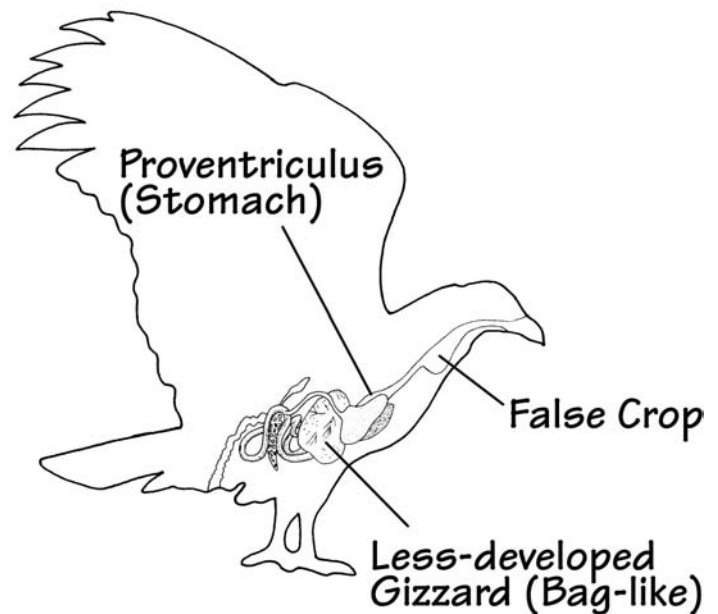
All birds, however, have a glandular stomach that digests food chemically. This is where most food digestion begins in birds. If a bird has a gizzard, the food is passed from the glandular stomach to the gizzard and digested further. If the bird has no gizzard, most of the digestion occurs in the glandular stomach, and the food passes on to the intestines. This is where the bird's body absorbs most of the food's nutrition.

If you've ever heard someone being laughed at

for talking about bird stomachs, it's no joke. It may be hard to swallow, but birds really do have stomachs.



Pelican



Vulture

CHAPTER FOUR

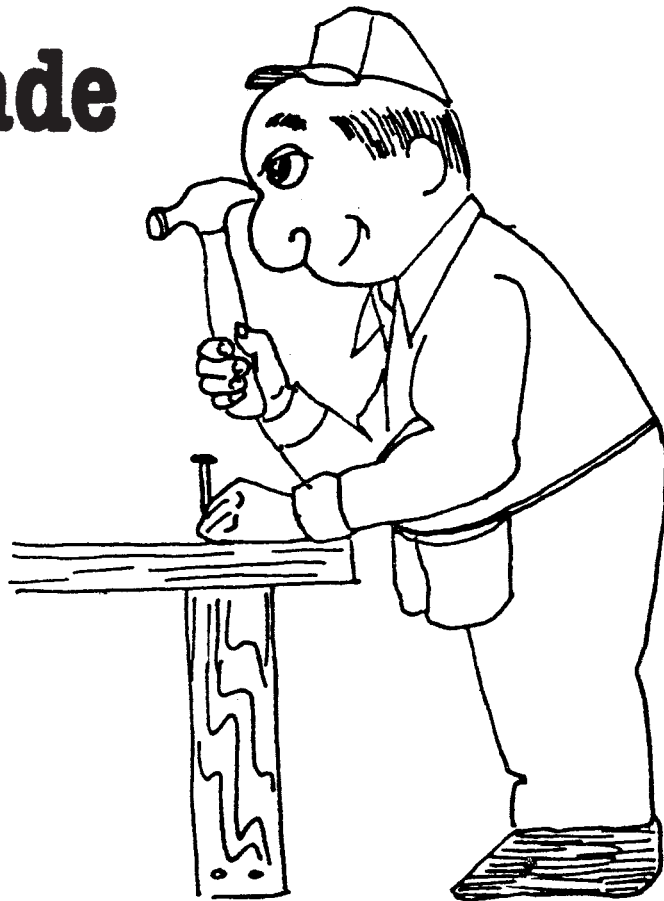
CAREERS

Tools of the Trade

Carpenters use hammers, saws, and nails to help complete their projects. Teachers use books, films, and chalk to get ideas across to their students. Dentists use drills, special chairs, and x-rays to help their patients.

All professionals have unique tools that help them accomplish their tasks. Wildlife biologists also have tools that help them manage wildlife and the plants that make up wildlife habitat. Some of the tools, such as shovels, are very common. Other tools are in the form of work plans, which are used on wildlife management areas.

People who have careers in wildlife conservation may work in one of several areas. Jobs in the wildlife profession may deal with law enforcement, research, management, information



and education, planning, or administration. Each of these areas is very important. They all work together toward the conservation goals.

The job descriptions below give an idea of some of the work involved in conservation and the tools required to do a good job. A close look shows that some special

skills are needed to do the work involved in wildlife conservation.

Communication skills are essential for any kind of wildlife work. The ability to speak and write clearly is very important, as is an understanding and respect for wildlife. Wildlife professionals need to be able to inform the public about what should be done to

effectively manage wildlife. Without public support, wildlife professionals cannot achieve their management goals. Getting along with people is very important in any career.

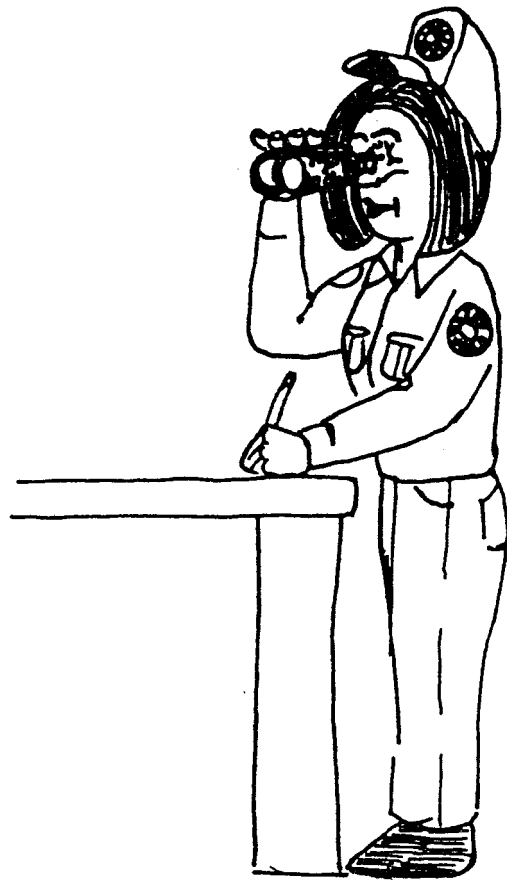
Wildlife law enforcement officers are called conservation officers in Kansas. Their job is to conserve wildlife through education and law enforcement. Wildlife conservation officers enforce state laws and regulations dealing with hunting, fishing, and boating across the state. These professionals get to know the people in their areas, and they are called upon to speak to students, sportsmen groups, and the general public. They also help with projects from other Wildlife & Parks programs, such as collecting data for surveys, assisting with habitat restoration projects, and helping with the wildlife education program.

Law Enforcement officers try to prevent laws from being broken by helping people understand the reasons for laws and

regulations. Laws are important to protect wildlife resources for everyone. They also help to assure that people enjoy outdoor activities safely.

Wildlife conservation officers are required to

attend the Law Enforcement Training Center in Hutchinson. They also receive training from an experienced wildlife conservation officer who teaches them the Fish and Game Commission's policies. Wildlife conservation officers must attend periodic training sessions to keep their knowledge and skills up-to-date. Law enforcement personnel need to have knowledge of wildlife and the laws that



attend the Law Enforcement Training Center in Hutchinson. They also receive training from an experienced wildlife conservation officer who teaches them the Fish and Game Commission's

pertain to natural resources. Law enforcement is an important part of wildlife conservation. Talk to your local wildlife conservation officer to find out more about the job.

Wildlife Biologists

by Joyce Harmon

Wildlife biologists are responsible for research and management activities. These scientists perform such a variety of tasks that it's impossible to list all of them. They conduct wildlife surveys so that changes in size or make-up of populations can be monitored. Another part of their job is to work with landowners to develop wildlife habitat on private land.

Habitat improvement projects are very important. Biologists may plant wildlife food and cover plots to improve habitat in an area. Game biologists sometimes use fire to clear an area, so that desirable plants grow.

Fisheries biologists' use large nets to sample fish populations. Sampling gives them information used in management.

They also stock certain species of fish in order to maintain balanced populations of predators and prey.

Biologists take samples, and conduct tests to gain information about the quality of water and soil. These tests can show the nutrients in the water and soil.

Not all of the biologist's work is done outside. Making plans for future projects and keeping reports up-to-date requires much of the biologist's time. Reports are important tools for keeping records about the condition of wildlife populations and wildlife habitat.

Biologists earn college degrees in fish or wildlife biology. They receive training in wildlife management techniques, ecology, research, and conser-



vation. After they have gained experience, some biologists become supervisors who are responsible for the work of the biologists in their region of the state.

With such a variety of projects, it's easy to see how important and interesting the job of a wildlife biologist can be. Learn more about a career from the biologist who works in your area.

Some careers in wildlife conservation deal with education and public affairs. These professionals work with television, radio, newspapers, school materials, and many other tools to teach people about wildlife. Wildlife Information representatives may help to write and take pictures for *Kansas Wildlife and Parks* magazine. They also give public talks and answer

questions about wildlife.

Planners for Wildlife & Parks help to prepare for the future of wildlife management in the state. They work with biologists to assure that future generations will have plenty of wildlife to enjoy.

Administrators are people with a great deal of experience in wildlife biology, which coordinate and supervise the biologists, conservation offi-

cers, and other field personnel.

The Kansas Department of Wildlife & Parks also employs engineers, accountants, and computer operators. With such a variety of jobs to do, wildlife management is a very exciting field to work in. You can learn more about careers in wildlife management from your local Wildlife & Parks office.

Answer the following questions after reading the paragraphs about wildlife careers.

1. List three skills that all wildlife professionals need.
2. Why do you think having public support is important?
3. If you were interested in a wildlife career, how would you prepare for it?
4. What is another name for law enforcement officer?
5. List some of the duties of wildlife conservation officers and wildlife biologists.
6. Why are wildlife laws and regulations important?
7. Paper work may not be as much fun as being outside, but why is it important?
8. Why are some species of fish stocked?
9. What is a wildlife survey, and why are they done?
10. People who make a career out of wildlife conservation often work long hours and earn moderate salaries. Why do you think they like this kind of work so much? Remember that the feeling of a job well done can be a valuable reward.

CHAPTER FIVE

ECOLOGICAL CONCEPTS



FOOD WEB GAME



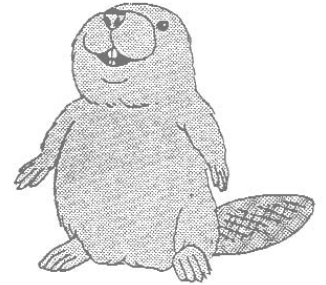
by Joyce Harmon



**HEY, Moms and Dads, Grandmas, Grandpas,
Babysitters, Aunts and Uncles!**

THESE ACTIVITIES AREN'T JUST FOR TEACHERS AND
GROUP LEADERS. YOU CAN USE THEM WITH YOUR KIDS
AND MAYBE SOME OF THE NEIGHBORHOOD CHILDREN.

THE FORMAT IS INTENDED TO BE EASY TO FOLLOW.
THE LESSONS TAKE LITTLE BACKGROUND OR EQUIP-
MENT. WE HOPE YOU WILL FIND THESE PAGES OF USE.
PLEASE FEEL FREE TO SUGGEST IMPROVEMENTS.



I'VE TRIED TO PROVIDE ACTIVITIES THAT WILL BE USEFUL FOR A RANGE OF AGES AND GROUP SIZES.
YOU CAN ADAPT THESE TO MEET THE NEEDS OF YOUR PARTICIPANTS.

GOOD LUCK and HAVE FUN exploring Kansas's wildlife!

IDEAS TO DISCOVER:

1. Animals are on different levels. Those animals that eat plants or their seeds are first level animals. Those animals that eat other animals are second level animals.
2. Plants use the sun's energy, soil, and moisture to make food.
3. Animals, plants, sun, soil, air, and water make up a food web. People are a part of this web. A food web or chain is the transfer of energy through plants to first level animals, and from first level animals to second level animals.

WHAT

YOU'LL

NEED:

One large ball of yarn or string, enough 5x7 index cards (or equivalent sized tag board) for each participant to have one.

Activity :

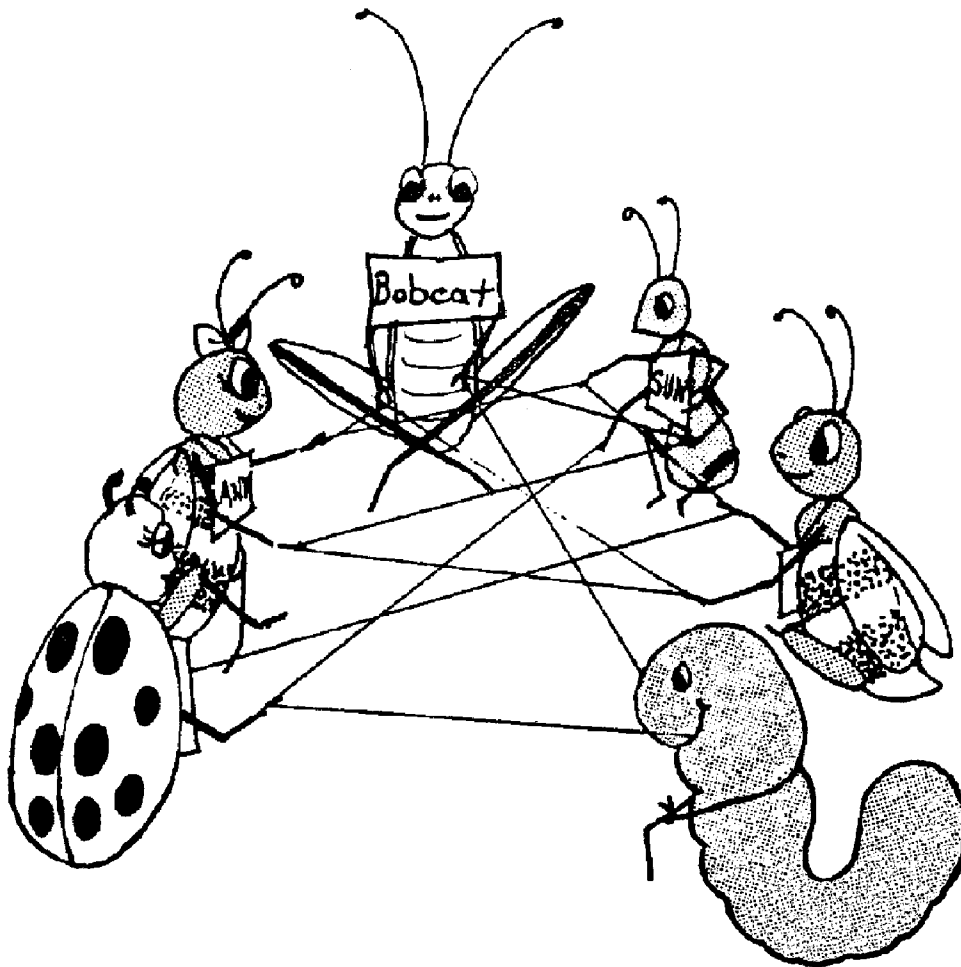
Each participant wears a nametag of a plant, animal or element (air, sun, water, or soil). The nametags can be decorated with a picture of the plant, animal or element to aid preschool or lower elementary children. The name-tags are made from 5x7 cards and can easily be worn if a piece of yarn is attached to go around the neck. Use animals and plants found in your area; some suggestions are: fish, cricket, snake, mosquito, owl, blue jay, turtle, bobcat, mushroom, trees, poison ivy, dandelion, etc.

he needs in order to survive, or, a player who depends on him for survival. He holds onto the strand of yarn and passes the ball to that next player. For example: the "SUN" could pass the yarn to the "GRASS", and the "GRASS" in turn pass the yarn to the "RABBIT", and the "RABBIT" pass it to the "COYOTE". As the game progresses, discuss the relationships between the members of the web. Try to get all players involved and discuss why the elements and lower level organisms

positive and negative impacts and the group might consider what they can do to keep the food web in a healthy state.

If you have a smaller group, you might approach this activity in the following manner:

Sit down with your child or children and cut out or draw pictures of the animals and plants you put on the cards, talking about them as you go. Arrange the cards face up on the floor or a large table. You could connect the cards into a food web or



Have the group form a circle close enough together so that they can read the other name tags.

The person labeled "SUN" begins the game. He or she hangs onto the end of the yarn and passes the ball of yarn on to any other player who has a direct need for the sun. The player who receives the ball of yarn looks around the circle for a player

seem to have more yarn in their hands (therefore needing to have more organisms at that level than the upper levels.)

Before enthusiasm wanes, discuss what impact people have on the food web. How does draining a marsh or pond, fire, disease, restoring habitats, hunting, and fishing affect the food web? Of course, we have some

chain by using a paper punch and attaching cards together with yarn. Or, with a large piece of paper underneath the cards you can connect the interacting cards with a pencil or crayon. Try using a different color of crayon for each chain formed.

The source of this activity is unknown. However, there are several similar activities that deal with the same concepts.

by Joyce Harmon

PYRAMID OF LIFE

For a fun change of pace you might try the following activity with a small group:

You'll need six or more children who are seven years or older, and a small clearing. Have each child secretly write the name of a plant or animal that lives in the area. The players are going to build a pyramid, but don't tell them that until you've collected the papers.

Generate background information by asking questions like: "From what source does the earth get its energy?"

(Answer: The Sun)

"What form of life is the first to use that energy?"

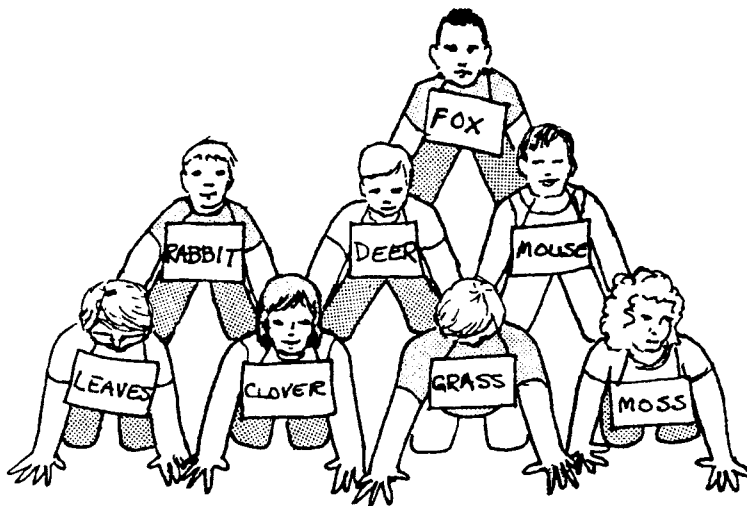
(Answer: Plants)



in a line. Now, as I read off the animals from the slips of paper, tell me whether they are plant-eaters or meat-eaters. All the plant-eaters (herbivores) stand in a line behind the plants. All the meat-eaters (carnivores) stand in a line behind the herbivores."

There will nearly always be more

the predators will have to change their position. Challenge the children to reconstruct a pyramid that will support all its members. The larger children can become plants and any omnivores (animals that eat both plants and animals) can be herbivores or placed wherever needed. The higher up on the food chain, the fewer the number of animals there are. Demonstrate the importance of plants by pretending to pull one of them out of the pyramid.



Terms that may be introduced:

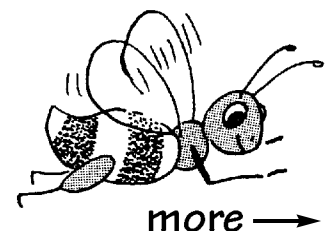
- HERBIVORE
- CARNIVORE
- OMNIVORE
- FOOD WEB/FOOD CHAIN

Source:

SHARING NATURE WITH CHILDREN
by Joseph Bharat Cornell
Ananada Publications, 1979.

Now the fun begins when you start to build the pyramid and the plants realize their fate. "The plants will be on the bottom of the pyramid because all animals depend on them directly or indirectly for food. The plants kneel down on all fours, close together

children in the upper level groups than in the supporting plant groups; it's a lot more fun to be a bobcat or coyote than it is to be a dandelion or a muskrat. With so many on top and so few for a base, it will be very difficult to build a stable pyramid. Some of



This bird has words on his feathers.

*Circle each word you find
in the puzzle
then color that feather.*

*How many can
you find?*



R	A	C	C	O	O	N	E	E	R	T	A
C	A	R	N	I	V	O	R	E	N	P	R
H	E	R	B	I	V	O	R	E	B	A	E
A	E	R	O	V	I	N	M	O	C	D	E
I	D	W	E	P	F	N	U	D	W	A	D
N	L	G	H	Y	O	A	I	S	O	I	L
D	J	M	N	R	E	T	A	W	R	T	B
U	O	R	I	A	P	U	N	R	M	I	V
C	K	V	O	M	Q	R	T	S	R	U	W
K	N	L	E	I	B	E	W	D	O	O	F
E	M	A	G	D	N	A	H	S	I	F	X

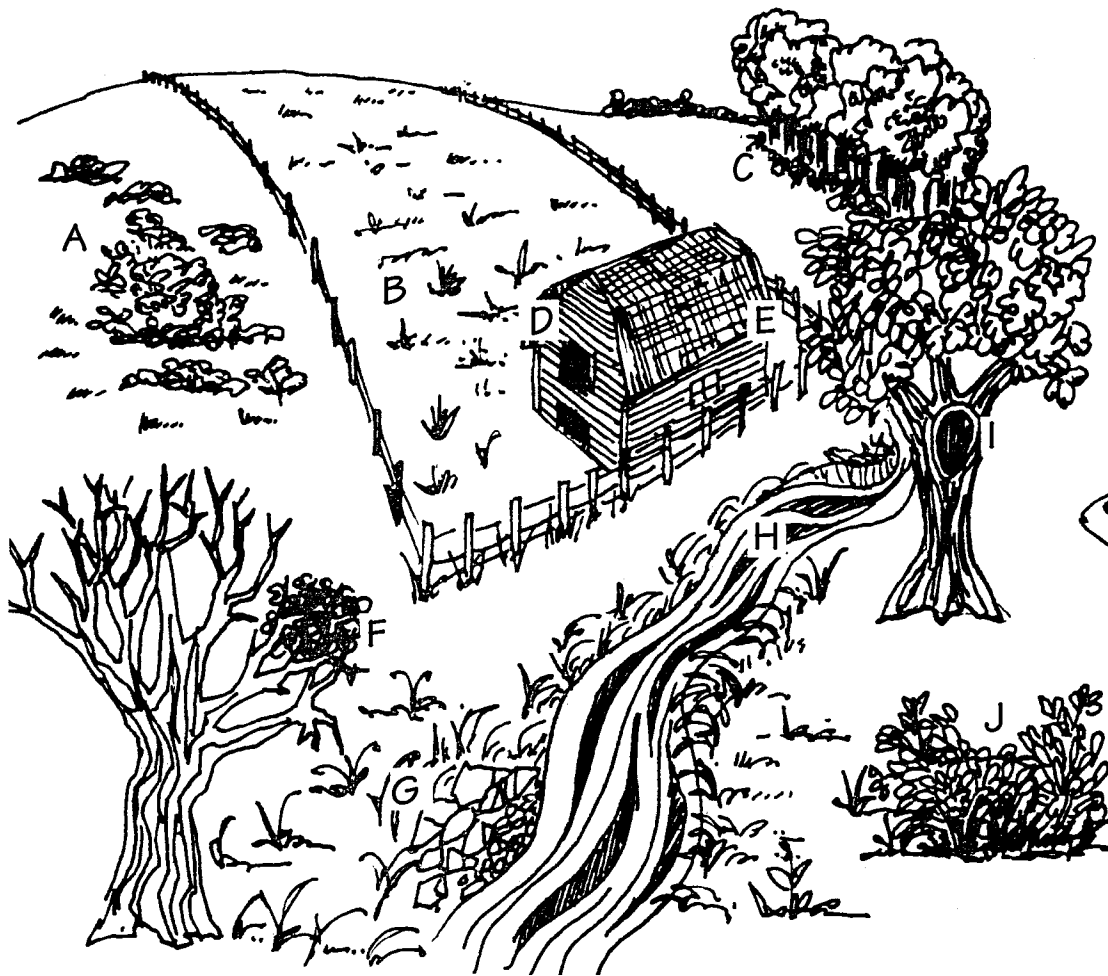
(HINT: Look up and down, forward and backward, and diagonally.)

HABITAT

by Joyce Harmond Depenbusch

SWEET HABITAT

In the country and city, many wild animals you can find
Kansans are lucky to have wild- wild animals. Match the animals living near you. Make a list of
life nearby. See how familiar you shown below with their habitats. these animals, or draw pictures
are with the habits and habitat Then, go outside and see how of them.



5

Squirrels nest in holes in trees or in leaf nests among branches. You might see them foraging for food on the ground and darting between cars.



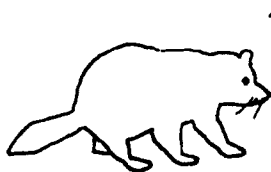
4

Sunfish are common in most waters, but they especially like warm water ponds. They eat insects, worms, fish and other small animals.



3

Nighthawks lay their eggs on open ground in fields or in cities on, graveled roofs. Nighthawks catch insects while in flight. You might hear their nasal call as they fly over at dusk.



1

Raccoons live in dens, often close to water. They eat just about anything, sometimes human garbage.



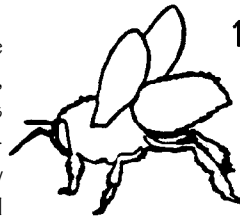
2

Barn swallows usually place their mud nests under the roofs of barns or porches not far from water. They eat a variety of insects.

KEY: 1. I, 2. D or E, 3. B, 4. H, 5. F, 6. G, 7. J, 8. C, 9. D or E, 10. A.



9 Big brown bats make their homes in caves, storm sewers, chimneys and other parts of buildings. While in flight, they catch and eat nocturnal (active at night) insects.



10 Honeybees are often seen near flowers in pastures and at their hives. Honeybee colonies are valuable for pollinating plants and for the wax and honey they produce.



6 Garter snakes are common near rocks, woodpiles and other cover. They eat frogs, toads, earthworms, salamanders, insects, crayfish and minnows.



7 Cardinals build nests of twigs, leaves, and grasses in small trees and shrubs. They eat caterpillars, grasshoppers, beetles, weed seeds and wild fruits. Cardinals will come to winter bird feeders for seeds.



8 Cottontail rabbits live in brushy areas or where they find other hiding places. Cottontails eat green plants in summer and may eat tender tree bark in winter.

KEY: 1.H, 2.I, 3.J, 4.C, 5.G, 6.B, 7.D, 8.E, 9.F, 10.A.

by Joyce Harmond Deppenbusch

WINTER SURVIVAL



What happens to the animals that don't **migrate** to warmer climates when winter arrives?

Those that remain here for the winter must **adapt** to the shorter days, longer nights and colder temperatures. Some animals do this by building up their body's fat supplies, then **hibernating**, or going into a deep sleep. Their body functions slow down so that they can survive the winter. Ground squirrels, for example, go from

187 breaths per minute to about three during hibernation. Their body temperature falls from 106 degrees to 37, and their heart rate drops from 350 beats per minute to five. Other **warm-blooded** animals that are true hibernators include woodchucks, bats, jumping mice and poorwills (the only hibernating Kansas bird). They hibernate in burrows, nests or caves where the air temperature is warmer.

Most **cold-blooded** animals

(animals whose body temperature matches the surrounding temperature) hibernate. All amphibians and reptiles hibernate. Many, such as frogs, toads, salamanders and turtles burrow, in the mud. Some kinds of rattlesnakes congregate together in a den to hibernate. Snails, spiders and other invertebrates also hibernate.

Insects generally hibernate in the eggs, larvae, pupae or nymph stage, although the red admiral butterfly hibernates in the adult

stage. Hibernating insects may be found in galls, under bark, in logs and crevices. Ladybugs take shelter from winters cold by gathering together in large clusters.

Mammals, such as the badger, skunk, raccoon and opossum are not true hibernators. They sleep during cold periods, but their body temperature remains high.

Staying active is another winter survival technique. Like hibernators, many of these animals prepare for winter by building up layers of fat on their bodies. They also adapt to winter by eating different foods. Birds that ate insects all summer may eat seeds in winter. Plant eater's change from eating tender leaves to

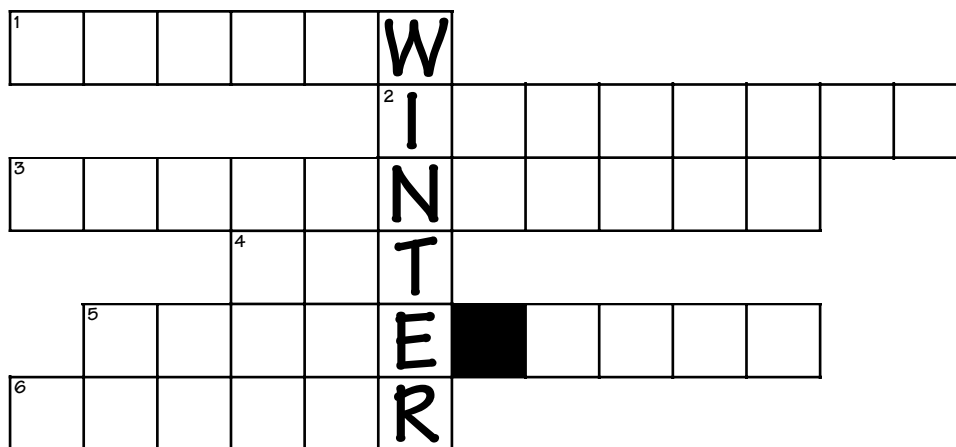
twigs or bark. However, some species store food. Squirrels store nuts; beavers store twigs and branches; fox bury rabbits; moles **cache**, or store, paralyzed worms; and pikas store piles of dried grass.

Other species **insulate** themselves from the cold air. Deer grow a thick winter coat that has long, hollow hairs. Air is trapped between the hairs keeping the body heat in and the cold out. Muskrats, beavers and otters have dense under fur that keeps cold water away from their skin. Birds fluff out their feathers and tuck their bills under their feathers to keep warm. Ducks and geese have soft down undercoats. Bobwhite quail clump together

in a **covey** to stay warm.

Another adaptation that ducks and gulls have is a **heat exc-hange circulatory system** that keeps their feet from freezing while standing on ice or swimming in cold water. The blood vessels near the skin's surface constrict (become smaller) reducing the amount of blood needed to nourish the tissue in the foot. The circulatory system sends warm blood down to the feet and warms the cold blood returning from the feet.

Shivering is another way birds and mammals make extra heat. The goose bumps on your body when you're cold is your body's way of keeping you warm.



WINTER REVIEW

Answer the questions listed below to solve the crossword puzzle above.

- 1) Some animals, such as frogs, toads and turtles, _____ in the mud during winter.
- 2) To help survive the cold temperatures of winter many animals _____ their bodies with a thick coat of fur, thick under fur, or by fluffing their feathers.
- 3) Animals such as bats, spiders and some butterflies spend winter in a deep sleep with a slow metabolism called _____.
- 4) Adding layers of _____ to their bodies is one way animals prepare for winter.
- 5) Squirrels, pikas, beavers and other animals _____ before winter arrives.
- 6) Many mammals and birds _____ to make extra heat.

Answers: 1)Burrow 2)Insulate 3)Hibernation 4)Fat 5)Store Food 6)Shiver

Habitat - Its In Your Backyard



Sally and Carl were walking home from school one day, kicking cans as they walked. Kicking cans down the street reminded them of the lesson in science class earlier that day. Mr. Simpson, the science teacher, had been teaching his class about the environment the last couple of weeks, and today Sally and Carl's class talked about the different types of pollution. "Did you notice how many cans we had to choose from when we started home today? Even if you lose one, there's plenty more to choose from," said Sally.

"Yeah!" agreed Carl. "Besides the cans, we had to wade through a bunch of fast food boxes and paper in that last block." They both agreed that the litter they were seeing was one type of pollution they had discussed in class that very same day.

Taking the short cut through the trees and creek, they were stopped by the sound of men working and the roar of a big tractor. Looking up the path, they saw men in hardhats and



machines knocking down trees and moving dirt here and there. "What were the words Mr. Simpson used last week in class," Sally asked?

Carl scratched his head and replied, "Habitat destruction, I think. Habitat is the place where wildlife lives and when you get rid of the habitat the animals have to find another place to live. I think it's kind of like when your little brother messes up your room just when you have all your stuff exactly where you want it."

"The only difference is that you know your little brother will get in trouble, and you can put all your stuff back where you had it without moving to a new room," said Sally. They detoured around the new construction site and continued on their way home.

Walking the last block to their homes, Sally and Carl noticed sprinklers still running from the night before and a neighbor across the street spraying his lawn for weeds. "You know, Mr. Simpson also talked about saving water





and not using so many chemicals inside and outside our houses,” Carl said. “Boy! Mr. Simpson’s class has really made me notice things. Even though we’re just kids, I think there are some things we can do to keep our own habitat nice and healthy.” They decided to make plans to talk with their parents and teachers about their walk home and how they wanted to help the environment.

Here are some ideas Sally and Carl came up with. Maybe you can think of more.

1. Encourage your teachers to give out more environmental information.

2. If you’re not already, start recycling in your home and school. Don’t plan on getting rich, but you might make a little pocket change if you recycle.

Most schools are starting recycling programs. Talk with a teacher or administrator if yours doesn’t. Schools use a lot of recyclable paper. Cans, cartons and plastics can be recycled from the lunchroom.

3. With the help of your parents and teachers, organize a neighborhood or town clean-up day. Getting people together for a good cause can be both

fun and rewarding.

4. Grow a garden (at home or school). Gardens can be a great learning experience for your class or family and the benefits are delicious.

5. Talk with your parents or teachers about growing habitat to attract wildlife. Song birds, butterflies, reptiles, small furbearers, even deer, can be attracted to your home or school grounds by planting proper plants, trees, and shrubs; building nest boxes; and having a water source. Here are some books to get parents and teachers started in the right direction: The Backyard Naturalist by Craig Tafts, National Wildlife Federation, Landscaping: For Wildlife ----- Nongame Wildlife Program, Department of Natural Resources, 500 Lafayette Road Box 7, St Paul, MN 55155-4007, An USBORNE Guide - The Young Naturalist by Andrew Mitchell, Growing and Propagating Wild Flowers by Harry R. Phillips, Gardening With Wildlife - The National Wildlife Federation, The Butterfly Garden by Mathew Tekulsky, The Hummingbird Garden by Mathew Tekulsky, Attracting Backyard Wildlife - A Guide For Nature Lovers by Bill Merilees.

6. Save water by asking your parents to install a low flow showerhead or a timer for your lawn sprinklers. For water saving tips write: The Kansas Rural Center, P.O. Box 133, Whiting, KS 66552 (913) 873-3431. Soil and Water Conservation Society, 7515 N.E. Ankeny Road, Ankeny, Iowa, 50021-9764 or call 1-800-The Soil.

7. Reduce chemical use: For information on safe alternatives to chemicals for your home and lawn write Backyard Wildlife Habitat Program, National Wildlife Federation, 1400 16th St. NW, Washington, DC 20036.

8. Walk or bike when you can. Reduce car and fuel use. A little exercise never hurt anybody.

9. If habitat loss in your neighborhood, town, or state bothers you, write your politician. The people, who are heard the loudest, usually get results (no matter what your age).

10. Read: Know the facts about environmental issues and what you can do to help. Check your local library for books on the environment. Join conservation groups such as the National Wildlife Federation, the Audubon Society or the Izaak Walton League.

by Dana Eastes & Mark Shoup

OWLS

A SCHOOLYARD LABORATORY

How would you like to build a wildlife laboratory right outside your school doors? Many Kansas Schools have done just that. They have established Outdoor Wildlife Learning Sites, called OWLS, right on their school grounds or nearby.

Kids who go to these schools have a real advantage when it comes to learning about native Kansas wildlife and the plant communities, called habitat, where they make their homes.

Just what is an OWLS? It's an outdoor environmental/wildlife learning laboratory. OWLS always contain one or more habitat areas. This habitat is designed to attract native Kansas wildlife and to allow you -- the student -- to learn more about them first hand.

In fact, students and their teachers actually build the OWLS, with help from a Wildlife and Parks biologist. They plant trees and shrubs for birds, rabbits, and squirrels. Native prairie and wetlands can also be established, but this isn't all.

There are many other exciting projects you can create: feeding stations for birds, squirrels, and other animals; butterfly and hummingbird gardens; nesting areas for songbirds, geese, and small mammals; trails; and ponds or wetlands with plants that

attract ducks, shorebirds, muskrat, and many other species.

On your customized area, you can also have special projects such as weather stations, animal track areas, and bird nesting boxes. You can even bury a time capsule to be dug up years later.

Sound great? Wish you had an OWLS at your school? Well, you can have one now and get everyone excited about wildlife. Any grade school, intermediate school, high school, special education school, or college can apply for an OWLS grant through the Kansas Department of Wildlife and Parks.

Of course, you've got to talk to your teacher or school administrator. They are the ones who must apply for the grant. If they aren't sure about the idea, tell them studies show that "hands on activities greatly enhance a student's ability to understand and remember concepts and facts."

To receive guidelines and a grant application, have your teacher write OWLS, Kansas Department of Wildlife and Parks, 215 SE 25th Ave., Pratt, KS 67124. Once you receive an application, you will be directed to a Wildlife and Parks biologist in your area who will help you develop

(For you and your teacher)



a plan.

School never looked better than today. With an OWLS, it can really be a hoot!

Here is a project that is part of the OWLS program. **Butterfly and Hummingbird Gardens**

Butterflies are attracted to plants because they are host plants for egg laying. Certain wildflowers, cultivated flowers, trees, shrubs, and vines are particularly attractive nectar sources and should make up most of the butterfly feature planting. *Butterflies and Moths of Missouri*, by Richard and Joan Heitzman, lists host plants and additional nectar species. A drinking basin can be made using shallow sloping sides or a series of partially submerged flat rocks for perches.

**Shrubs, Trees, and Vines
that Attract butterflies
and hummingbirds**

- Black haw
- Blueberry
- Blue spirea
- Buckeye
- Bush honeysuckle
- Butterfly bush
- Buttonbush
- Clematis
- Climbing honeysuckle
- Dewberry
- Farkleberry
- Hawthorn
- Huckleberry
- Lilac
- New Jersey tea
- Pear
- Privet
- Redbud
- Smooth sumac
- Spice Bush
- Spirea
- Wild crab
- Wild Gooseberry
- Wild plum

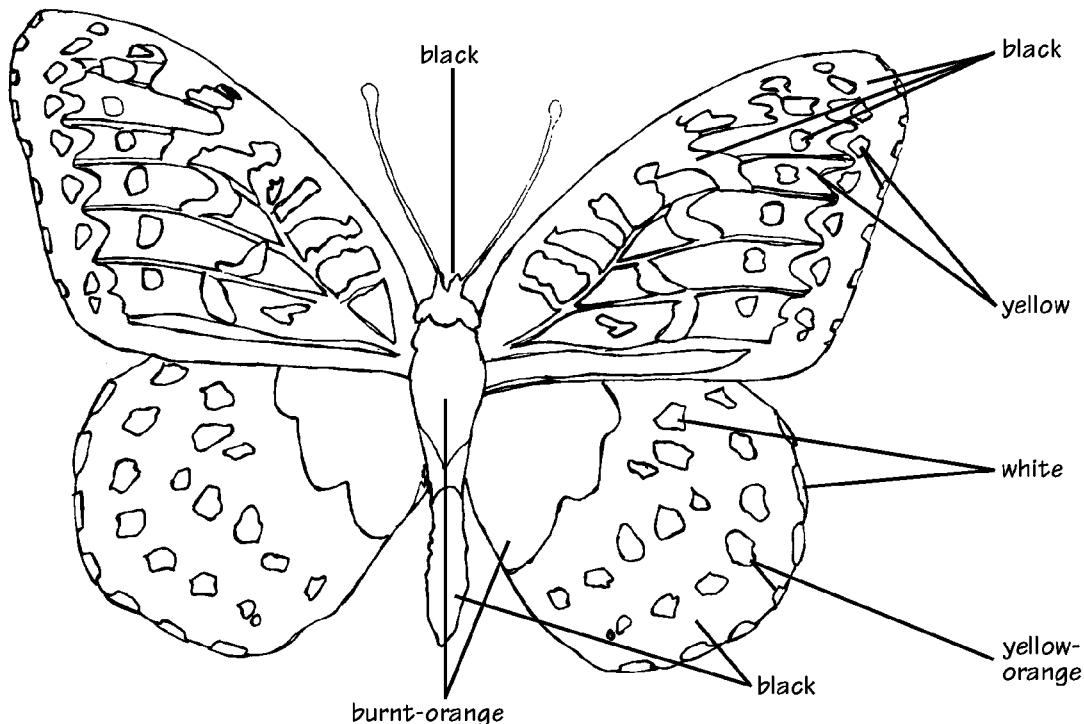
**Forbs that Attract butterflies
and hummingbirds**

- Aster
- Blazing star
- Browneyed susan
- Butterfly weed
- Calendula
- Common daylily
- Cosmos
- Dogbane
- Golden alyssum
- Goldenrod sp.
- Honesty
- Hyssop
- Impatiens
- Joe-pye weed
- Lavender
- Marigolds
- Meadowsweet
- New Jersey tea
- Partridge pea
- Perennial daisies
- Red clover
- Salvia
- Sedum
- Thistles
- Thyme
- Yarrow
- Zinnia

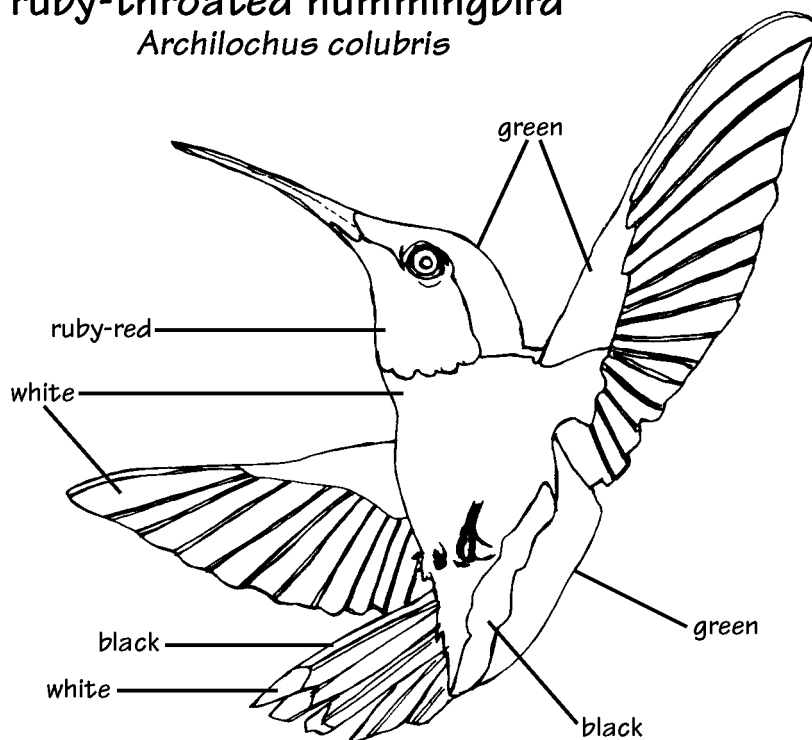
(Just for you)

Paint or color the regal fritillary butterfly and ruby-throated hummingbird. Bird and butterfly books will help you determine color patterns. **Another option:** Copy and paint several butterflies and hummingbirds and make a mobile using black thread and coat hanger wire.

regal fritillary
Speyeria idalia (Drury)



ruby-throated hummingbird
Archilochus colubris





nature's notebook

CHAPTER SIX

ETHICS

OUTDOOR RESPONSIBILITY

Everyone should enjoy the pleasure of being outside to explore nature by bird watching, camping, hunting, fishing, taking photographs, hiking, drawing or other activities. There are many unique and beautiful areas to investigate. All areas should be treated with respect.

To use privately owned land, follow a few common sense suggestions. To gain and retain the use of someone's land, permission must be received. Don't assume that permission is good from one year to the next. Ask each year. Don't abuse the landowner's generosity by bringing additional people without asking. Many landowners may not live on the land. Ask people who live nearby who the landowner is

so that you can gain permission. Remember that trespassing on another's land is against the law and against outdoor ethics.

Here are some general guidelines to develop a good relationship with landowners:

- 1) Act like a guest on the owner's land. Follow the restrictions he or she places on you. Be polite and courteous. Accept the landowner's decisions without argument.
- 2) Get permission as far ahead of time as possible. For example, don't wait until the opening day of a hunting season to ask permission.
- 3) Know the boundaries of the land, and do not stray

onto another landowner's property without permission.

- 4) Do not allow your pets to bother the landowner's animals, land, equipment or family.
- 5) Leave things in better condition than you found them. Do not litter or damage any equipment. Repair or replace any damage you are responsible for. Be helpful to the landowner if the opportunity arises.
- 6) Walk or drive on roads not in cultivated fields, fields with crops or pasture, unless you have permission.
- 7) Close gates if you open them. Do not cut or break fences.

COLOR PAGE

THE PICTURE BELOW SHOWS AN OUTDOORS PERSON RESPECTING A LANDOWNER BY ASKING PERMISSION TO HUNT.



by Dana Eastes

“The Ballad of Rascal in a box in our garage”

And he can't get home. Oh! no, he can't get home.

And we found him. He was just a wondering amongst the grass and the trees, cute as you please.

Look over there fellas. He's lost without his mother. Should we pick him up or let him roam? He's so cute and fuzzy, pick him

up, pick him up; he needs a home!!! But what should we tell our parents? Oh well, it doesn't matter, he's lost, we'll pay the cost.

We like to listen to you chatter and when you run across the kitchen floor, your feet go pitter-patter. You really kind of

smell, but it's so fun to feel your fur and squeeze the rings around your tail.

So what do we feed you? I'm beginning to think we don't even need you. Oops! You made another mess; let's blame it on our sister Tess. Shoo! Shoo! Out the door! Don't put up a fight! OUCH! I never dreamed a cute, fuzzy thing like you might bite.

NO! You should not be in that box in our garage. We like your fur and chatter too, but you should not be in that box in our garage. No, you should not be in our garage. With all the things that you can do, the outdoors is the place for you!



LET NATURE TAKE ITS COURSE

Kind of a silly song huh? Silly but true. You probably wouldn't be a bonafide kid if you haven't brought some living critter home to be kept in a box or jar. Though we soon find out that this wild critter that we've brought to live in our nice home is usually more than we can handle.

Even though you think you're doing a wild animal a favor, you're not. It's a good idea to leave wild animals in the wild. Young animals that look lost and abandoned usually have a parent hiding nearby waiting for you to leave. If you think about it, how would you like it if something picked you up and took you from your parents and the comfort of your home?

The law of nature is survival, eat or be eaten. As cruel as it sounds a small animal that is truly abandoned -- and this is rare -- will be food for another animal's survival and it's best to let nature take its course.

You should also keep your health in mind the next time you're tempted to take home a wild animal. Even though they may look cute and fuzzy, wild animals carry a number of things that may threaten your health. Rabies can be transmitted from a bite or saliva contacting a human's open wound. The number of rabies cases has greatly increased this year. Ticks can result in lime



disease. A small number of cases have been reported in Kansas. This disease mimics a number of illnesses and is hard to diagnose. Not only you and your family are at risk, but so are your pets. Distemper and rabies are the most common illnesses that household pets acquire from wild animals.

Not only could it be harmful to your health, it is illegal to keep most wild animals. All migratory birds are protected by law. People can't resist helping a young bird that has fallen from the nest, but parent birds will continue to feed a fledgling on the ground until it is ready to fly on its own. Often the smallest bird is booted out by the larger ones, because the competition for food. Even if the bird is put back, it will probably lose its battle with the rest of the bunch.

If you come across an injured wild animal and are debating on what to do, before you take it home, call the local Wildlife and Parks office in your area. They can give you some good advice

on what to do. And the next time you find an animal that you think is abandoned. Remember to keep the wild things in the wild. It is a greater thrill to observe a wild animal in its natural habitat, than in a box in your garage.

Just for fun.

SILLY SONG SING ALONG

Choose a bird, animal, or reptile. Go to the library and learn some fun facts about the animal you've chosen. Make up a simple rhyming song, using the information you've acquired (just a few lines will do). On a large sheet of paper draw a picture of the critter you've chosen and write your silly song beside the picture. Hang up your pictures for all to see. Go around the room, each person can read or sing their song and talk about their critter drawing. By doing this, everyone can learn about your animal and you can learn about theirs.

Let's Go Hunting!

Hunting with your mom and dad can be lots of fun, and it's a great way to learn more about nature and the outdoors. Dove and teal seasons open in September and are perfect for young, beginning hunters. You won't get too cold or too hot, and there's usually plenty to see and learn about.

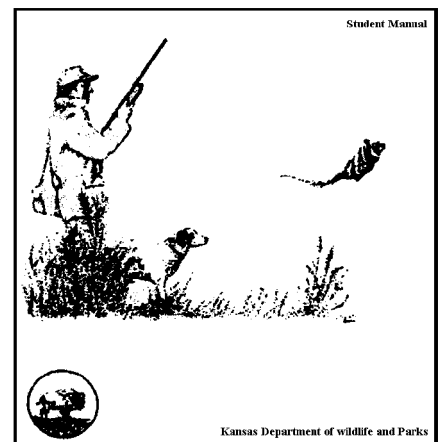
Before you go hunting, you must complete a Hunter Education Course. The course is sponsored by the Department of Wildlife and Parks and is taught by volunteer instructors from all across Kansas. Instructors are usually experienced hunters who want to pass on their hunting and firearm safety knowledge to young people. The course lasts 10 hours, usually over several evenings and a Saturday morning, and you'll have to pass a test at the end. But don't worry, it's fun and interesting and you'll learn

neat stuff about Kansas wildlife, conservation, hunting regulations, hunter ethics, and firearm and bow hunting safety. Have Mom or Dad call the nearest Wildlife and Parks office for a course schedule. Area instructors will usually conduct courses in August, September and October.



Kansas

Hunter Education



Once you pass the course, you're ready to start learning about hunting.

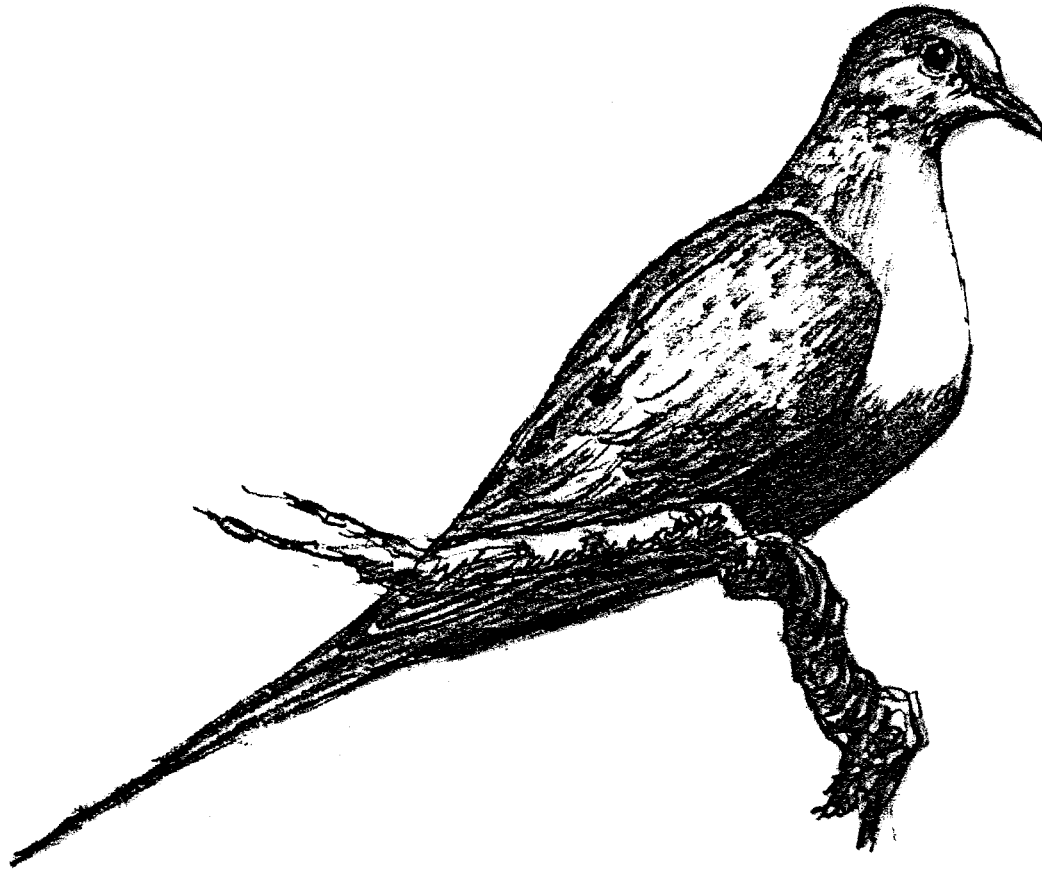
Mourning dove season opens on September 1. Doves are the most numerous game birds in North America, and Kansas usu-

ally has very high dove populations through the summer. Doves are migratory, meaning they fly south in the fall to avoid the cold temperatures. And it doesn't take very cold weather to make a dove migrate. If the weather is hot and dry in early September, there will be lots of doves, but if it's cool and wet, many will head south.

Dove hunting can be action-packed, especially when hunting near a pond

only one out of three.

Remember: ask your mom and dad about taking a hunter education course -- they might even take it with you. Then, with mom or dad's help, practice shooting before the sea-



ally has very high dove populations through the summer. Doves are migratory, meaning they fly south in the fall to avoid the cold temperatures. And it doesn't take very cold weather to make a dove migrate. If the wea-

ther is hot and dry in early September, there will be lots of doves, but if it's cool and wet, many will head south. Dove hunting can be action-packed, especially when hunting near a pond in the evening. You may see hundreds of birds fly by, but it's certainly not easy. You'll want to be sure to shoot a lot of practice shells before the season because doves fly fast and are hard to hit. Even good shooters will hit

only one out of three. Find a public hunting area near your home, or ask a landowner for permission to hunt. Your whole family can have a blast being outdoors together, hunting and learning about the Kansas outdoors.



nature's notebook

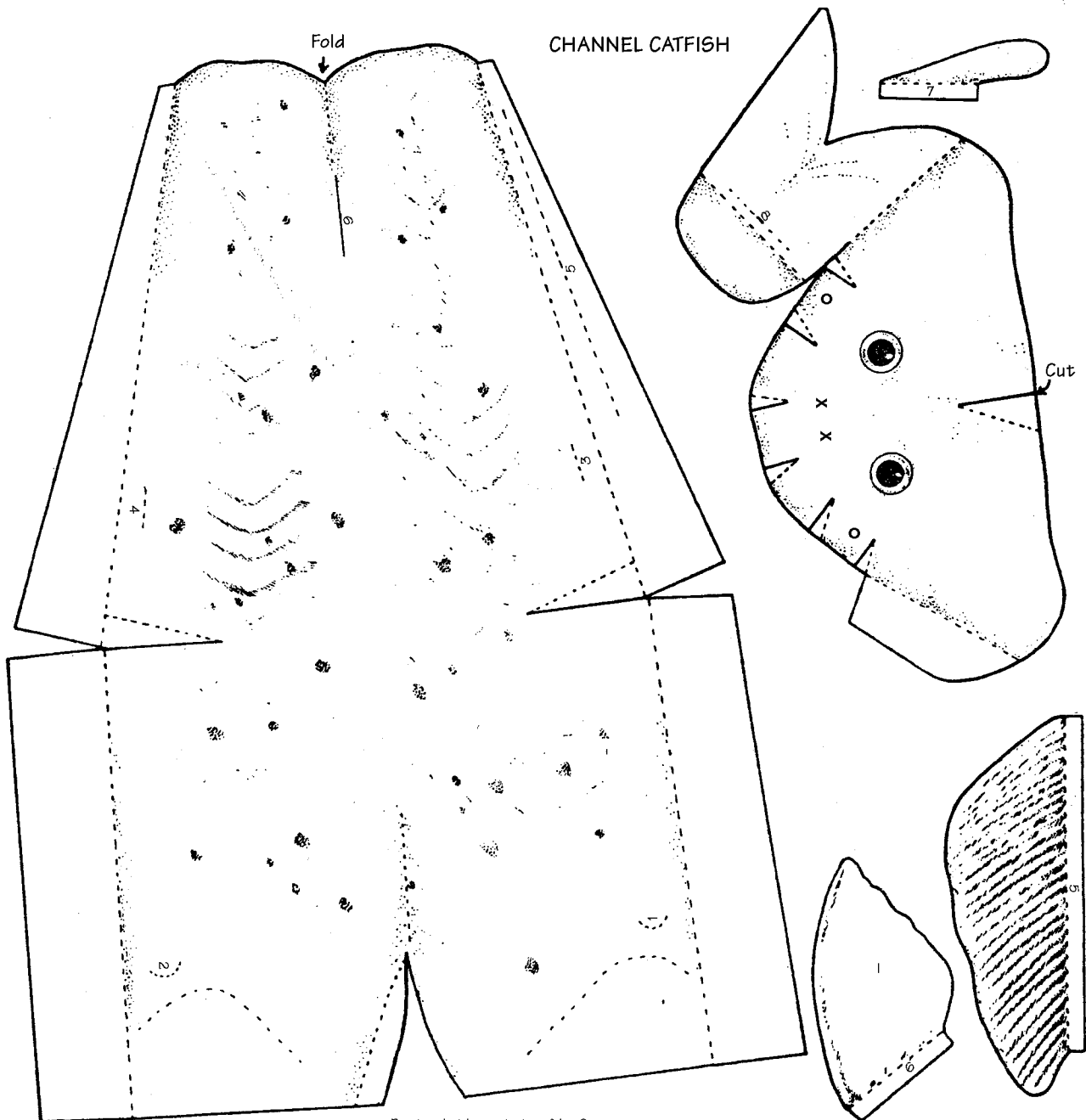
CHAPTER SEVEN

FISH & MUSSEL

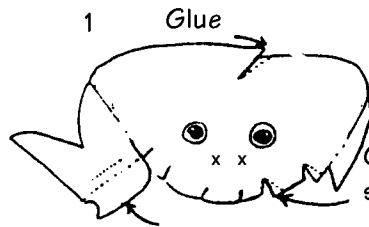
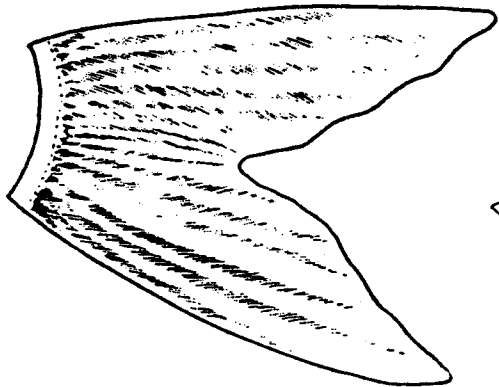
by Joyce Harmond Depenbusch

WILDLIFE
IN ANOTHER **DIMENSION**

Channel catfish are an angler's delight. Make a three-dimensional model of one by following the directions below. Copies of this pattern may be glued onto heavier paper, or a ditto master can be made, with copies run on construction paper. Have fun.

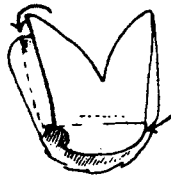
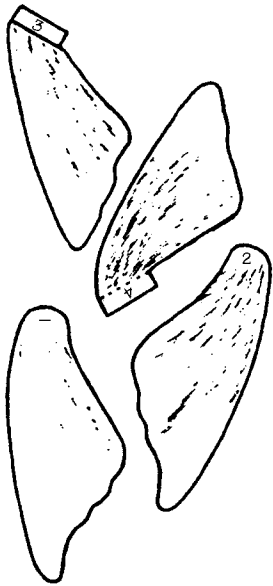


Reprinted with permission of Art Start



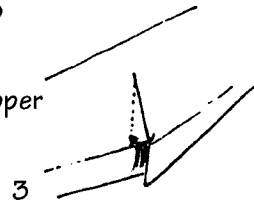
Glue flap over to dotted line to shape front of head.

Curl Tightly with scissors to form bottom lip.



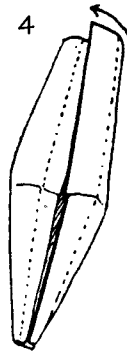
2 Glue V-shape flap under head to dotted line to close head.

Tuck bottom lip slightly under upper lip.

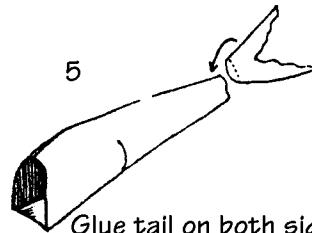


3

Glue slits on both sides over to dotted line.

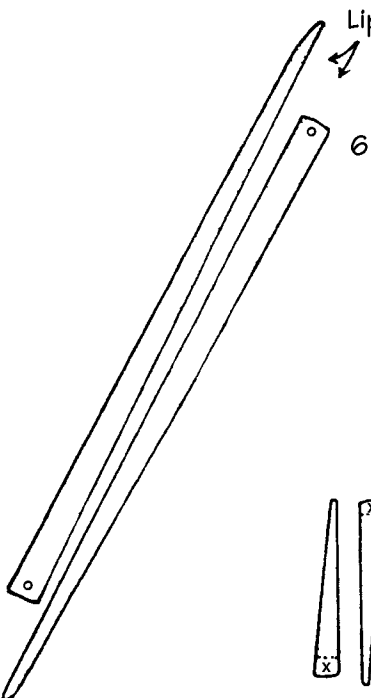


4 Glue bottom right side over left to the dotted line.



5

Glue tail on both sides at dotted line.



Lip barbels

6

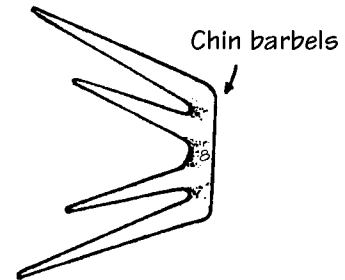
Glue head to body at bottom and at gill sections (marked on body by dotted lines).

7

Attach fins by matching numbers.
Attach short barbels on Xs on head.
Long barbels attach on O at each side of upper lip.



Short barbels



Chin barbels

by Joyce Harmond Depenbusch

FISH TO COLOR BY NUMBER

Kansas is lucky to have more than 120 species, or kinds, of fish. They vary in size from a 5 ½ foot paddlefish to a 1 ½ inch least darter. They vary in habitat from needing undisturbed, clean streams to being tolerant of warm, polluted water. And, they vary from drab gray to brightly colored. Generally breeding males are the most brightly colored.

Below are a few of the most colorful Kansas fish. Use the color chart to color these species.

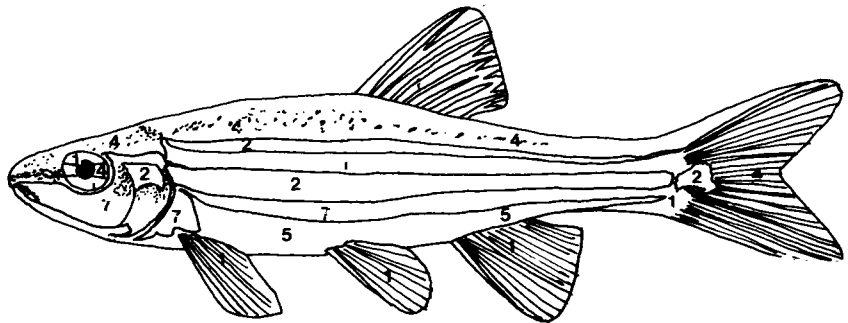
Color Chart

- | | |
|------------|-----------|
| 1 - Yellow | 6 - Blue |
| 2 - Black | 7 - White |
| 3 - Orange | 8 - Green |
| 4 - Brown | 9 - Gray |
| 5 - Red | 10 - Rust |

REDBELLY DACE

approximate length 2 ¾ inches

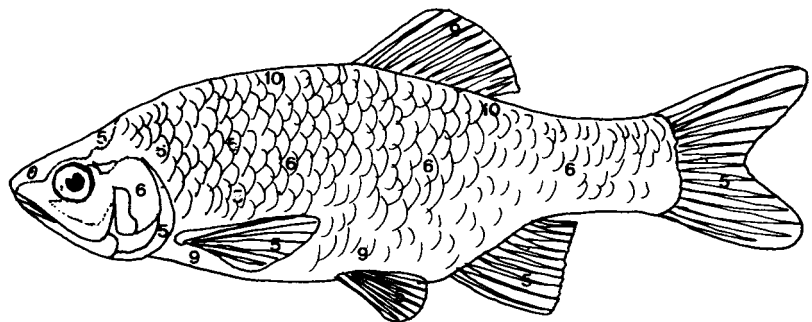
Redbelly dace have two dark stripes dividing pale areas on their sides. In spring the males have bright yellow fins with red on their bellies. Their preferred habitat is small, clear streams near springs. They eat tiny organisms, like algae.



RED SHINER

approximate length 3 inches

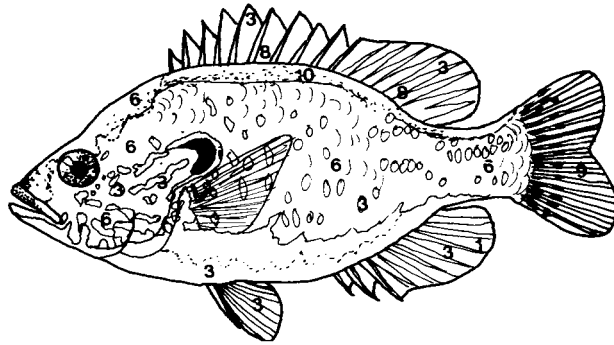
Red shiners are hardy and adapt to all kinds of waters in Kansas. They have been found in polluted streams that few other fish were living in. Breeding males have blue sides, and a red crescent behind the head. The lower fins are red, as is the top of the head. It eats small aquatic animals.



Named for its many spots, this species of sunfish lives throughout Kansas. Orange-spotted sunfish prefer shady streams, but tolerate a variety of conditions. It eats insects and is prey for larger game fish. The breeding male has blue and orange streaks on the sides of his head. His breast and fins are also orange. The "ear" flap is long with a black spot and white edge.

ORANGESPOTTED SUNFISH

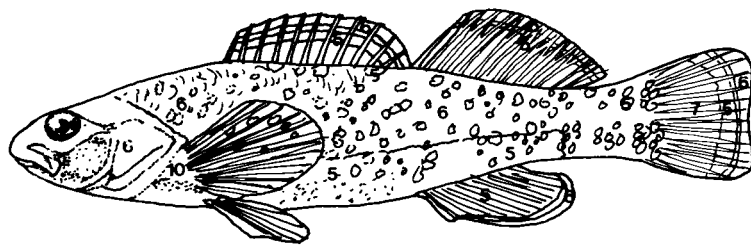
approximate length 4 inches



Generally a plain brown fish, the male redfin darter turns patriotic during breeding season. His fins have red, white and blue bands; his sides have red dots; and his anal fin is red with a blue border. Not abundant in Kansas, the redfin darter lives in streams with slow-moving currents and gentle riffles.

REDFIN DARTER

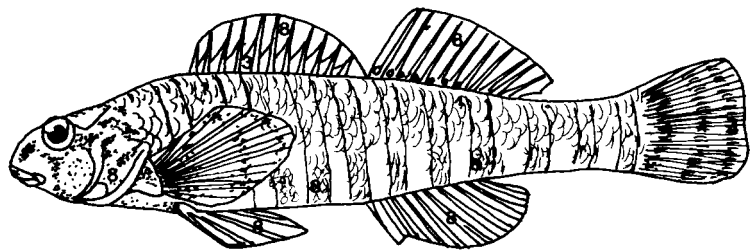
approximate length 2 3/4 inches



Named for the 9-12 bright green vertical bands on the male, banded darters are found in clear streams with deep riffles. The yellow-green fins of the banded darter have red spots at the base. Brown flecks cover its body. Ichthyologists, people who study fish, think this darter lays its eggs on stones or plants in flowing water. It eats insect larvae.

BANDED DARTER

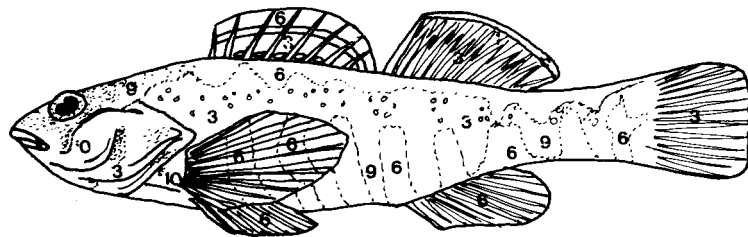
Approximate length 2 1/4 inches



Blue and orange bands cover the orangethroat darter's body. Breeding males have blue bands on their bodies, an orange dorsal fin with blue border, an orange tail and a solid blue anal fin. Small streams with shallow riffles are preferred habitat, but this darter can adapt to certain lakes and pools. Its tolerance of warm water allows the orange throat to be widespread in eastern and central Kansas. The orangethroat eats insect larvae, worms and fish eggs.

ORANGETHROAT DARTER

Approximate length 2 1/4 inches



by Dana Eastes

The Colorful Cardinal Shiner

Notropis cardinalis

In this Nature's Notebook, you will learn about a newly discovered fish in Kansas, called the cardinal shiner. You will also get to color, paint or do an ink resist and find out how brilliantly colored and interesting this little fish is.

The cardinal shiner makes its home in headwaters of the Neosho River Basin and in the Spring River located in the Flint Hills. Small populations are also found in Oklahoma, Missouri and Arkansas. Cardinal shiners

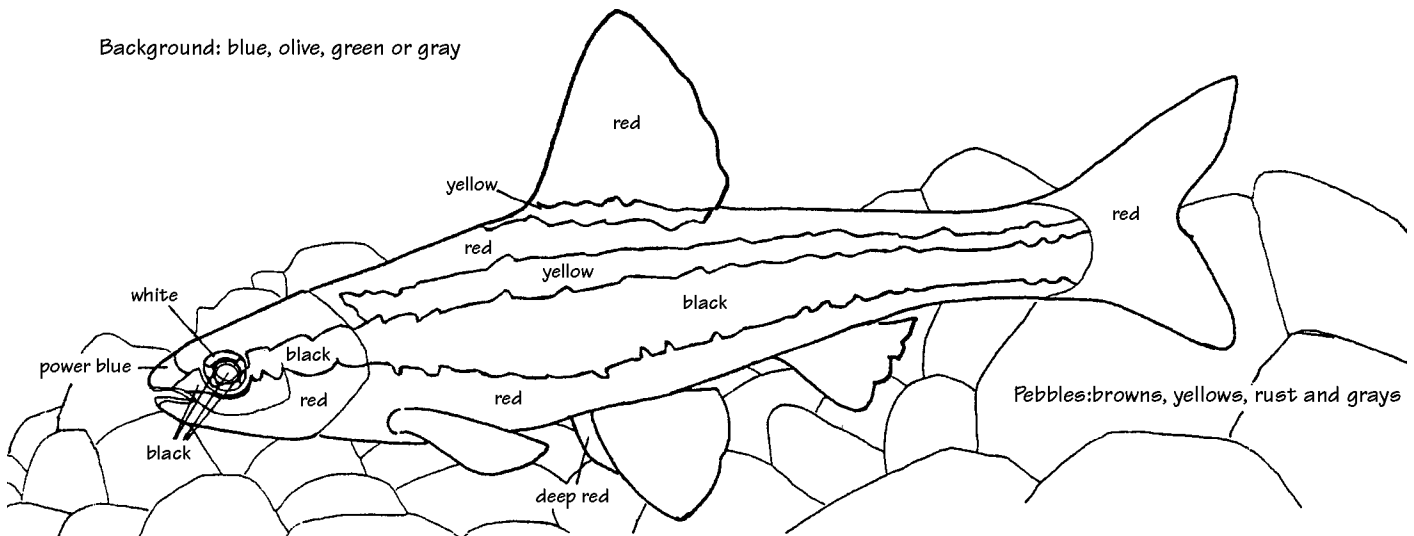
like small pools with current and faster water called riffles. They thrive in the gravel-bottomed, clear, cool streams and small rivers of the Flint Hills.

Cardinal shiners spawn in the spring and lay their eggs in small pit-like depressions dug by the males on clean, gravelly riffles. During the spawn, the males have a brilliant red body and fins and a blue snout. Females are not as colorful. Cardinal shiners can be 5 inches

long and live 3 years. They eat aquatic insects and insects that fall into the water.

This new minnow was discovered by Dr. Richard Mayden while doing his Ph.D. research for the University of Kansas. Dr. Mayden also discovered the dusky stripe shiner and the bleeding shiner. Although this unique little fish is new to the list of 139 Kansas fish species, its survival is threatened by the ongoing destruction of Flint Hills streams and river.

Background: blue, olive, green or gray



PAINT OR COLOR PROJECT

Follow the diagram above to color or paint the cardinal shiner on the following page.

MATERIALS: Crayons, markers, watercolors or tempera paint.

COLORS:

cardinal shiner: Crimson or bright red fins and body, with horizontal black and yellow stripes running the length of the body. A powder blue patch on the end of the snout.

Gravel or pebble habitat: rocks can be a variety of colors: browns, yellows, rust, and grays.

Background: Can be blue, olive green, or gray.

SUGGESTION: If you're doing this as a classroom or home project, drawing and painting materials will work best if you make copies from the magazine. You may even want to try a heavier paper in your copy machine. Try enlarging the image if you have that option.

INK RESIST PROJECT

Try an ink and crayon resist. This will give your picture a stained-glass effect. The ink will run into the cracks where there is no waxy crayon.

MATERIALS: water, sponges, india ink and crayons.

Using crayons color the cardinal shiner with its appropriate colors. Next, with a damp sponge cover your picture with india ink, wait a few seconds to let the ink soak into the cracks and wipe off the excess.

Cardinal shiner
Notropis cardinalis



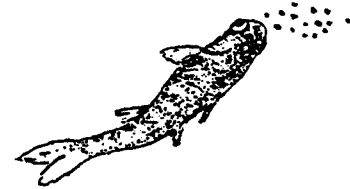
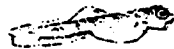
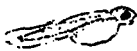
by Joyce Harmon

From Fry to Fins

Spring can be an exciting time for outdoor study. Take the opportunity to get outside and enjoy Kansas while you learn more about the environment.

As spring arrives you may

find your group's attention has wandered. Here are some ideas to keep everyone interested. Kansas prides itself with an excellent fish population. Let's learn more about **FISH!**



1 Set up a small aquarium. Have the children observe the fish for the following:

- How do they breathe?
- Why does the fish open its mouth so often?
- Do they have eyelids?
- How do they swim?
- Do they have ears?

Fish breathe with gills; people use lungs. Water goes into the fish's mouth and is forced over the gills. The gills take oxygen out of the water.

Fish don't have eyelids. We have eyelids to keep our eyes moist. Fish are always in

water, so they don't need eyelids to keep their eyes wet.

Fish have several fins to help guide them through the water. The shape of the fish's body and the scales on its body make it easier for the fish to glide through water.

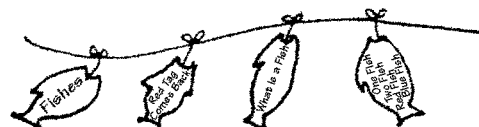


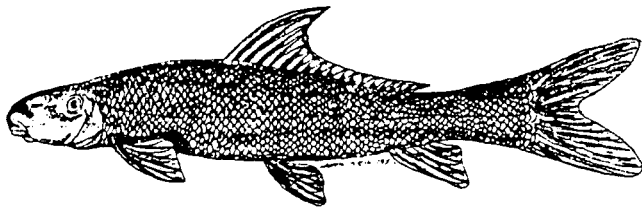
2 Set up a fishing reading corner in your classroom. Place a rubber raft, old boat, or small children's swimming pool in the corner of your room and label it with a sign like "Gone Fishin'" or "Fish Go to School," etc. Fill the boat with books on fish. Depending on the read-

ing level, here are some suggestions. One Fish Two Fish Red Fish Blue Fish by Dr. Seuss, Fishes in Kansas by Frank Cross and J. T. Collins, Fish Do the Strangest Things

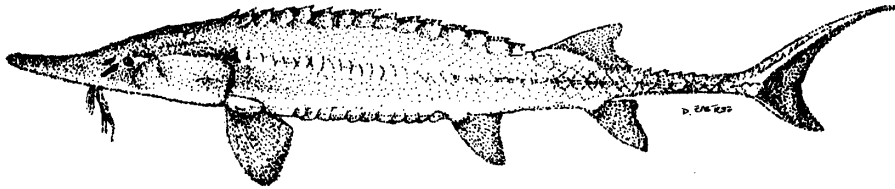
by Lenora and Arthur Hornblow, What is a Fish? by Gene Darby, and Red Tag Comes Back by Fred Phlager.

For a reading incentive, have the students put the name of each book they finish on a construction paper fish and the fish gathered on a yarn stringer.





3 Research the status of fish in Kansas. We have several game species that are described in a publication, "Fishing Guide to Kansas". There are also some threatened and endangered species of fish in Kansas such as the Neosho Madtom, Silverband shiner, Redspot Chub, Pallid Sturgeon, Arkansas River Shiner, and the Speckled Chub. What can be done for these fish?



4 Have students research what fish eat. Take a water sample to observe under a microscope in order to see the really small plants and animals.



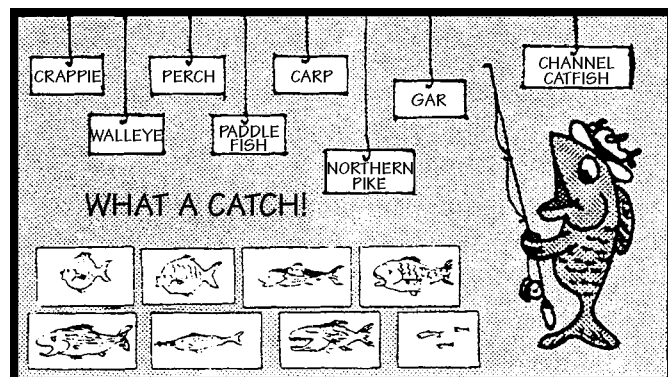
5 A fish art project might include making fish mosaics and mobiles from tissue and construction paper; or a messier alternative is:

Spray one side of the fish with hair spray. Paint one side of the entire fish including fins with acrylic paint. Wipe paint off of the eye. With the fish painted side up on a newspaper, press a sheet of paper on the fish. Gently but firmly

make sure the paper touches the head, body, tail and fins without the paper slipping. Too much paint will be a blur and too little will be faint. Paper towels work well for trial runs. The finished projects can be done on cloth or soft paper.

(Adapted from Multidisciplinary Wildlife Teaching Activities by Bill Hernbrode.)

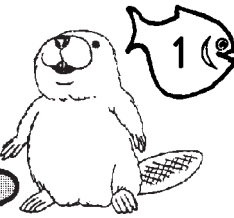
6 To accent your study of fish, gather pictures of common Kansas fish and put your students to work matching the fish to a name. (A good source of pictures is the publication, "Kansas Sport Fish.") Hang the fish names on string with bent paper clips for hooks. Use an old fishing pole or make a pole from cardboard and attach a hook less lure.



Add some fishy words to your vocabulary or spelling list:

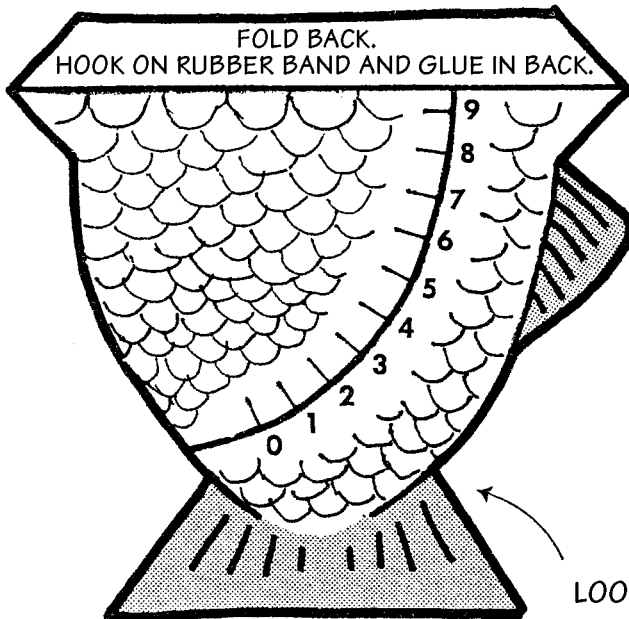
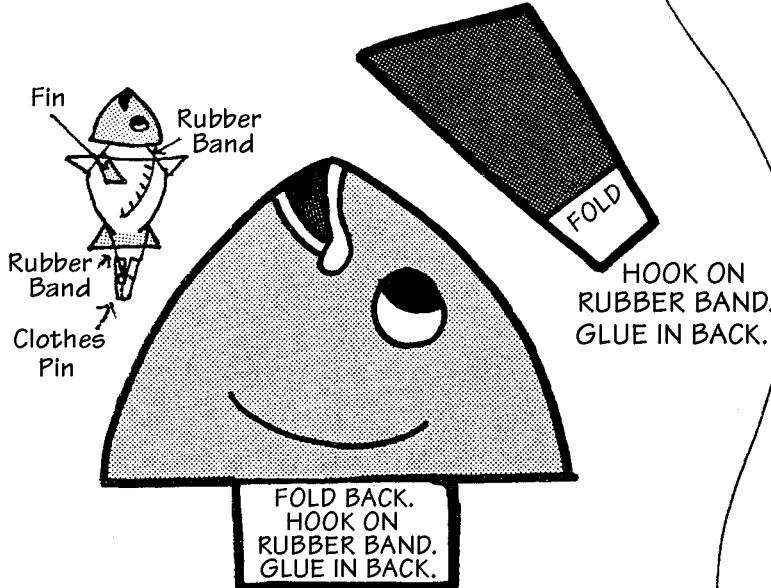
- | | | | | |
|--------|----------|----------|-------------|-------------|
| scale | fry | spawn | fingerlings | barbels |
| fin | oxygen | gills | anadramous | catadramous |
| school | stocking | hatchery | minnow | seine |

KID'S PAGE

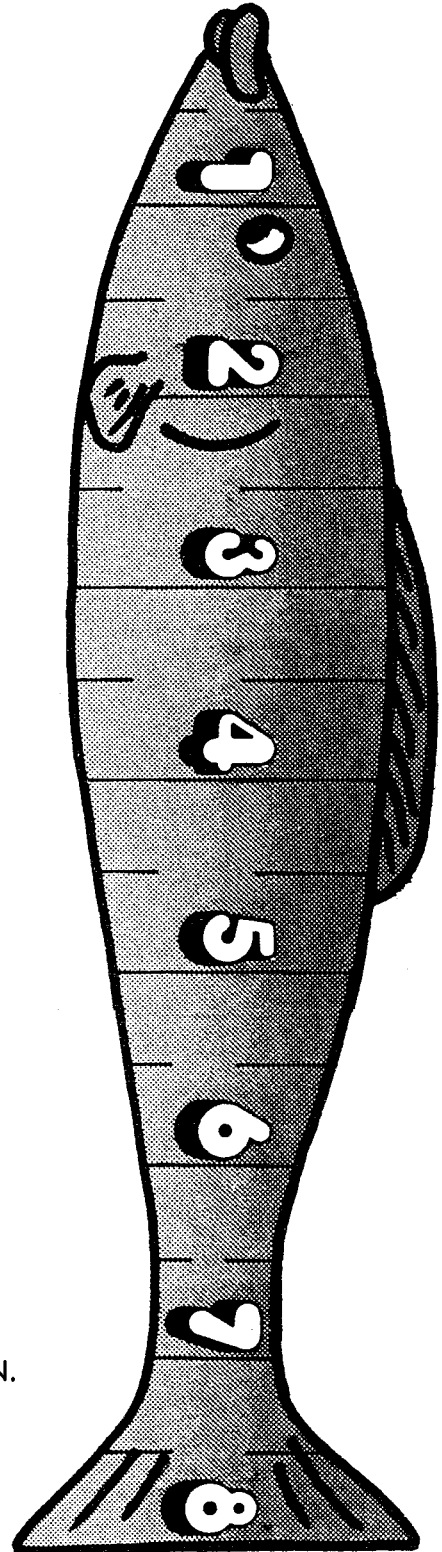


by Joyce Harmon

Measure the length of objects with this fish ruler. First, cut it out and glue it onto cardboard. Measure things in your house and at school to practice. Then go outside and measure leaves, fish and other things you find.



LOOP RUBBER BAND
AROUND TAIL HERE.
ATTACH CLOTHES PIN.



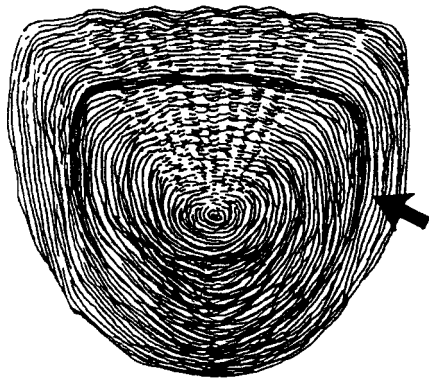
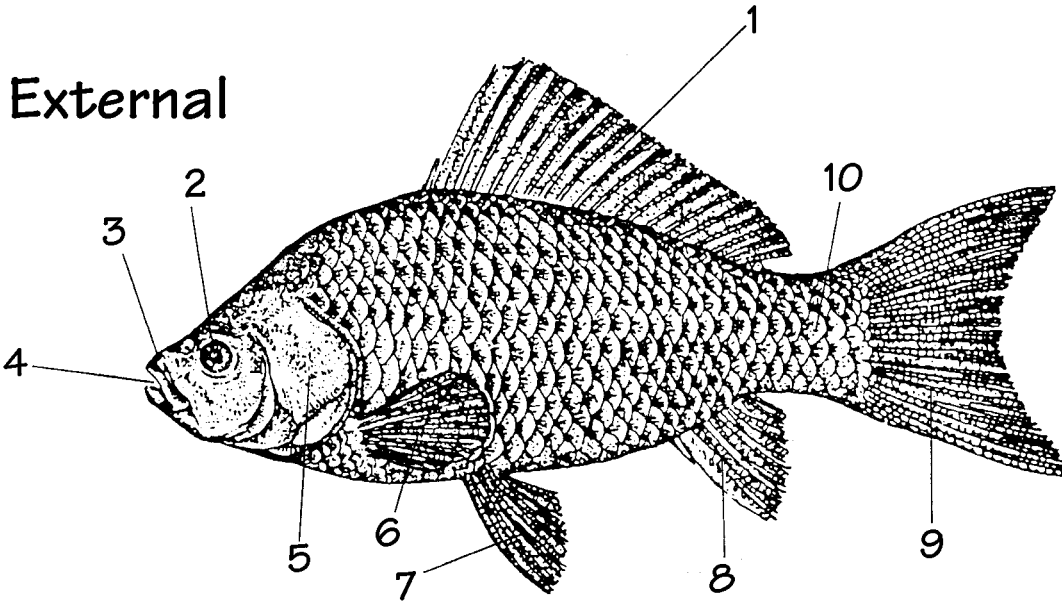
Measure the difference in weight of objects with this fish scale. Glue the pieces onto thin cardboard. Attach a rubber band to the head and glue in place. The fin goes on the same rubber band and hangs

in front of the body. Put a second rubber band around the tail and add a clothespin onto the end of the rubberband. Go ahead and compare weights of small objects. (Adapted from SCIENCELAND magazine)

ANATOMY OF A FISH



Study the body parts below then cover up the answer key and quiz yourself.



SCALE CLOSEUP

Fisheries biologists take scale samples from fish to determine age and rate of growth.

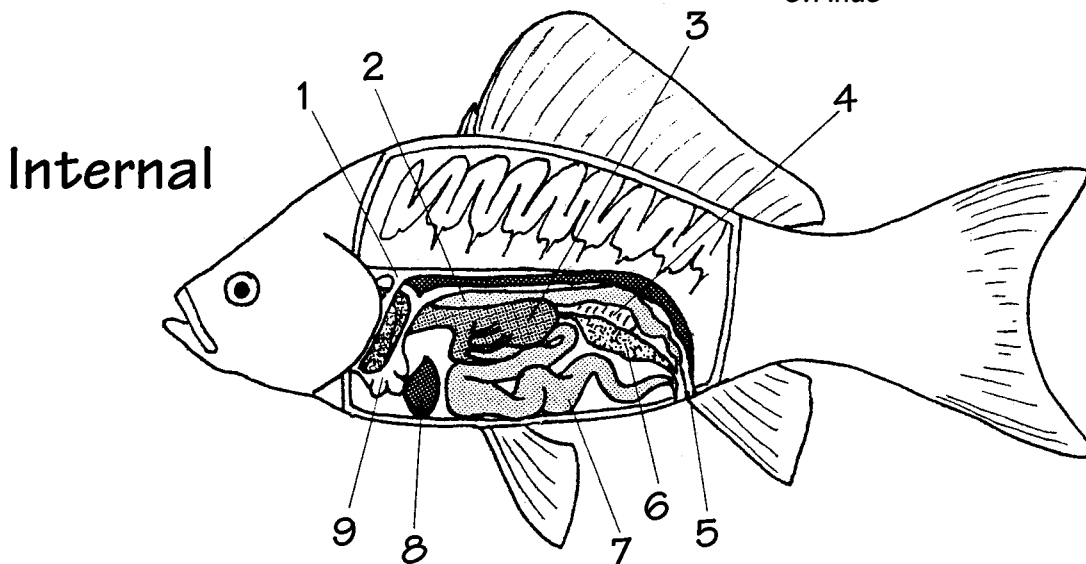
The dark line is an annulus that marks one year in the life of a fish. This scale is from a fish in its second year.

FISH - EXTERNAL

- | | |
|------------------------------|----------------------|
| 1. Dorsal Fin | 6. Pectoral Fin |
| 2. Eye | 7. Ventral Fin |
| 3. Nostril | 8. Anal Fin |
| 4. Mouth | 9. Caudal (Tail) Fin |
| 5. Operculum
(Gill Cover) | 10. Scale |

FISH - INTERNAL

- | | |
|-----------------|--------------|
| 1. Dorsal Aorta | 6. Ovary |
| 2. Kidney | 7. Intestine |
| 3. Stomach | 8. Liver |
| 4. Swim Bladder | 9. Heart |
| 5. Anus | |



by Marc Murrell

GO FISH

Fishing is something anyone can learn to do. You don't need fancy equipment, and getting started doesn't cost much. A new 5-foot rod and spincasting reel, complete with 6-pound test line, can cost less than \$15. (An even cheaper choice is a cane pole.) To this, add #8 or #10 hooks, split shot weights smaller than a pea, and a bobber about the size of a quarter. Throw in a dozen worms, and you're set for many a fishing journey for less than \$20.

If you don't want to buy a fishing pole, make one out of an aluminum can. Tape the end of your fishing line to the middle of the can and wrap it 15 or 20 times around the lower

half of the can. Attach your hook weight and bobber to the line. Holding the end of the can opposite from your line, gently ease the can back, and swing it forward like a tennis racket. The line will spool off the can, and you're fishing!

In Kansas, kids don't have to buy a fishing license until they are 16 years old. Many areas offer free fishing on city ponds or lakes. Look for places where fish might like to hide, like docks, rocks, trees and bushes in water, and weeds close to shore. The bobber should be close enough to the hook to keep it off the bottom.



There are two kinds of bait. Live bait includes worms, minnows, grasshoppers, and crickets. Artificial bait looks like live bait and can be used over and over again. Spinners, spoons, and jigs are good artificial bait, but live bait is best for beginners. And fish love it.

The three most common fish in Kansas are bluegill, channel catfish, and largemouth bass. Bluegill is a small fish that rarely weigh more than one pound. Channel catfish have no scales and can weigh as much as 30 pounds. Largemouth bass are ferocious, leaping fighters that can weigh 10 pounds or more. Of course, most fish are much smaller than these weights.

When you catch a fish, handle it carefully. All fish have sharp fins, and some have teeth. Hold it firmly around the body and gently remove the hook. If you plan to eat the fish, place it on a stringer or in a fish basket and put it back in the water. If you let it go, gently release it in the water.

Fishing can provide hours of summertime fun. It's great for families and people of all ages. If you like to fish, take someone along who hasn't ever done it -- even if it's your mom or dad!



FUTURE FISHERMAN CODE

- * **I Always Practice Safe Fishing.** I am careful when casting. I handle all fishhooks carefully. I wear a life jacket when I am in a boat or when I am near deep or running water.
- * **I Am A Courteous Fisherman.** I Don't Litter. I pick up all extra line, leftover bait, candy wrappers and other trash. I don't get too close to someone else who is fishing.
- * **I Obey Fishing Laws.** I have a fishing license when required. I know the size, kind, and number of fish I'm allowed to keep.
- * **I Respect The Outdoors.** I observe but do not disturb other wildlife that live around the water. I release fish right away if I don't plan to eat them.
- * **I Invite My Friends To Go Fishing With Me, And Help Others Learn To Fish.**

by Mark Shoup

NATURAL MUSSEL

No, this is NOT a story about Arnold Schwarzenegger. We're talking mussels, not muscles, although these critters are plenty strong. In fact, inside its hard shell, muscle is about all there is to a mussel, or so it would appear.

Anyone who has ever opened a mussel shell has noticed a large muscle called the "foot." The foot is used for movement and for holding the animal to the bottom of a stream or lake. If conditions are just right, the mussel's foot may hold it in the same place its entire life. However, the foot can be used to pull the animal along if, say, it is stuck in a pool that is drying up. Mussel trails have been seen on sandbars where the animals have dragged themselves in search of deeper water.

Although the foot may be the most obvious mussel organ, the animal actually has most organs of other animals -- heart, stomach, kidney, reproductive organ, liver,



mouth, and gills. The mussel's gills are used for breathing, just like fish. The gills collect microscopic food the animal eats and also provide a growth chamber for larval mussels.

Although mussels come in many shapes, many species look alike. It takes a practiced eye to tell one from another. However, they all have layers of non-living material in the shell made mostly of calcium carbonate. The outer shell is usually dark gray, green, or brown and has ridges, growth lines, and bumps called "pustules." The two parts of the shell are joined on one side by the "hinge."

It is the inside of the mussel shell, however, that has created so much interest in this small creature. Called the "nacre" [pronounced NACK-er], this smooth

and colorful shell surface is also known as mother-of-pearl. The nacre of bluefer mussels is especially beautiful, having a deep purple cast.

The beauty of the nacre has led commercial harvesters to collect mussels for use in making rings, necklaces, and earrings. But before the invention of modern plastics, the most common use for mussel shells was in the making of buttons. This was once a multi-million dollar industry in many states.

Today, most harvested mussel shells are sold to Japan, where they are cut and shaped into round pellets that are inserted into pearl oysters. The oysters are then placed in cages in seawater until they produce a pearl around the shell pellet -- anywhere from six months to three years, de-

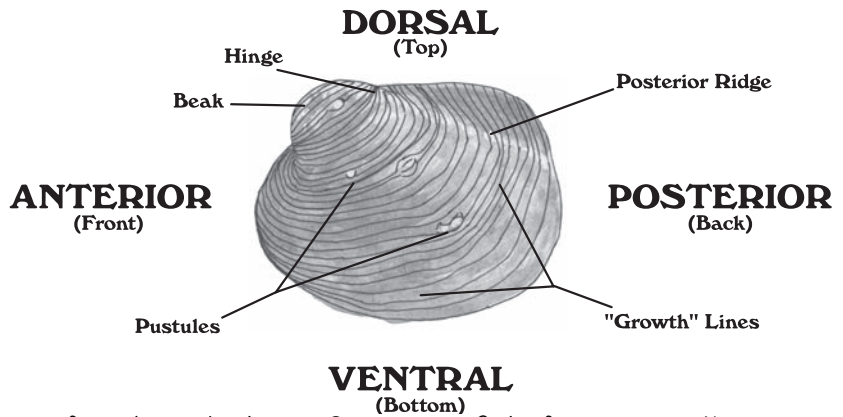
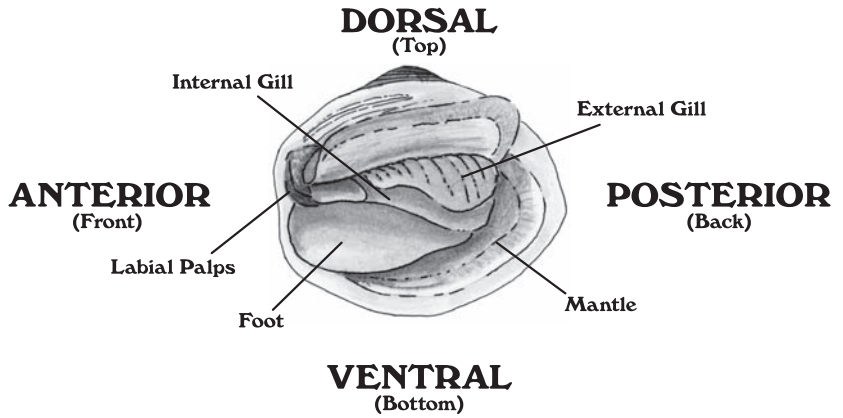
pending on the size of pearl desired.

Such pearls are called "cultured" pearls. Natural pearls occur when a mussel (or an oyster) gets something like a grain of sand stuck in its tissue next to the mantle, which covers the inside organs. In response, the mussel secretes mother-of-pearl to surround the grain. Eventually, this creates a pearl.

Only about five in every 100 wild mussels produce a pearl, and most of these are oddly shaped and of little value. Round natural pearls are extremely rare and may sell for several hundred dollars apiece.

Before pioneers settled in Kansas, about 42 native mussel species inhabited Kansas waters statewide. Native Americans found them a ready food source and used their shells for decoration. Today, only about 38 remain, and most are in low numbers. Of these, one is endangered and ten are listed as Species In Need of Conservation.

Commercial value may be one



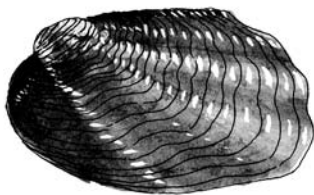
reason for their decline. Some harvesters disobey the law and take species that are protected, take mussels from off-limits waters, or violate size limits.

Only four native Kansas mussels -- the threeridge, monkeyface, mapleleaf, and bleufer -- can be legally harvested.

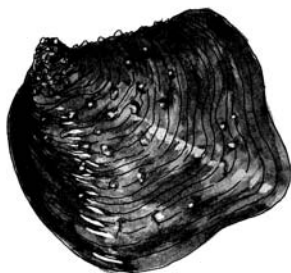
Of course, harvesting is not the only reason for mussel decline. Erosion, construction, river dredging, and pollution from chemicals and city wastes can kill mussels. Because of this, mussels are an important indicator of environmental health. If mussels are dying, something might be wrong with the waters they live in.

Mussels are fascinating creatures, and their names reflect this. Next time you're floating in your favorite stream or pond, think about critters with names like elktoe, giant floater, purple wartyback, pigtoe, snuffbox, bankclimber, monkeyface, and pistolgrip. Who knows? You might find a pearl.

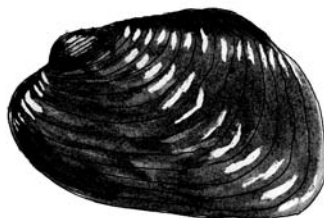
Threeridge



Mapleleaf



Monkeyface



Bleufer

CHAPTER EIGHT

FOSSILS

FASCINATING FOSSILS

by Joyce Harmond Depenbusch

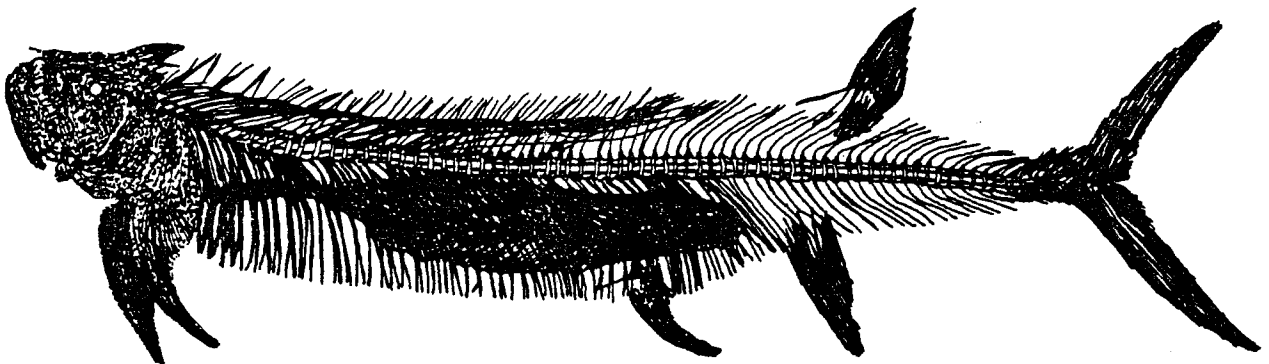
How have the species of living things changed through time in Kansas?

Fossils are signs of life formed thousands or millions of years ago. Scientists, called **paleontologists**, use them to discover what kind of life has been here and when it lived in our state. Generally, the oldest fossil layers have simple life forms, while more complex animals are in the more recent fossil layers.

The many fish and other aquatic animal fossils

found in the state suggest that Kansas was underwater at one time. This illustration shows the famous fish-within-a-fish fossil in the Sternberg Memorial Museum at Fort Hays State University. The fossil was collected in Gove County in 1952 by George Sternberg. It was in a Kansas Cretaceous chalk bed. These fish species lived about 135 million to 65 million years ago.

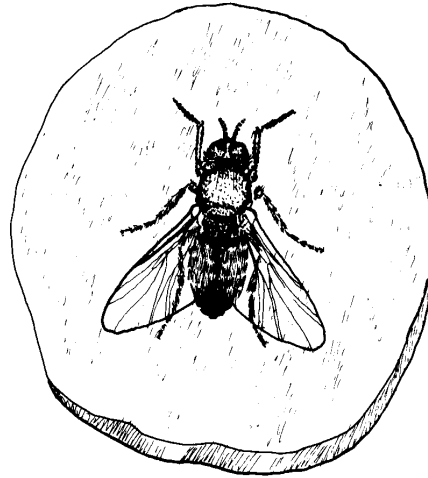
At that time Kansas was covered by an ocean. Paleontologists think that the larger fish, a 14-foot **Xiphactinus**, swallowed the 6-foot **Gillicus**. Because the smaller fish was too big, the **Xiphactinus'** stomach ruptured, causing it to die. The fishes sank into the soft mud of the ocean floor. When the ocean dried, the hardened mud preserved the fish.



Fossils may be formed several ways. On rare occasions the whole organism may be preserved when tree sap hardens into clear **amber**. More commonly, a dead organism is quickly covered with sand or silt, slowing decomposition. A

fossil of the organism is formed if the sand or silt turns to rock. Fossil **molds** are the imprints of organisms. Fossil **casts** are made when the mold is filled with sedi-

ment that later turn into rock. Ice has preserved specimens, such as the woolly mammoth in Siberia. The bone, hair, internal organs, muscles and blood of these frozen fossils are maintained under layers of ice.



FLY IN AMBER

Now that you know how real fossils are made, you can make your own fossil-like models. You'll need modeling clay, plaster of Paris, petroleum jelly, water, container and artifacts, such as leaves, bones, or shells.

Cover your work area with plastic or newspaper. Rub a thin layer of petroleum jelly on a leaf, bone or shell.

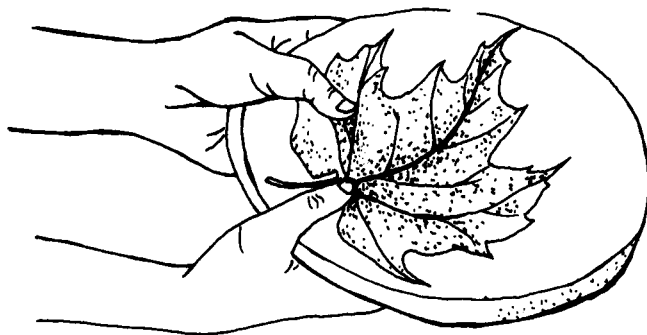
Press the side of the

object with petroleum jelly into modeling clay. Remove the object carefully, leaving an outline, or imprint, of the object. Now you have a mold.

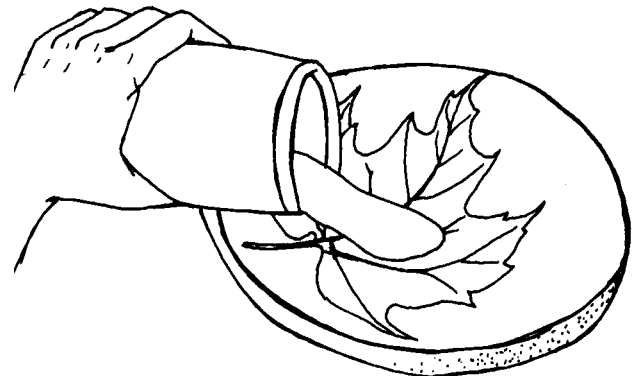
To make a cast, coat the clay mold with petroleum jelly. Mix the plaster of Paris with water until you have a thick batter like consistency. Pour the plaster into the clay mold. Peel the

clay away when the plaster cast is dry.

For amber like fossils, place a few drops of nail polish or clear glue on waxed paper. Put a dead insect, leaf or other artifact on top of the polish or glue. Let the polish or glue harden. Continue to add a few drops of glue or polish as each layer dries until the artifact is completely covered.



MOLD



CAST



nature's notebook

CHAPTER NINE

GENERAL WILDLIFE

ANIMAL TALK

Take a walk on the wild side. Challenge your sense of hearing in the great outdoors.

You can do it in your neighborhood, or even better, grab your parents and head to a state park or wildlife area.

As you walk quietly, listen for wild sounds. You may or may not see an animal, but you can identify it by its sound.

Animals make sounds for different reasons, such as attracting mates, defending territory and fear. A cardinal sings to warn others to stay out of its neighborhood, and at the same time, it might be trying to attract a mate. A squirrel will chatter to alert others of your intrusion. Prairie dogs will warn other town members of danger by making a high-pitched chirp or yip, sounding like a small dog.

Animals will also use calls for more social reasons. A mallard duck will call to the rest of the flock to let them know where food can be found. Sitting on a hill, a coyote may howl, just to let other coyotes know that its there. Like all animals, a coyote can communicate fear, defend territory and attract a mate with the different sounds it makes.

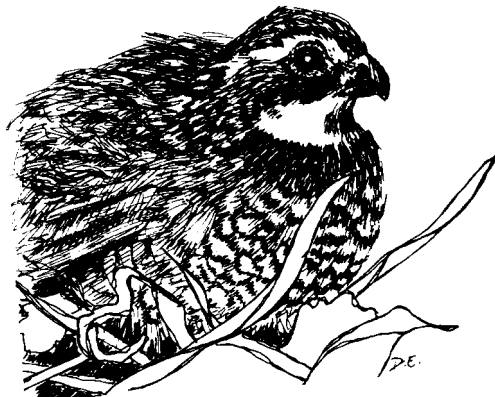
Many animals are named by the

sounds they make such as the bobwhite quail and the black-capped chickadee.

Here are just a few animals you may hear on your next walk on the wild side. Try this animal talk with your classmates or at home with your family. If you would like to identify more animals by the sounds they make, ask your teacher to order materials such as records, tapes or films from the Kansas Department of Wildlife and Parks Ref. Ctr., 512 SE 25 Ave., Pratt, KS 67124. The next time you're outdoors turn on your ears and try to identify animals by the sounds they make.

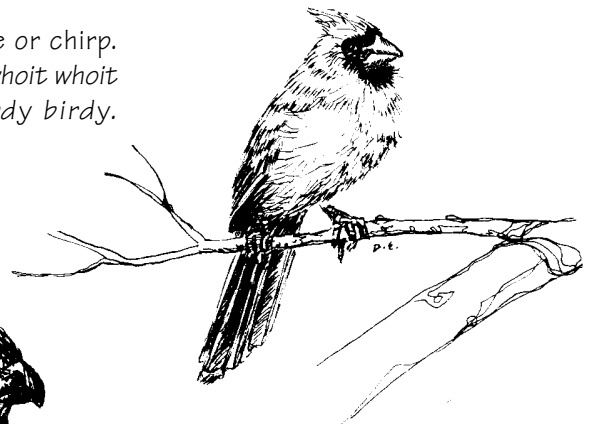
Cardinal

Song, a loud high whistle or chirp. *what - cheer cheer cheer, whoit whoit whoit or birdy birdy birdy birdy.* Note, a short thin chip.



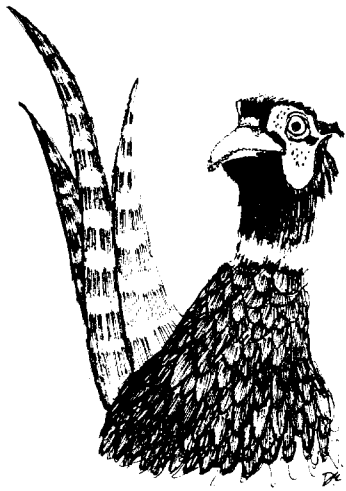
Prairie dog

A high pitched yip or chirp. *chirp, chirp, chirp. yip, yip. yip.*



Bobwhite Quail

Bob - white! or *Poor, Bob - whoit!* Covey call, *ka - Loi - kee?* Answered by *whoil- kee.*



Ring-necked Pheasant

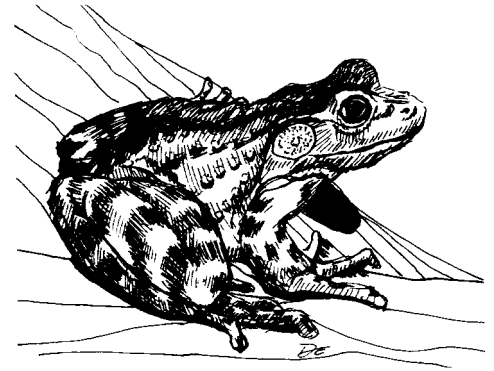
High-pitched kutuck - kutuck

Loud double squawk, kork - kok



Red-tailed Hawk

An raspy squeal, keeer -r -r -r
(slurring downward)



Bullfrog

Low-pitched and gravelly

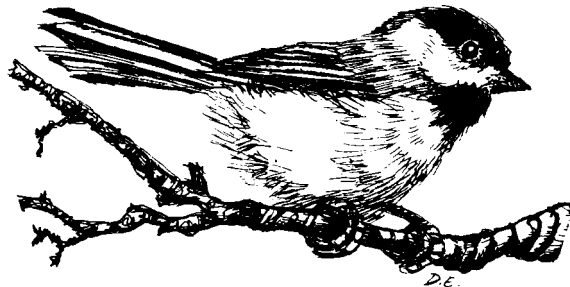
Aarr - rumph, Aarr - rumph



Flicker

Song, aloud wick wick wick wick.

Notes, a loud klee - yer and squeaky
flick-a, flick-a.



Black-capped Chickadee

A clearly enunciated
chick-a-dee-dee-dee or dee-dee-dee.

Song, a clear whistle, fee-bee-ee or
fee-bee

Coyote

Howls and yips

Howls: ahu. ahu. Haahh-o-o-o-o-o-!

yips: a high pitched shrill.

yip,yip yip yip, yip



Squirrel

A scolding rattle.

chuck chuck, chuck chuck chuck chuck

by Joyce Harmon

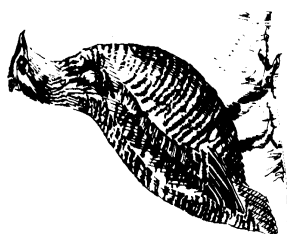




Don't miss exploring outdoors and discovering more about wildlife. Check off what you see. You do not need to pick anything.

B I N G O

SOIL 	CLOUD 	FLY 	BIRD SINGING 	LEAF
PRAIRIE 	WIND 	TREE 	SEEDS 	AN ANIMAL MOVING
AN ANIMAL EATING 	SPIDER 	free	BUTTERFLY 	FLOWER
FISH 	GRASS 	HOLLOW LOG 	HILL 	NEST
LAKE, STREAM OR RIVER 	RAIN OR DEW 	MUSHROOM 	SHADOW 	PINE CONE

How much can you learn and observe of wildlife each month? Use these calendars to help guide your study.

AUGUST

<p>1st week</p>	<p>"He who knows what sweets and virtues are in the ground, the waters, the plants, the heavens and how to come at these enchantments is the rich and loyal man." -Emerson</p>		<p>August 2, 1868 Opening of the first upland game bird season. Before this time these birds were not protected by law.</p>	<p>Upland- The higher ground of a region, above the level where water flows. Upland game animals include prairie chicken, pheasant, quail etc.</p>	
<p>2nd week</p> <p>August 1954 Passage of U.S. policy on fish & wildlife conservation at small watershed projects. The goal of this policy was to conserve the nation's land and water and the wildlife that depends on it.</p>	<p>Watershed- The area drained by a river, stream or creek.</p>		<p>August 9, 1950 Passage of the Dingell-Johnson Act (O.J). The funds from taxes on fishing equipment are used for fish restoration projects.</p>	<p>Observe the fish in your area. How many species can you identify?</p>	
<p>3rd week</p> <p>Explorers Long and Pike labeled Kansas the "Great American Desert". The name remained on maps until after the Civil War.</p>	<p>Prairie- Land with grasses and flowering plants; grass-land</p>		<p>What species of wildlife would you expect to find in short, mid, and tall grass prairies in Kansas?</p>	<p>Species- A group of individuals that resemble one another and are able to breed among themselves but not able to breed with members of another species.</p>	
<p>4th week</p> <p>Be aware of Hunter Safety Education courses in your area getting organized for fall.</p>	<p>If you were born on or after July 1, 1957 you must have a hunter safety card to hunt or purchase a hunting license.</p>	<p>Hunting ethics- The standards or rules of conduct of a good sportsman; showing respect for wildlife habitat and people</p>	<p>Make a list of the reasons you think hunting ethics and law enforcement are important to wildlife and people.</p>	<p>The job of the game protector is - to conserve wildlife through education and law enforcement.</p>	

by Joyce Harmon

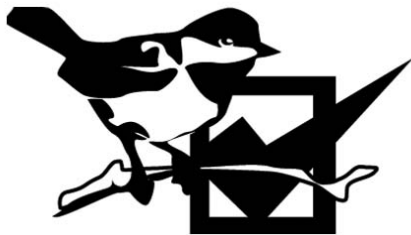
Symbols of Significance

Symbols are letters, figures or other characters used to represent something. The Kansas Department of Wildlife & Parks uses several symbols. How many of these have you seen before?

A buffalo and prairie grass combine to form the symbol or logo for the Kansas Department of Wildlife

& Parks. This agency is responsible for managing all wild-life and habitat resources in the state.

Each of the 50 states has a similar agency.



This chickadee represents 22,600 nongame wildlife species found in Kansas. Wildlife & Parks' Nongame Wildlife Improvement Program or "Chickadee Checkoff" works with all wildlife that is not hunted, fished or trapped. Tax-payers can make donation to the program on their state tax form each year. The program has helped

reintroduce swallowtailed kites and mountain plovers, provided bird feeders to nursing homes and enhanced a wide variety of research and educational programs. Don't forget to take the opportunity to help with these important projects when tax time rolls around.



The prairie chicken symbolizes the abundance of wildlife we have in Kansas. Understanding and appreciating wildlife and habitat are the goals of the Wildlife Education Service. This program provides free educa-

tional materials to Kansas schools and workshops for Kansas teachers. Education is needed for young and old to be more aware of the value of our wildlife resources.



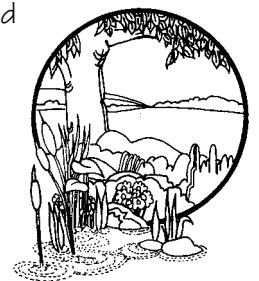
wildlife education service

W.H.I.P. is the nickname for a very important project going on across the state. See if you can figure out what each of the letters stands for by completing the puzzle below.

W $\frac{9}{1} \frac{12}{2} \frac{4}{9} \frac{12}{20} \frac{9}{1} \frac{6}{20} \frac{5}{20}$
 H $\frac{1}{13} \frac{2}{16} \frac{9}{18} \frac{20}{15} \frac{1}{22} \frac{20}{5} \frac{20}{13} \frac{14}{5} \frac{20}{20}$
 I $\frac{18}{18} \frac{15}{15} \frac{7}{7} \frac{18}{18} \frac{1}{1} \frac{13}{13}$
 P

Wildtrust is another Wildlife & Parks program that lets people help in the important role of conserving our natural resources. Individuals can make tax-deductible donations to help the cause of wildlife. These donations brighten the future for wildlife and for future generations of Kansans.

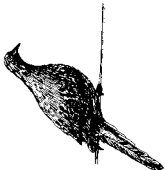

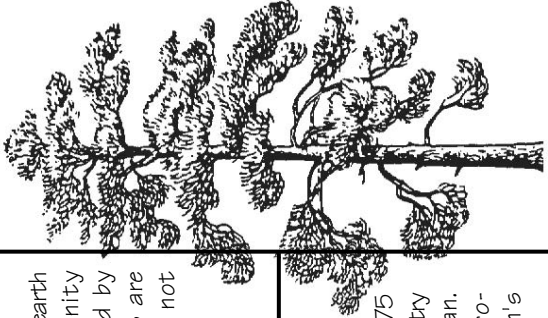





WILDTRUST



KEY: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

SEPTEMBER

As the days become shorter and we enter the special season of autumn, here are a few things you should be aware of.

<p>1st week</p> <p>Opening of dove hunting season.</p> 	<p>Pittman-Robertson Act. Passed September 2, 1937. Provides funds from excise taxes on hunting equipment to be used for wildlife restoration, research and land acquisition.</p>	<p>Conservation- Wise use of natural resources.</p>	<p>September 3, 1964 Passage of the Wilderness Act to preserve national wilderness areas.</p>		<p>Wilderness- An area where the earth and its community are untrammelled by humans. Humans are visitors who do not remain.</p>	
<p>2nd week</p> 	<p>Habitat- The place in which an animal lives. It must include food, water, and cover. This involves escape cover, winter cover, cover to rear young, and space to play. Loss of habitat is the biggest single threat to wildlife.</p>	<p>Study the habitats around you. Use all of your senses. What smells, sounds, feels or looks different in the fall?</p>	<p>Name some renewable and some nonrenewable resources.</p>	<p>Hunt- To search for game animals for the purpose of catching or killing. Hunting is now regulated under comprehensive laws in every state. Sport hunting removes the surplus of wildlife.</p>	<p>September 10, 1875 The American Forestry Association began. Its goal is to protect the nation's forests.</p>	
<p>3rd week</p> <p>Game- Animals that can legally be hunted, fished or trapped.</p>		<p>Study the sun and observe shadows.</p>	<p>Fall equinox- Day and night are equal in length.</p>	<p>Study the sun and observe shadows.</p>	<p>NATIONAL HUNTING & FISHING DAY Sept. 24, 1983</p>	
<p>4th week</p> <p>Migratory- Birds and other animals that make an annual trip to a different area. Distance may be long or short, depending on the species.</p>	<p>Observe flight activity of birds for several weeks. What directions are the flocks headed? What kinds of birds are they?</p>		<p>Flock- Group of birds, sheep or goats. Count the birds in each flock you see.</p>	<p>Diving ducks- Ducks that prefer deep water as in lakes and bays. They feed by diving below the surface and take flight from a running start.</p>	<p>Puddle ducks- Ducks that prefer shallow water. They are surface feeders and take off nearly vertically. Also called dabbling ducks.</p>	

Sunflower State Symbols

by Joyce Harmon

On January 29, 1861 Kansas became the 34th state to enter the Union. We celebrate January 29 as Kansas Day in recognition of the state's historic past and promising

future. Many symbols have been established to represent the spirit of the state. Kansas' state symbols include an insect, bird, mammal, tree, and flower. All of these are yellow and brown in color.

There have been campaigns to select a state fish. We also have a state song, "Home on the Range", and a state motto, "Ad Astra per Aspera" (To the stars through difficulties).



State Tree — Cottonwood

A riparian (streamsideside) tree, the cottonwood grows rapidly, making it a good source of wood. Cottonwoods also provide important shade for wildlife and humans. In fall, the green leaves turn bright yellow. The nickname "pioneer tree of

Kansas" is appropriate because the cottonwoods seem to be found where few other plants have grown. They also provided a resting place for pioneers along the trail. The cottonwood was selected as the official state tree in 1937.

State Bird — Western Meadowlark

The Western Meadowlark was selected by Kansas school children in an election on Kansas Day, 1919. The Kansas State Legislature made the election official in 1937. This colorful bird announces its presence with a loud flute-like song. The meadowlark has a black V on

its bright yellow breast. The remainder of the bird's body is a mixture of brown, black and white. This common Kansas bird is helpful to farmers because it eats insects and many weed seeds that can harm crops. Meadowlarks are often seen perched on fences along the highway.



State flower — Common Sunflower (Helianthus)

Twelve kinds of sunflowers grow in Kansas. The tallest species is the wild native sunflower or Helianthus. The yellow petals and brown center of this flower can be seen in fields or on roadsides, always facing the sun. Pioneers wrote about the beautiful sunflowers along

the trails. Wild sunflower seeds are food for many bird species. Domestic sunflowers are raised for seeds, as well as oil. The governor declared the wild native sunflower as the official state flower in 1903. Since then, Kansas has been known as the "Sunflower State."



State insect — Common Honey Bee



The common honeybee was imported to Kansas from Italy. Yellow and brown bands color this bee's abdomen. These insects have long pointed tongues and work in social groups or castes. Each colony has one queen,

which lays eggs; drones, or functional males; and workers, which are undeveloped females. The industrious honeybee was chosen as the official state insect in 1976, after a campaign by Kansas school children.

State animal — American Bison

Once numbering in the millions statewide, the bison (commonly called buffalo) is now reduced to a few remnant herds scattered across Kansas. Bison tend to be gregarious, which means they live together in herds. The head, legs and lower shoulders are dark brown. The back is lighter

yellowish-brown; the horns are curved and black. Adults range in weight from 410 to 910 kilograms (900 to 2,000 pounds), with females being about 40 percent smaller than males. Bison graze on prairie grasses and forbs. This mammal was designated the state animal in 1955.



by Joyce Harmon

Wildlife Christmas Celebration

As you ready yourselves for the holidays, don't forget the wildlife in Kansas. Here are a few ideas that will help you celebrate with your feathered and furred friends:

"A CHRISTMAS TREE FIT FOR BIRDS"



You have a tree indoors — why not an outdoor tree, too? Try decorating an existing tree or shrub with some of the "ornaments" listed below. They're good for the birds any time of the year. Quantity of ingredients in seed mixture depends on what you have on hand, what kinds of birds

you want to attract, and the number of ornaments you want to make.

STRINGS OF CRANBERRIES AND POPCORN

If you string popcorn and cranberries for your tree, make a few extra strings for wildlife but add peanuts in their shells.

SUET CAKES

Use 1/2-pint milk cartons (or similar sized container), suet, and the same mixture (minus the peanut butter) as used for the Pine Cone Feeders.

Melt the suet in a double boiler or an old can. Pour the melted suet into the milk cartons until the cartons are about half full. Add seeds, rice, breadcrumbs, etc. until the cartons are nearly full. Mix thoroughly. While the suet is cooling put a twisted pipe cleaner in to form a handle. The suet should be hard in four to eight hours. Peel away the milk carton and hang your suet cake on a branch. A variation

of this same idea is to pour the mixture in empty halves of oranges and grapefruits. These may be suspended with yarn or a pipe cleaner.

PINE CONE FEEDERS

Roll pinecones in a mixture of bird seed, breadcrumbs, cornmeal, oatmeal, rice and peanut butter. The seeds and grains make the peanut butter less sticky and easier for the birds to eat. Use your fingers to tuck the mixture in between the pinecone scales. Hang the cone by attaching a piece of yarn or string.

COOKIE CUTTER ORNAMENTS

Use cookie cutters on stale bread to form ornaments. You might add peanut butter on one side and make a sandwich. Hang these with string or yarn. You can also hang assorted, shaped crackers by stringing thread through their holes.

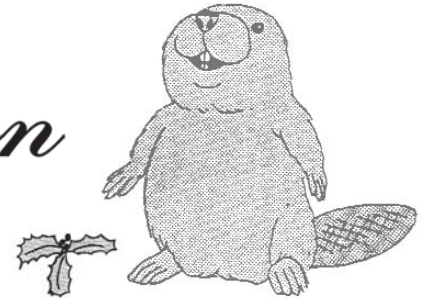


STRAWBERRY POPCORN

The chickadees enjoy strawberry popcorn tied in a bundle on a tree. Bunches of cranberries, firethorn (or pyracantha) berries, mountainash berries, and other fruits add color to your tree and wildlife certainly finds them a nice treat.

KEEP FEEDING

Once you start feeding the birds, please continue. Many of them come



to depend on you. They also bring a lot of cheer through the cold, drab winter months.

WHAT TO DO WITH YOUR CHRISTMAS TREE AFTER CHRISTMAS

Instead of discarding your tree, why not donate it to wildlife? An old tree can be piled with others or even alone, and be useful as a windbreak and cover for animals. Join your neighbors in a brush pile effort and enjoy watching the animals you attract.

For that hard-to-buy-for person on your list, consider purchasing a tree or shrub (to be planted in the spring or fall). Some that are equally attractive to humans and animals are: pyracantha (firethorn), dogwood, elderberry, Russian-olive, holly, wild cherry, mountain-ash, crabapple, hawthorn and snowberry. (Check with your local nursery for availability).

Other gift ideas are: a bird feeder or birdhouse, books on wildlife and outdoor activities, or a gift subscription to KANSAS WILDLIFE magazine.

ART PROJECTS USING FEATHERS FROM GAME BIRDS

Glue small feathers on the base of scotch, red or jack pine cones to make a turkey. Add pipe cleaners for wattles and eyes.

Use feathers for an attractive addition to a weaving or macramé project.



Glue feathers onto a picture for a 3-D effect.

(REMEMBER: These feathers must be from birds that are taken legally.)

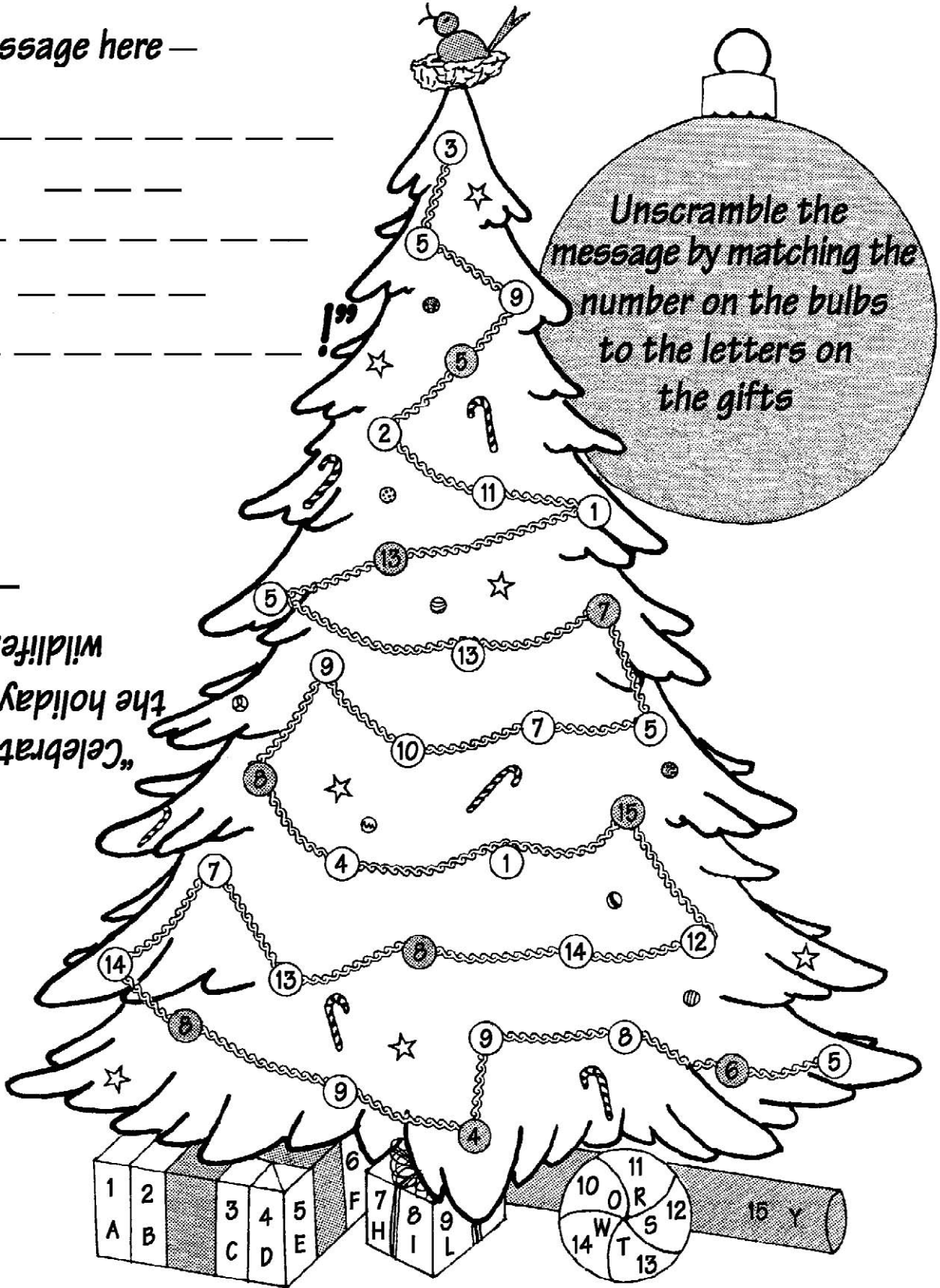
Write message here —

66

Unscramble the message by matching the number on the bulbs to the letters on the gifts

Answer —

“Celebrate
the holidays with
the wildlife!”



by Joyce Harmon

Wildlife Dough Ornaments

DECORATE YOUR OWN TREE WITH ANIMAL CHARACTERS!

For a fun family, club or class project, here's one holiday recipe that's NOT fattening and sure to be a hit!

To prepare the dough, mix together:

4 c. flour (whole wheat produces brown cookies)

1 ½ c. water

1 c. salt

Knead mixture for 4 - 5 minutes. A small amount of water can be added if the dough is too stiff. The dough can be molded or rolled flat for cutout cookies and will produce approximately 35 average-sized ornaments.

Form your dough into some of the wildlife in Kansas or use a cardboard pattern for cutouts. Draw your own patterns, use a coloring book or use the enclosed

patterns of buffalo, prairie chicken, catfish, and prairie dog. Designs with little detail are recommended.

Roll dough to a one-quarter inch thickness on wax paper. Trace the pattern with a knife. Carefully place the cutout on a cookie sheet. Draw details of the animal on the cookie with a toothpick, pencil, or knife. Corrections can be made by gently pressing the dough with a small amount of water. Details can be omitted until after baking and added with paint, felt scraps, etc. Push a paperclip or other wire in the top of the cookie in order to hang your ornament. A hole can also be made and the ornaments hung with yarn or ribbon.

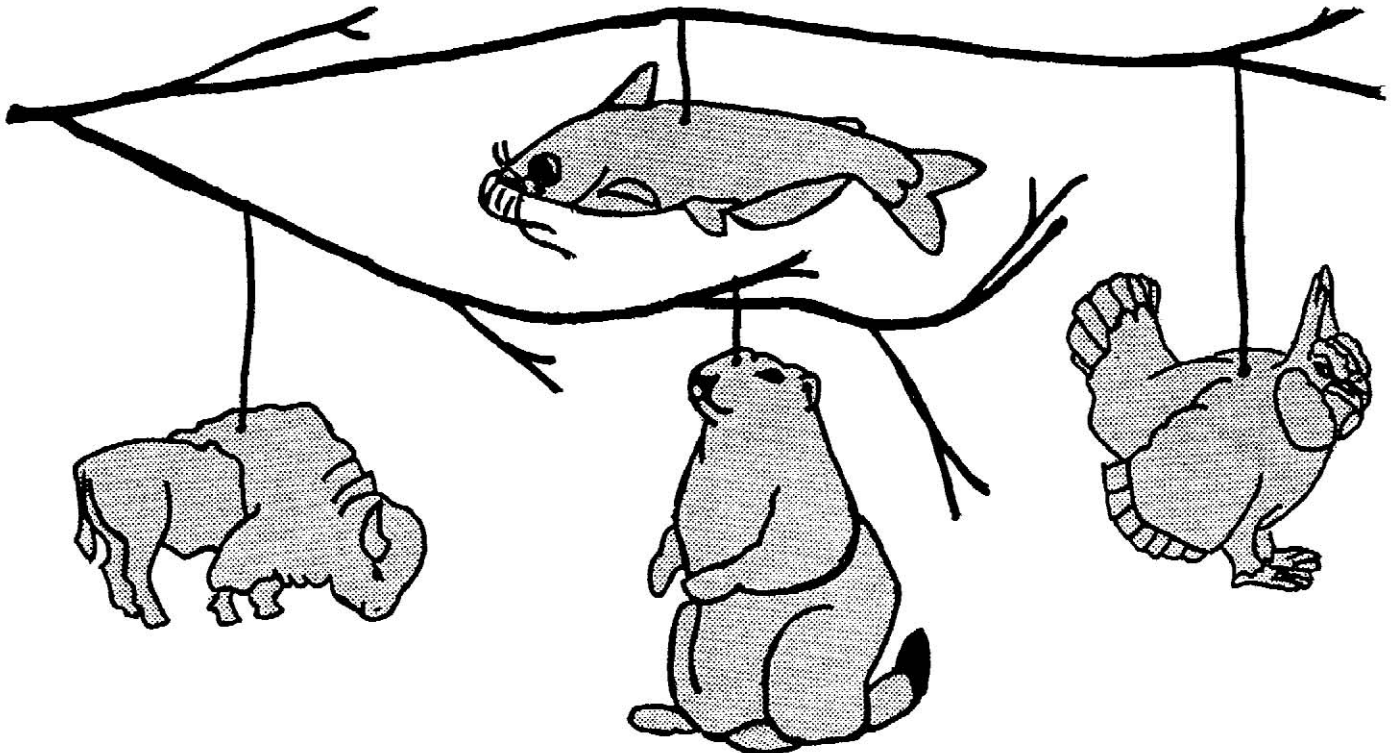
Bake the ornaments for approximately one hour in a 350°F (pre-heated) oven, or in a microwave for approximately two minutes.

(Microwaves tend to puff up the ornaments giving them a 3-D effect.) Bake until they are no longer soft when touched. Cool the cookies. The ornaments may be left plain or color added with watercolors, poster or acrylic paints. Felt tip markers can be used instead of paints or to add fine details.

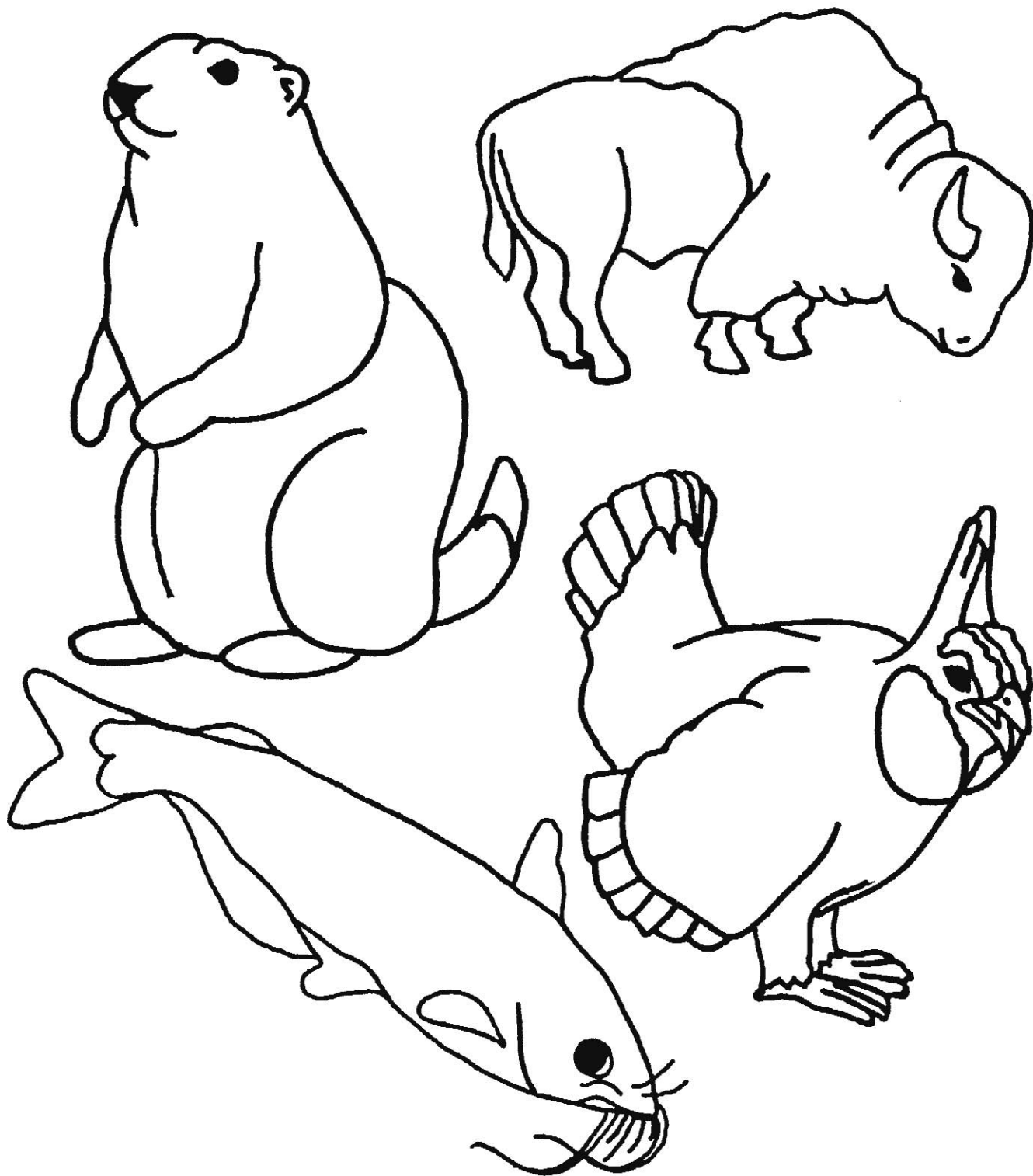
Spray ornaments with a clear fixative to preserve them.

These cookies are not edible but you could use your patterns and a favorite cutout cookie recipe to produce edible cookies. Icing or edible paints can be used for decoration and the cookies can be hung with ribbon or yarn.

When the holidays are over, your ornaments are still appropriate in the form of a mobile, or they can be packed away for next year.



Wildlife Dough Ornament Patterns



Faster Than A Speeding . . .

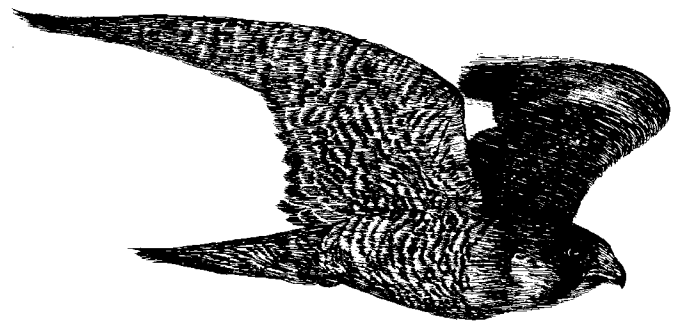
How fast an animal can move is not always easy to determine. Scientists have made speed estimates of some animals with a stopwatch and a pre-determined distance.

Below is a chart of the approximate speed of several animals. Compare these speeds by placing at least 15 of the speeds on a bar graph. (* Some of these speeds are maximum speed for short distances.)

Name of Animal	Speed in Miles per hour*	Name of Animal	Speed in Miles per hour*
pronghorn antelope	70	american woodcock	13
peregrine falcon	200	killdeer	55
jack rabbit	45	pintail	70
gray fox	40	ruffed grouse	22
sidewinder snake	2	kestrel	25
golden eagle	120	pheasant	40
housefly	5	bobwhite quail	30
running human	20	mourning dove	55
nighthawk	22	canada goose	72
belted kingfisher	36	red-tailed hawk	22
herring gull	36	turkey vulture	21
redhead duck	45	green-winged teal	60

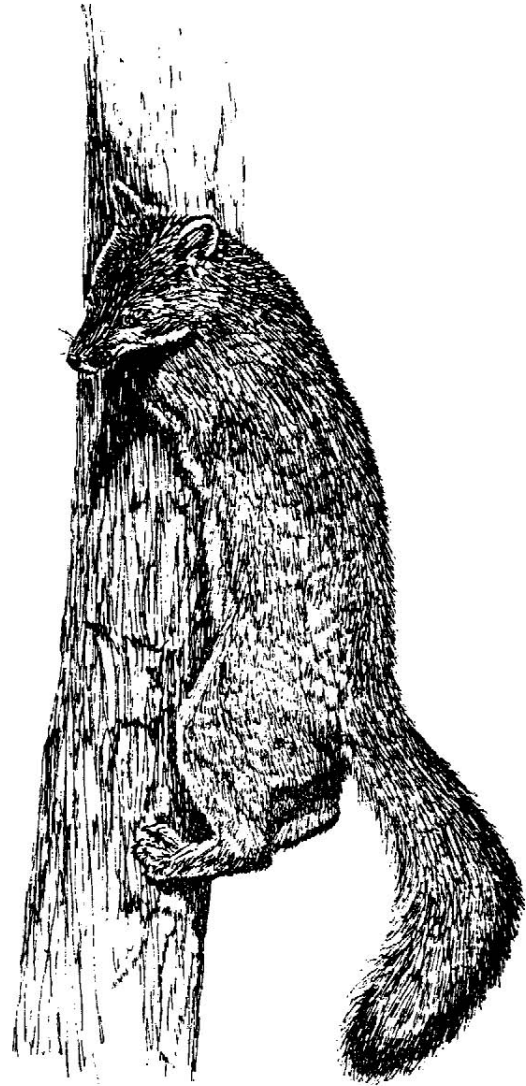
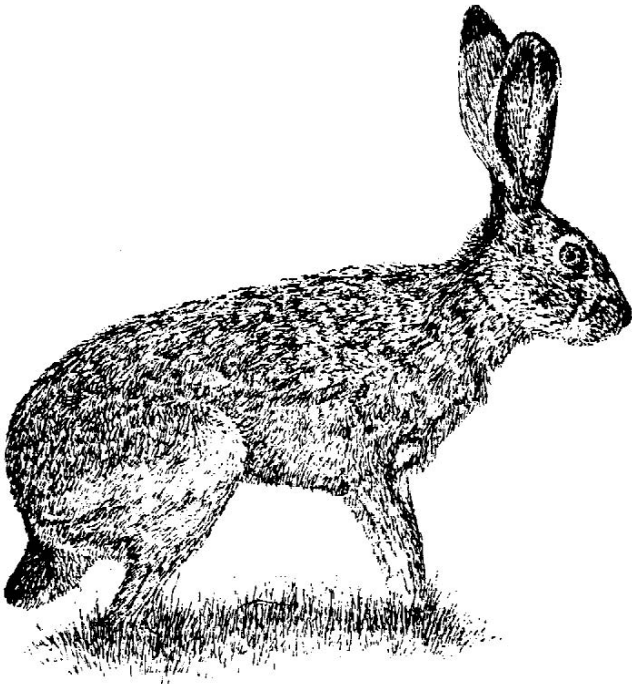


Golden eagles are able to fly at speeds up to 120 mph. Their prey is a small mammal, especially jack rabbits. Adult golden eagles can carry an animal that weighs nearly 12 pounds, and can drag a heavier animal for short distances.



Peregrine falcons catch their prey by dropping from great heights at incredible speeds. This endangered species has an estimated flight speed of 80 mph and a maximum pursuit speed of 200 mph.

Jack rabbits can rapidly accelerate to escape predators. They leap across the open prairie at speeds up to 45 mph. Some leaps are over three meters long. Jack rabbits "spy-hop" by alternating regular running gaits with springing up about a meter in the air to get a good view of things.



Pronghorn avoid danger by being able to run quickly for short distances. They've been clocked at 70 mph. When frightened, the white hairs on their rump patch are raised.

Gray foxes not only are able to run at 40 mph for short stretches, but they are also able to climb trees. They can run up sloping and vertical trees by wrapping their forelimbs around the trunk and pushing with their hind feet. Their claws help them keep their grip. Climbing helps the gray fox find food, elude predators, and reach their dens.

by Joyce Harmond Depenbusch

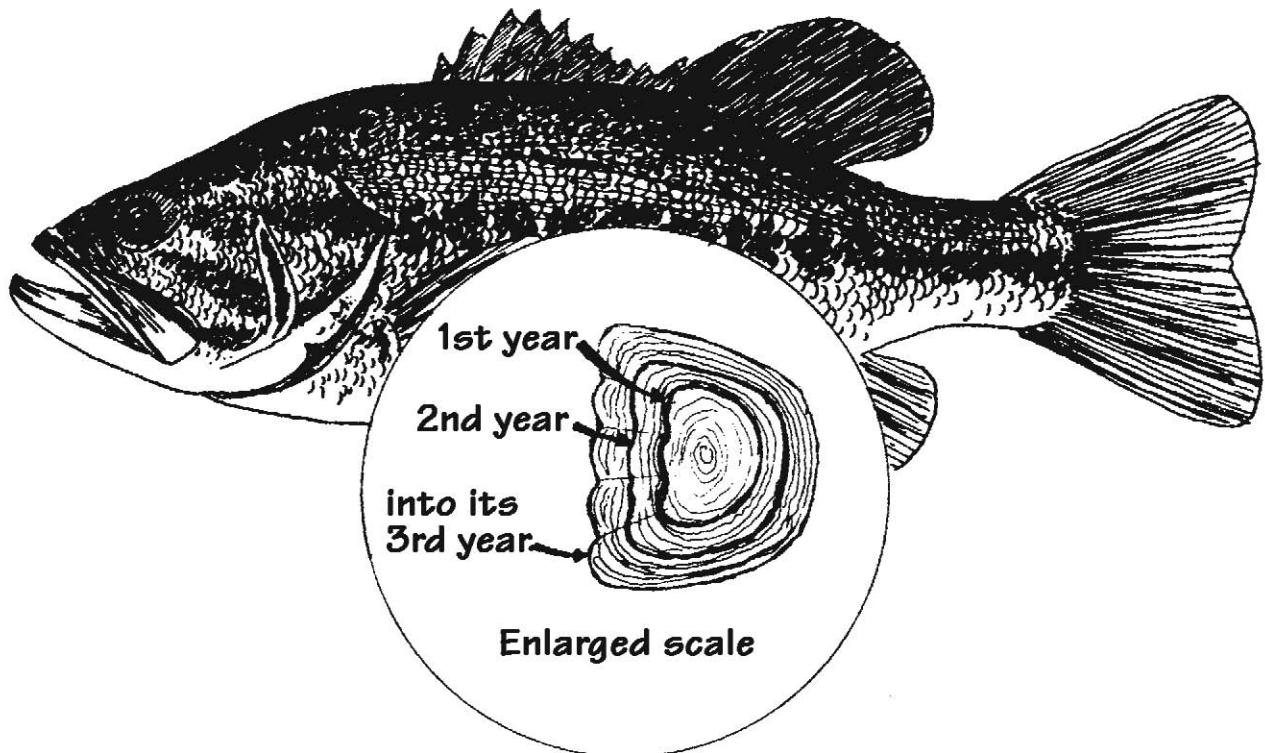
AS OLD AS THE HILLS

The old saying, "Don't look a gift horse in the mouth," hints at one way the age of an animal can be determined. Techniques used to age wildlife are more complicated than checking a horse's worn teeth, because wild animals won't stand still to be examined. Let's take a closer look at a few of the ways biologists discover how old wild animals are.

Aging certain wildlife and plant species is made easier by **growth rings**. The rings

are formed when the tissue of the animal or plant grows rapidly for one part of the year and then very slowly, or not at all, during another part of the year. This change in tissue growth forms bands or rings that can be counted, with each one representing one year. The bands are also called **annual lines** or **annuli**. You may have counted the rings of a tree stump to age it. The growth rings of animals are similar.

The **scales** of many fish have growth ridges, which are formed when the fish grows rapidly in warm weather and slowly in cold weather. Fisheries biologists count these ridges under a microscope. The ridges grow in the spring and summer. When the weather turns cooler, growth is slowed, causing the ridges to form close together. In winter, growth stops, leaving incomplete ridges. Counting the dark bands left by the winter ridges can age fish.



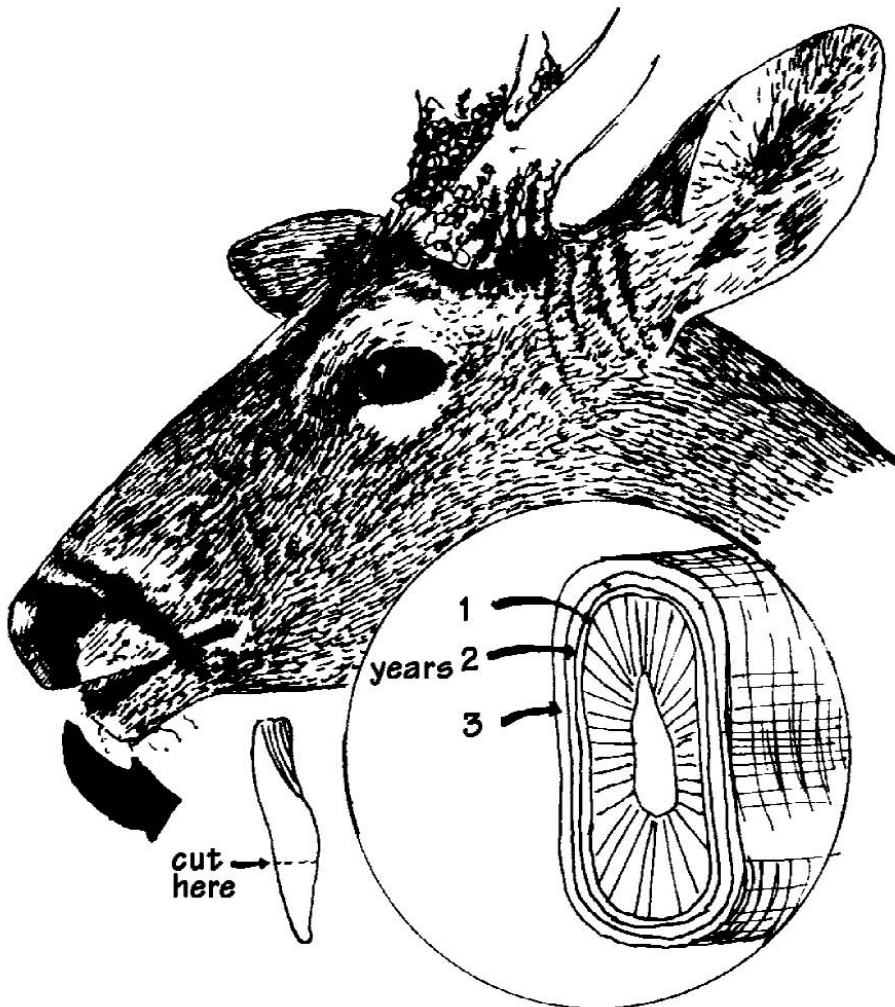
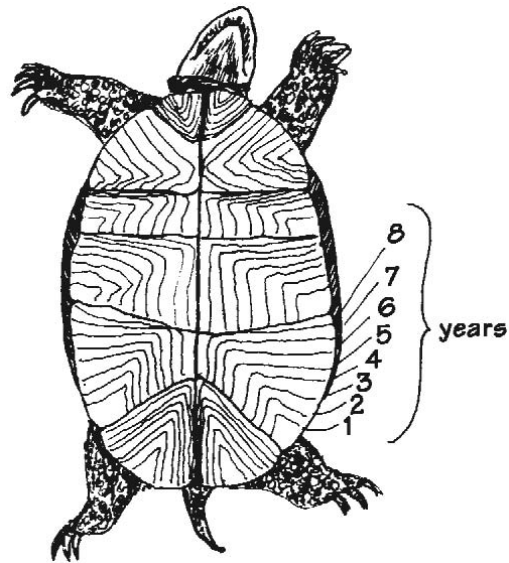
Some fish do not have scales, so bones, such as ear bones or vertebrae, are used to age them. Catfish have **pectoral fins** with **spines** that show growth rings when they are cut open.

Some turtles, such as the box turtle, have annual lines on the top shell, or **carapace**, and bottom shell, or **plastron**. Counting these lines gives an accurate age for turtles younger than five years and is fairly accurate up to 15 years of age, but this technique does

not work for older turtles.

The growth rings of freshwater mussels, appear as ridges that are higher than

the rest of the of the shell. These ridges are formed when growth is slow during part of the year.



To age deer, biologists check their front teeth, or **incisors**. A very thin slice of the tooth root is looked at under a microscope. The **cementum**, or outside cover of the root, has annual lines. The lines are formed during the winter, when the deer's body is **adapting** to the change in weather and diet. The body chemistry of male deer, or **bucks**, changes during the mating season, which is also called the **rut**. This may form false annual lines.

Rams, or male bighorn sheep, have horns with prominent annual growth rings. These rings can be counted to age sheep with some accuracy. As the ram grows, his horns increase in size. They may live for as long as 15 years.

by Joyce Harmond Depenbusch

A RIPE OLD AGE

Between dodging predators, disease, harsh weather, and searching for food, water, and cover, wild animals have rough lives. No wonder so few of them reaches a "ripe old age." In fact, among wild animals, old age is rare.

Scientists have found that coyotes may live up to nineteen years in captivity, but generally not more than six to eight years in the wild. Why such a difference

An animal in captivity is provided with essentials - food, water, and cover in a safe environment. Its wild counterpart exerts a great deal of energy just to survive from one day to the next.

Predation is one of the greatest influences on the **life span**, or length of life, of a wild animal. Predator species help to limit the number of prey species in an area.

Disease and **parasites** commonly cause early **mortality**, or death, in wildlife. Most wild animals have, or are **host** to, several different parasites. Animals in captivity are protected against diseases and parasites by vaccination and



by isolation from other animals.

Weather also affects the length of a wild animal's life. Severe winter, drought, flood, and a late cold spell in spring result in dead wild animals. Kansas sometimes has wet, cold springs that kill young wildlife, such as bobwhite quail and pheasants. More than 85 percent of the quail hatched each year die before they are one year old.

When these **limiting factors** are combined with **overpopulation**, wild animals face even more stress. The **density**, or number of animals in an area, affects how they respond

to limiting factors, such as disease. A deer herd that has overpopulated an area reduces the quantity and quality of its food supply. Parasites and diseases spread more rapidly under such crowded and stressful conditions. Under-nourished and parasite-ridden deer cannot handle extreme winter cold, and often die in large numbers. Also, predators find such deer easy prey.

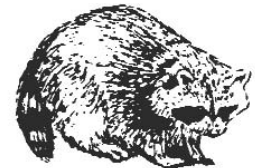
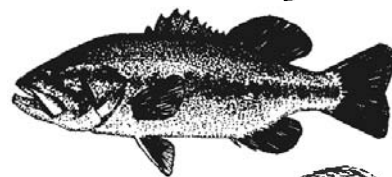
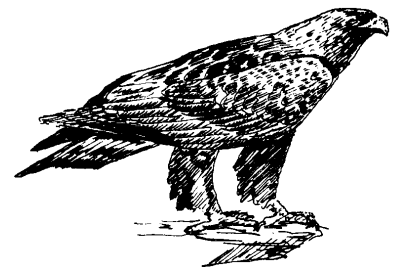
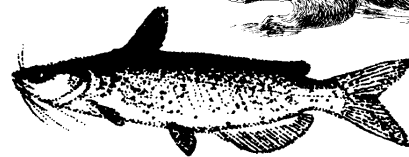
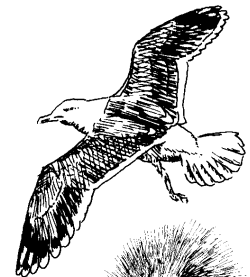
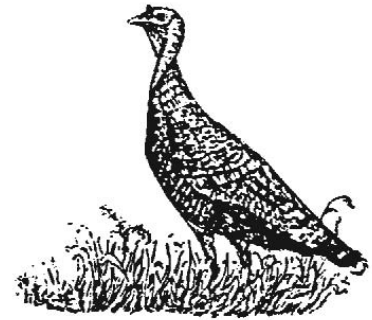
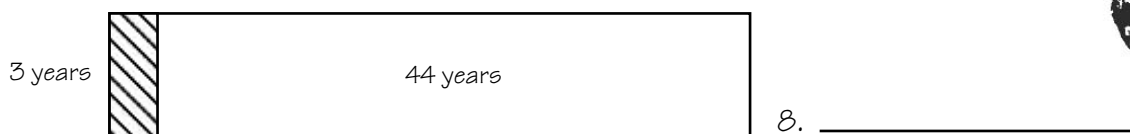
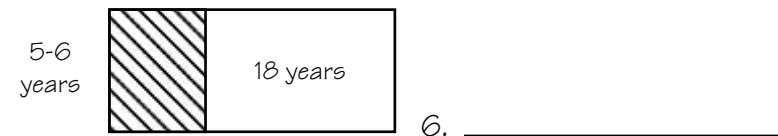
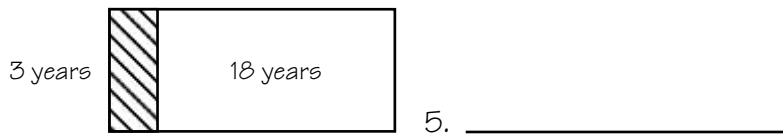
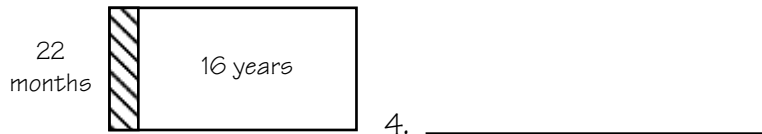
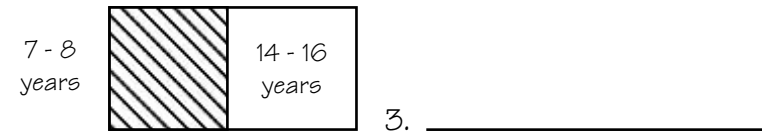
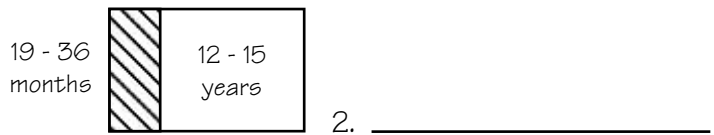
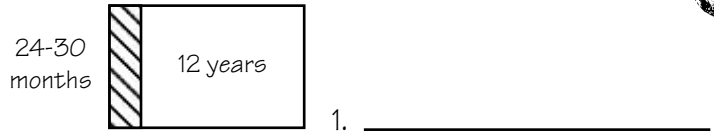
Death is a necessary component of the natural system. It ensures that there will be enough food and space for wildlife populations to survive.

Below is a bar graph that shows the average life span (how long an animal will likely survive in the wild) and potential lifespan (how long an animal will likely survive under the best conditions). These figures are approximations based on the observations of experienced biologists. See how well you can match the animals to their place on the graph.

KEY: Potential lifespan



Average lifespan



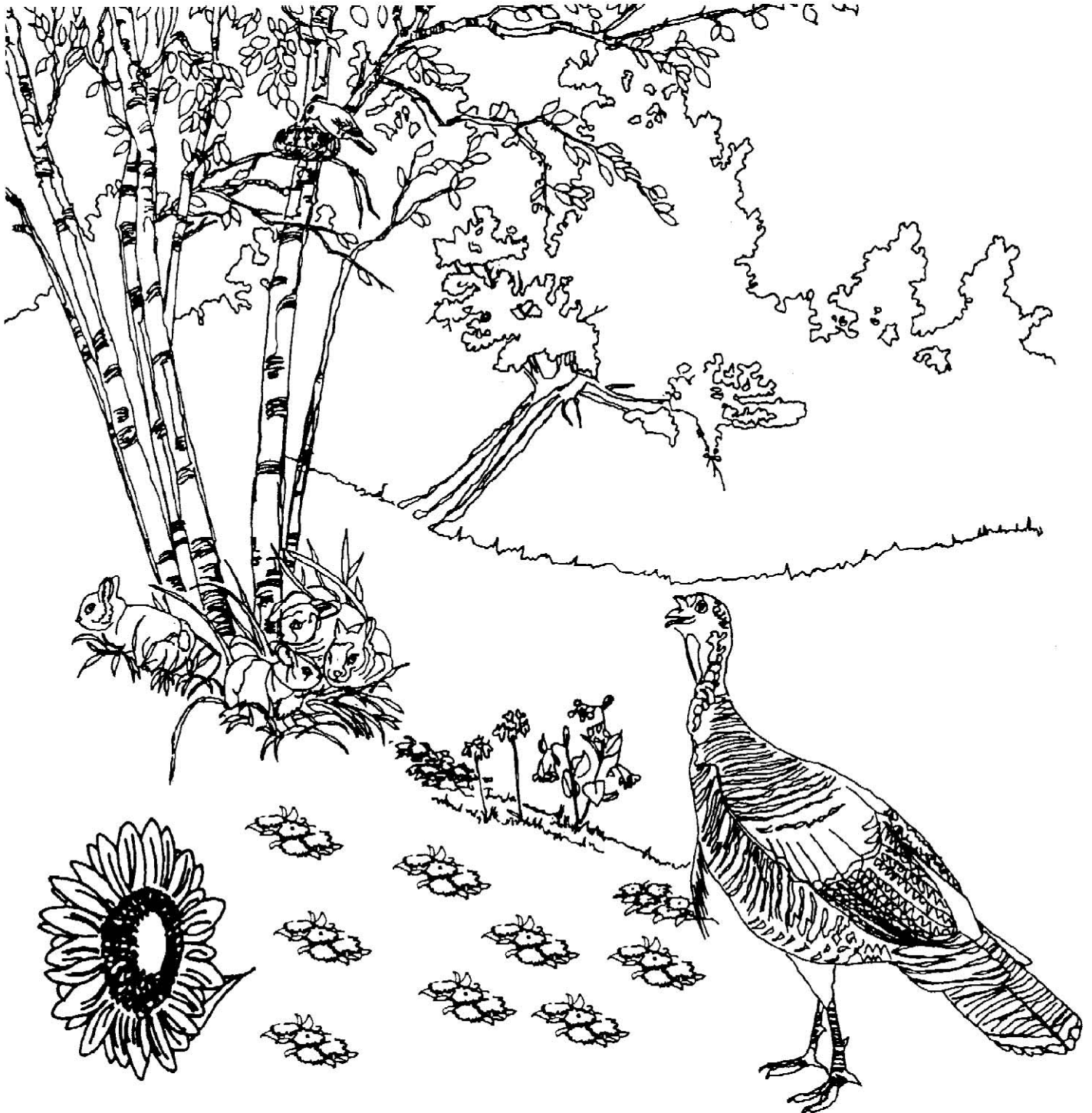
ANSWERS: 1. wild turkey, 2. gray squirrel, 3. channel catfish, 4. largemouth bass, 5. mule deer, 6. largemouth bass, 7. golden eagle, 8. herring gull

Adapted from "Nature's Way", Wildlife In North Carolina, September 1983

by Joyce Harmon

"Spring Fling"

"Spring brings warmer days, flowers, food, singing birds, and animal babies."



HAPPY BIRTHDAY TO YOU!

Spring is birthday time for most wild animals. Increased daylight and food sources along with warmer temperatures make the beginning of life easier than it would be in winter or fall. Those creatures that live in more temperate climates or those indoor animals have the benefit of a constant spring. Their young may be born anytime.

between mating and birth. During this time, animal young are developing either inside their mother or inside an egg. Incubation describes gestation in birds and other animals that develop in eggs. They are kept warm until they are ready to hatch. Eggs from insects and fish are not incubated.

The chart below gives an idea of how wild animals differ in birth



dates. How does their birthday compare with yours? Can you make a similar chart for other Kansas species?

WILDLIFE	MATING SEASON	GESTATION OR INCUBATION	NUMBER OF YOUNG	COMMENTS
Black-tailed Prairie Dog	Late March or early April	28 to 33 days.	Litter of 2 to 10, usually 5 or 6.	Born hairless and with closed eyes. Yearling females produce fewer young than older females. Fully furred in 26 days. In 33 to 37 days, eyes open and pups can call. Begin foraging at six weeks.
Arkansas River Shiner	Spawns from June to August when streams near flood stage.	3 to 4 days.	100's (exact number unknown).	Eggs drift near water surface in swift currents of open channel. Hatchlings swim to shelter in 3 to 4 days.
Massasauga	Both in spring and fall.	15 to 16 weeks.	5 to 13 per litter.	Young are born in July and August and are venomous at birth. Male does a courtship "dance."
American Toad	During spring rains from March through early May.	Eggs quickly hatch to tiny tadpoles, and metamorphose into tiny toadlets within a week.	4,000 to 20,500 eggs	Gather at breeding sites of shallow streams or ponds. Males attract a mate by singing choruses.
Marsh Wren	May	13 to 14 days	3 to 10 eggs; 5 or 6 most common.	Courtship songs and display attract mates. Nest in cattails of wet marshes. Incubation done by female. Male helps in feeding young.
Red Bat	In autumn, sperm remain dormant until spring ovulation.	Up to 3 months.	1 to 5; 3 or 4 most common.	Young born hairless and blind in mid-June. Can fly after one month and are weaned in 5 to 6 weeks.
Mule Deer	Rut runs from September into December. Breeding peak in late October to early November.	200 days.	1 or 2, usually twins.	Spotted fawns born in late May or June. Follow doe to forage 1 week after birth. Nurse for 3 to 5 months.

by Joyce Harmon

Mother Nature's Babies

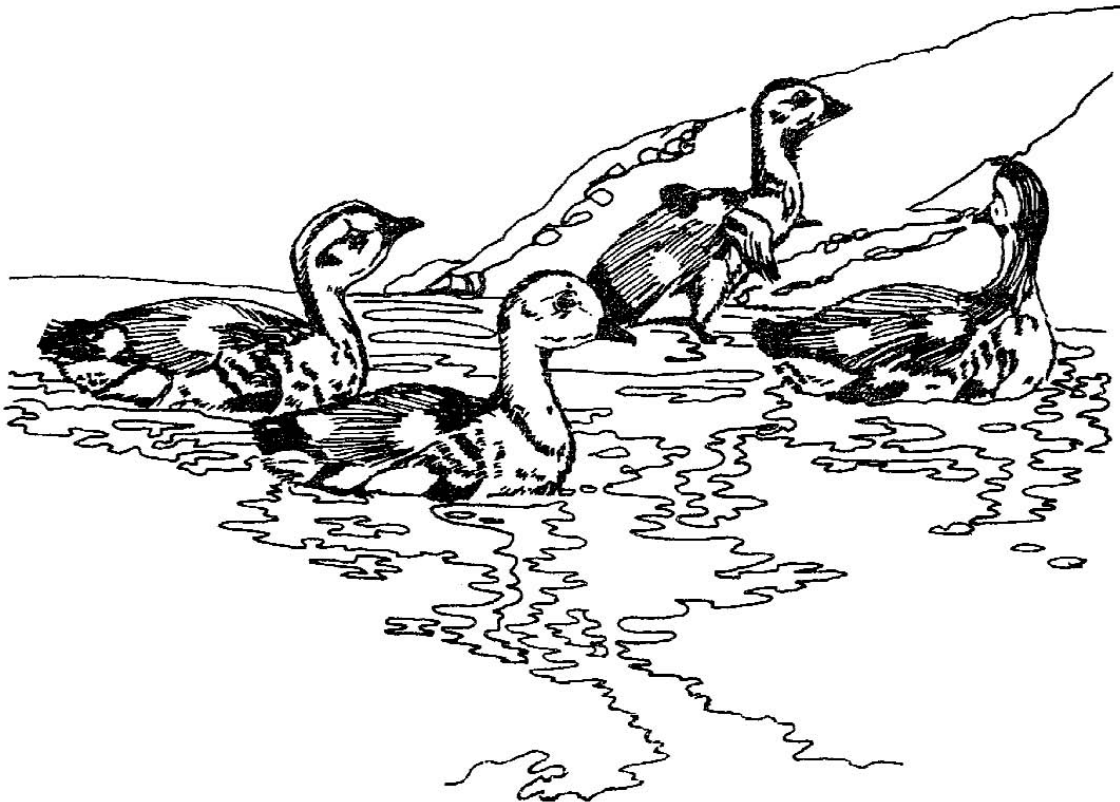
Baby bunnies, cuddly raccoons, and big-eyed fawns. What could be more endearing than a baby wild animal? Just one look at any of Nature's cute and seemingly helpless infants is enough to melt the heart of the toughest hombre. That's why so many people create problems by "rescuing" what they assume to be orphaned animals. Taking a young animal from the wild is bad for it and you for several reasons. For one thing, few wild animal babies are ever abandoned. People just think they are because adult animals flee when man comes snooping around. Even when undisturbed, most wild mammals leave their young alone and hidden, visiting them only for brief feeding periods. This protects the scentless and camouflaged - youngsters from the sharp eyes and noses of predators.

Taking a baby wild animal from the

wild is really a form of kidnapping. Chances are the young critter will die from poor or improper nutrition. If it does live, it will not be part of the natural wildlife population, and chances are it will not even make a good pet. Many wild animals turn vicious without warning when they mature. People have been bitten, gored, and even killed by "pet" deer, raccoons, coyotes, etc. When an unruly pet is no longer wanted, its owners sentence it to life behind bars or dump it into the wild where it does not know how to fend for itself. Zoos cannot handle all of the wild pets that become unmanageable. Another danger is that wild animals can transmit rabies, distemper, tuberculosis, skin diseases, respiratory diseases, tapeworms, mites, lice, flukes, roundworms, ticks, and fleas to you or your domestic pets.



Yes, Mother Nature is occasionally cruel when a mother animal dies and leaves her young to starve, but chances are you'll be more cruel by stealing perfectly healthy babies from their mother. If you find wild animals this spring, quickly and quietly leave the area. The mother will return, probably at night. If you know for certain the mother is dead, contact a Wildlife & Parks employee as soon as possible. State and federal laws carefully regulate who may not possess wild animals. Permits are required. So play it safe, and give Nature a chance. She's been doing it for thousands of years.



NATURE'S NICKNAMES

The young of many species are given special names. See if you can match the animal baby with the adult. Some young may have more than one name.



YOUNG



ADULT



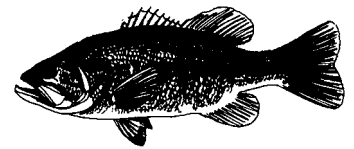
- A. SQUAB
- B. EAGLET
- C. CATERPILLAR
- D. FAWN
- E. DUCKLING
- F. PUP
- G. KIT

- _____ BEAR, LION, SHARK, TIGER
- _____ BIRD
- _____ FOX, BEAVER, RABBIT, CAT
- _____ GOAT
- _____ SWAN
- _____ TURKEY
- _____ KANGAROO



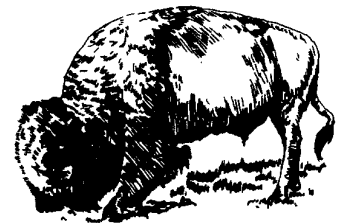
- H. SHOAT
- I. KID
- J. POULT
- K. FRY
- L. WHELP
- M. TADPOLE
- N. CUB
- O. LARVAE

- _____ DUCK
- _____ OWL
- _____ FISH
- _____ EEL
- _____ CHICKEN, OSTRICH, OTHER BIRDS
- _____ FROG
- _____ INSECT
- _____ EAGLE



- P. OWLET
- Q. CHICKENET
- R. JOEY
- S. FOAL
- T. GOSLING
- U. FLEDGLING, HATCHLING, NESTLING
- V. CHICK
- W. CALF
- X. ELVER

- _____ HOG
- _____ PIGEON
- _____ GOOSE
- _____ BUFFALO, ANTELOPE, OTHER MAMMALS
- _____ DOG, FOX, SEAL, COYOTE
- _____ DEER
- _____ ZEBRA, HORSE



by Joyce Harmond Depenbusch

WINTER FORECASTING

There's certain amount of guesswork in any weather forecast even with meteorologists' technical equipment. But you won't believe some of the ways our ancestors used to predict the coming winter weather. After reading about

these techniques, make a winter forecast for your area. The experts don't put much stock in the folklore, but see how close your predictions were to the actual weather.

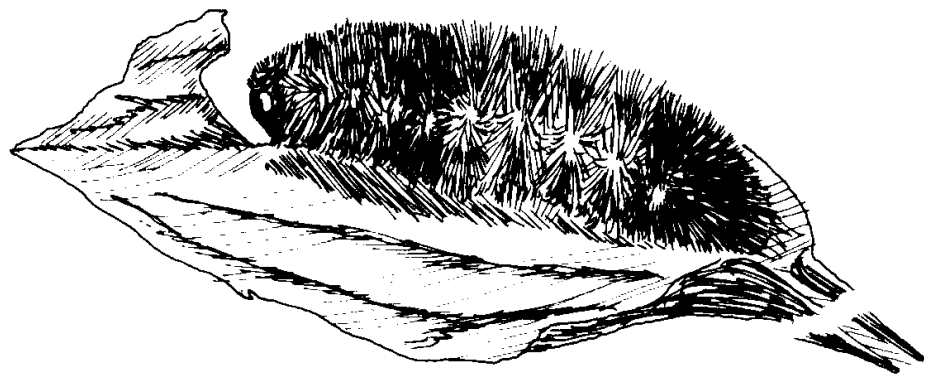
The old weather predictors believed that if animals put on

an extra heavy coat of fur or feathers, or added a large layer of fat, we were in for a harsh winter. Experts say that the animal's health and amount of food available before the cold weather affects animals, not the future weather.

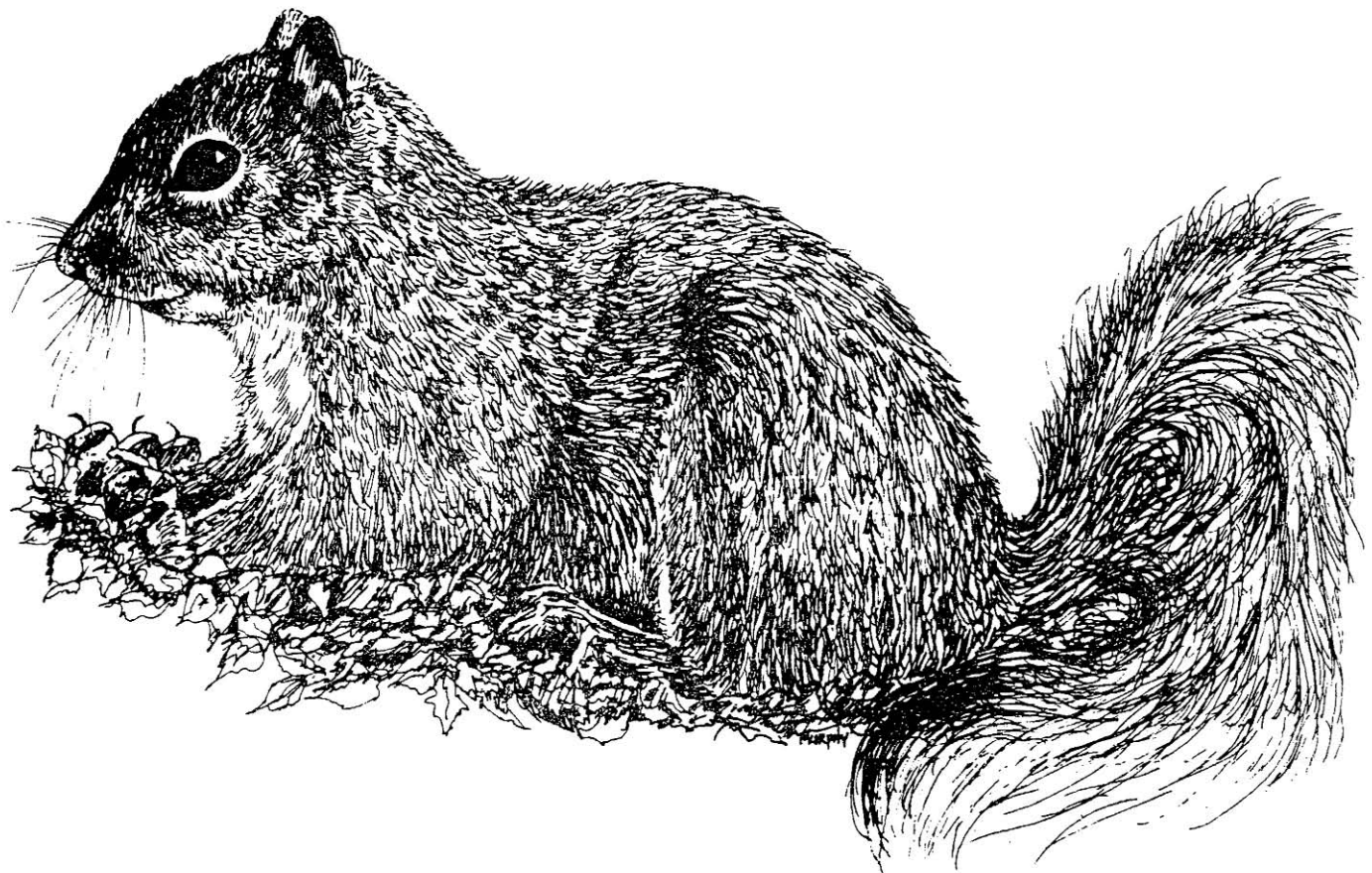


Woolly bear caterpillars have been credited as winter forecasters. A wide band on the caterpillar means a hard winter; a narrow band predicts a mild winter. Early fall geese migrations are supposed to be signs of an early, tough winter.

A long, hard winter is supposedly ahead if oak, walnut, chestnut and other mast-producing trees are heavy with nuts. Tree bark that's thicker on the north



side of the tree is said to mean the same thing. When squirrels store large caches of nuts, it might mean they're getting



ready for a harsh winter. The trouble with this folklore is that squirrels may bury their food in several storage locations.

Do beaver and muskrats know to expect a severe winter when they build high lodges? Scientists say no; the amount of available vegetation determines the lodge size.

Hornets and paper wasps are said to make nests with thick walls if a bad winter is expected.

by Joyce Harmond Deppenbusch

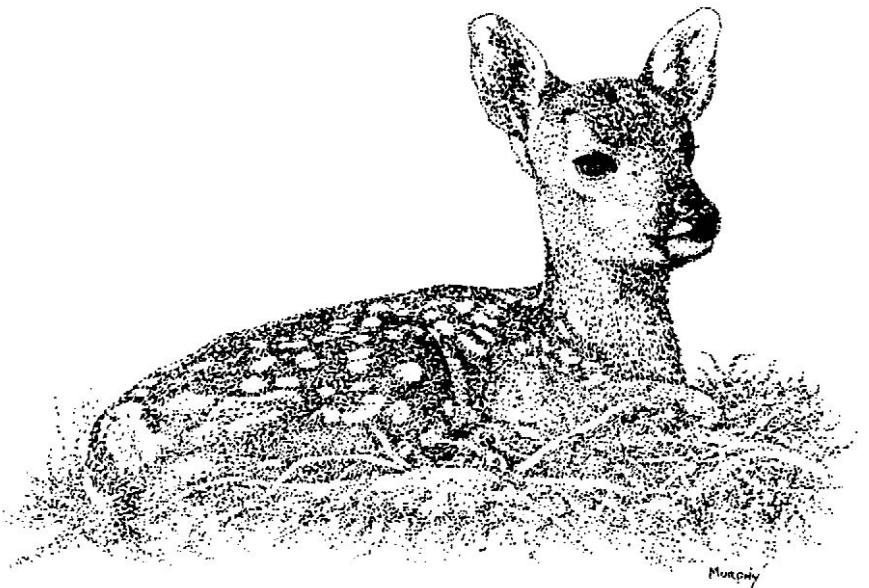
FUN AT THE FAIR

This September, while you're visiting the Kansas State Fair in Hutchinson, stop by the Wildlife and Parks booth. Take along this issue of "Nature's Notebook" and learn more about some of the animals you'll see there. These animals are temporarily on loan from an animal rehabilitator or zoo. Color the pictures to look like the animals you see.

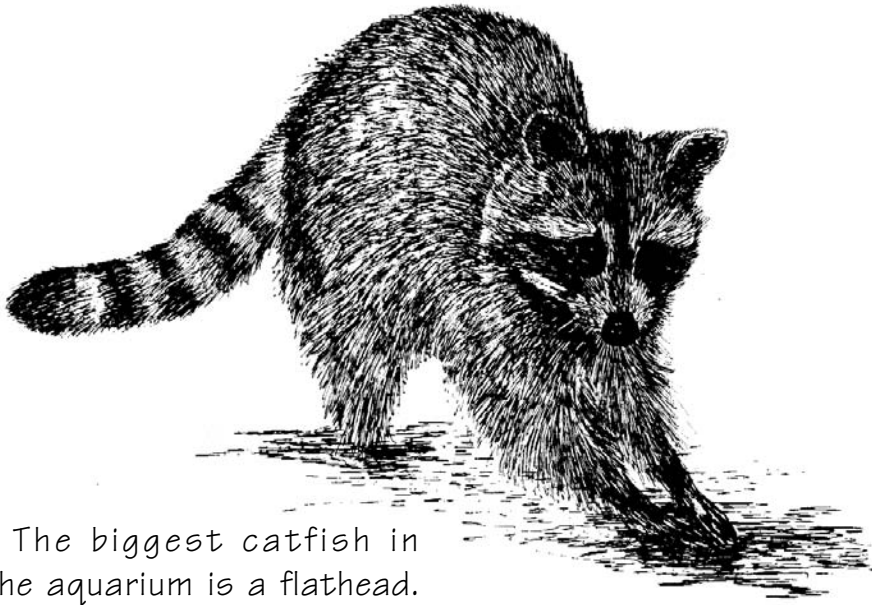
One of the most popular animals in our zoo exhibit is the deer fawn. The light spots on the fawn's tan coat helps it blend in with

the environment. The spots will disappear when the fawn is about three months old. Deer are **herbivores**, or plant eaters, browsing on leaves, stems, buds, bark

and agricultural crops. Fawns are generally born in May or June and may be one of twins. They are considered adults when they are about 1½ years old.

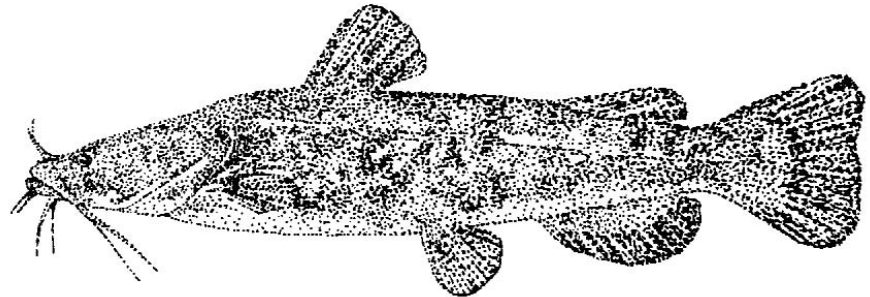


Nicknamed the "monkey-faced owl," the barn owl's ability to catch mice and rats makes it helpful to people. They do not build nests, but use hollow trees, banks of hills and deserted buildings to nest in. Barn owls have excellent hearing and night vision.

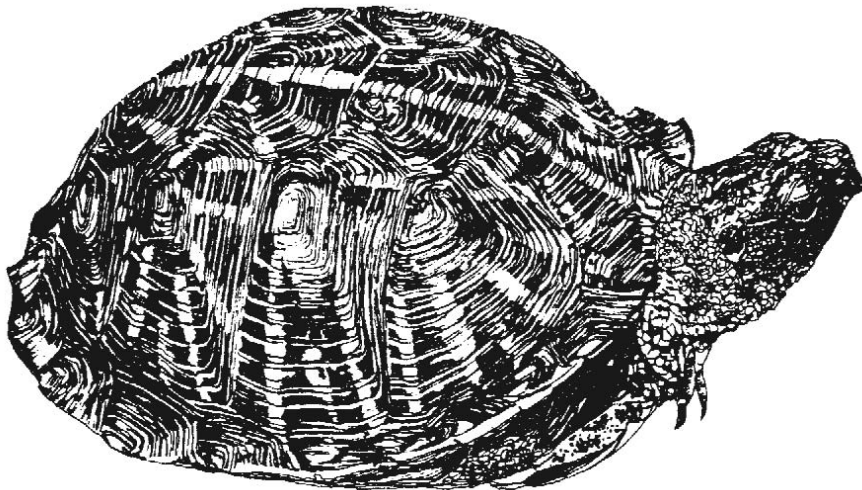


Raccoons are best known for the bandit like appearance of their black mask and striped tail. Raccoons are **omnivores**, eating both plants and animals. Depending on the season, raccoons may eat crayfish, turtles, fruit, nuts, agricultural crops or insects. Raccoons live where trees are abundant, but these mammals have adapted to city life where they may raid garbage cans for food. Raccoons have three or four young per litter in April or May, and are **nocturnal**, or active at night.

The biggest catfish in the aquarium is a flathead. How much do you think this fish weighs? Guess how it got its name. Flathead catfish are common in the larger streams and reservoirs of Kansas. This fish lives on the river bottom, near cover such as fallen trees, concrete aprons of dams, or bridge-supports near deep pockets of water. Flatheads spawn in June or early July in cavities. They are **carnivorous**, or meat eaters, eating insects when they're



young and fish as adults. The record Kansas flathead weighed 86 pounds, 3 ounces.



Our state reptile is a **terrestrial**, or land, turtle with a brown and yellow upper shell. Found throughout Kansas, the ornate box turtle feeds on beetles, caterpillars, earthworms, grasshoppers, other insects and fruit. This turtle spends the winter burrowed underground and will come out when the spring weather is warm and moist.

THE FISH & GAME GAME

by Joyce Harmon

Games can be a fun way to learn new information or review old. Kansas Wildlife & Parks' The Fish & Game Game is designed for your use with a small group, or for a larger group if multiple copies are made. Adapt the questions to the age group you work with.

Construct your game by making 11 by 17 enlargement copies of the game board, back the copy with cardboard for sturdiness. Make a life-size game board on the playground with chalk, or paint the pattern onto a large piece of canvas or plastic. On the giant game board, the participants become the place markers.

Use a spinner from another game or

make your own from cardboard.

For starters, use the sample questions below. As you gain experience, add your own questions and statements. Use your library and KANSAS WILDLIFE magazine for references. Copy the questions and statements onto heavy stock paper or cardboard. Draw a fish on the top of the action cards and a prairie chicken on the top of the true-false questions. Separate the fish cards from the game cards into two stacks.

RULES OF PLAY: Maximum number of players is six. Assign each player a number to keep the spinning order organized. Select someone to read the

cards and operate the spinner. If a player lands on a Chickadee Check-off square, he or she gains an extra spin. If a player lands on a fish, the caller reads a fish card, and the player must do what the card says. If a player lands on a prairie chicken, the caller reads a game card. Whenever the player answers correctly, he or she moves forward two spaces. - If the answer is wrong, the player must move back four spaces. Discuss the statement cards with the entire group. If a player lands on an arrow, he or she must move in the direction the arrow points. The first player to cross the finish line wins.

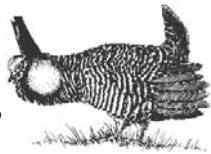
SAMPLE FISH CARDS:

- Planted trees for wildlife. Move up 3.
- Drained a marsh. Move back 5.
- Broke the hunting laws. Move back 3.
- Built a birdhouse. Move up 3.
- Shared your skills of hunting and fishing with a friend. Move up 2.
- Donated funds to the Nongame Wildlife Improvement Program. Move up 4.
- Sprayed pesticides over crops on a windy day. Move back 4.
- Kept a bird feeder all winter. Move up 2.
- Read about wildlife and ways you can help. Move up 2.
- Practiced energy-saving activities. Move up 3.
- Built a brush pile for wildlife in your back yard. Move up 4.
- Cut down the fencerow of trees and shrubs. Move back 5.
- Planted crops to the edge of the fence. Move back 4.
- Protected a stream from soil erosion and pollution. Move up 4.
- Spent time observing and studying wildlife. Move up 2.
- Carved initials in trees and harassed nesting birds. Move back 3.
- Informed a group of citizens about the needs of wild life. Move up 2.
- Kept land for wildlife use instead of mowing or plowing it. Move up 4.
- Brought wild animals into your home as pets. Move back 3.



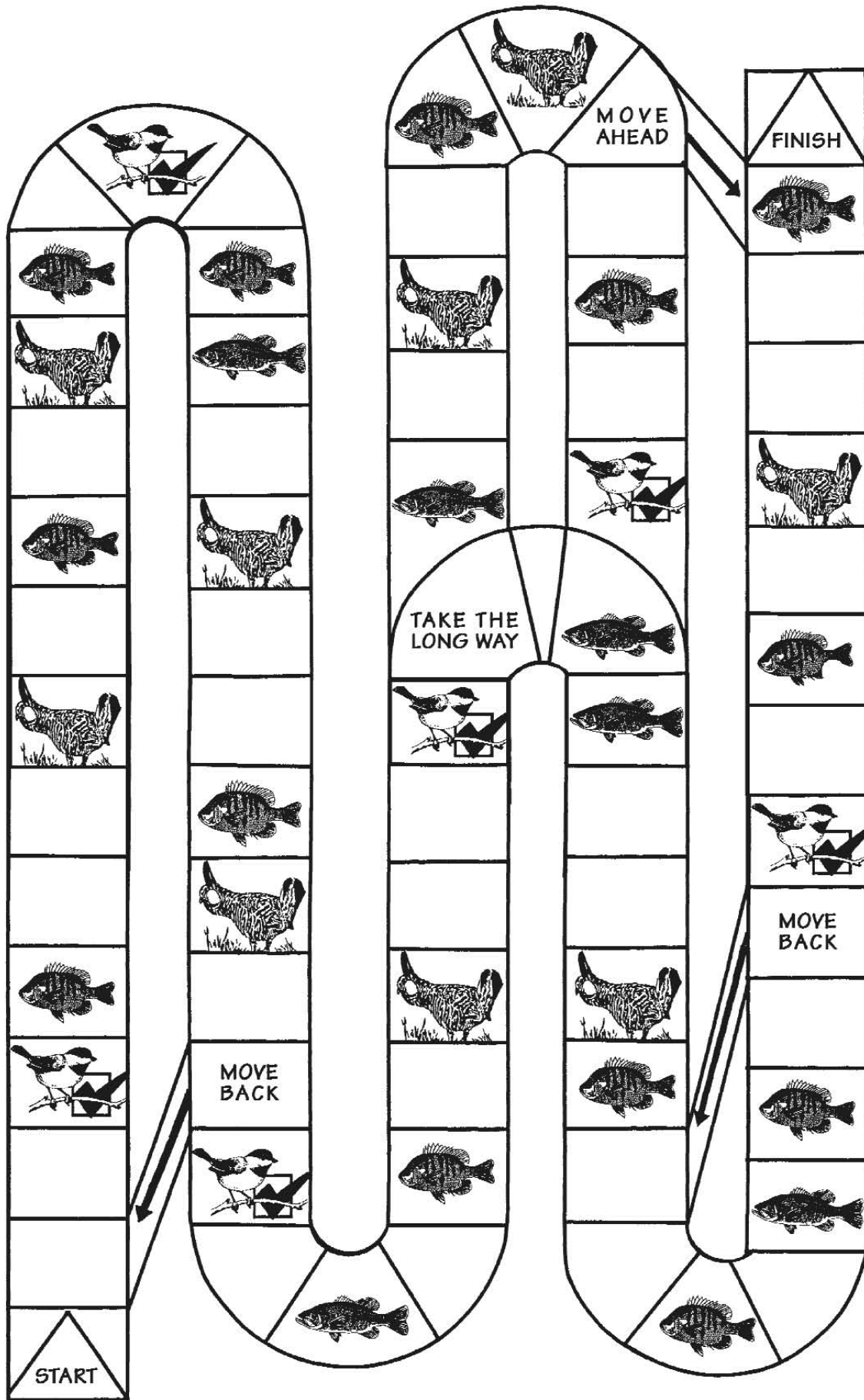
SAMPLE GAME CARDS:

- Male wild turkeys have beards. (T)
- Insects are animals. (T)
- Upland game species live only on hilltops. (F)
- Riprapping a steep bank with rock can help to keep the stream from eroding. (T)
- Carrying capacity means the largest population a habitat can support. (T)
- Diurnal animals are active during the night and nocturnal animals are active during the day. (F)
- Bag limits are set on hunting and fishing seasons to regulate the number of animals taken. (T)
- Non-game means animals that are not hunted, fished, or trapped. (T)
- The ring-necked pheasant is an endangered species in Kansas. (F)
- Predators aren't important in the environment. (F)
- Habitat is the place that animals live. It provides water, food, and cover for wildlife. (T)
- Fish and game laws are not enforced in Kansas. You just need to use your own judgment. (F)
- Riparian habitat is the most abundant habitat in Kansas. (F; for an extra square forward, define riparian habitat.)
- Fish are stocked in the ponds, lakes, and reservoirs of Kansas. (T; for an extra square forward, tell why they are stocked.)
- Vertebrates are animals without backbones. (F)-W.H.I.P.



stands for "Wildlife Habitat Improvement Program"

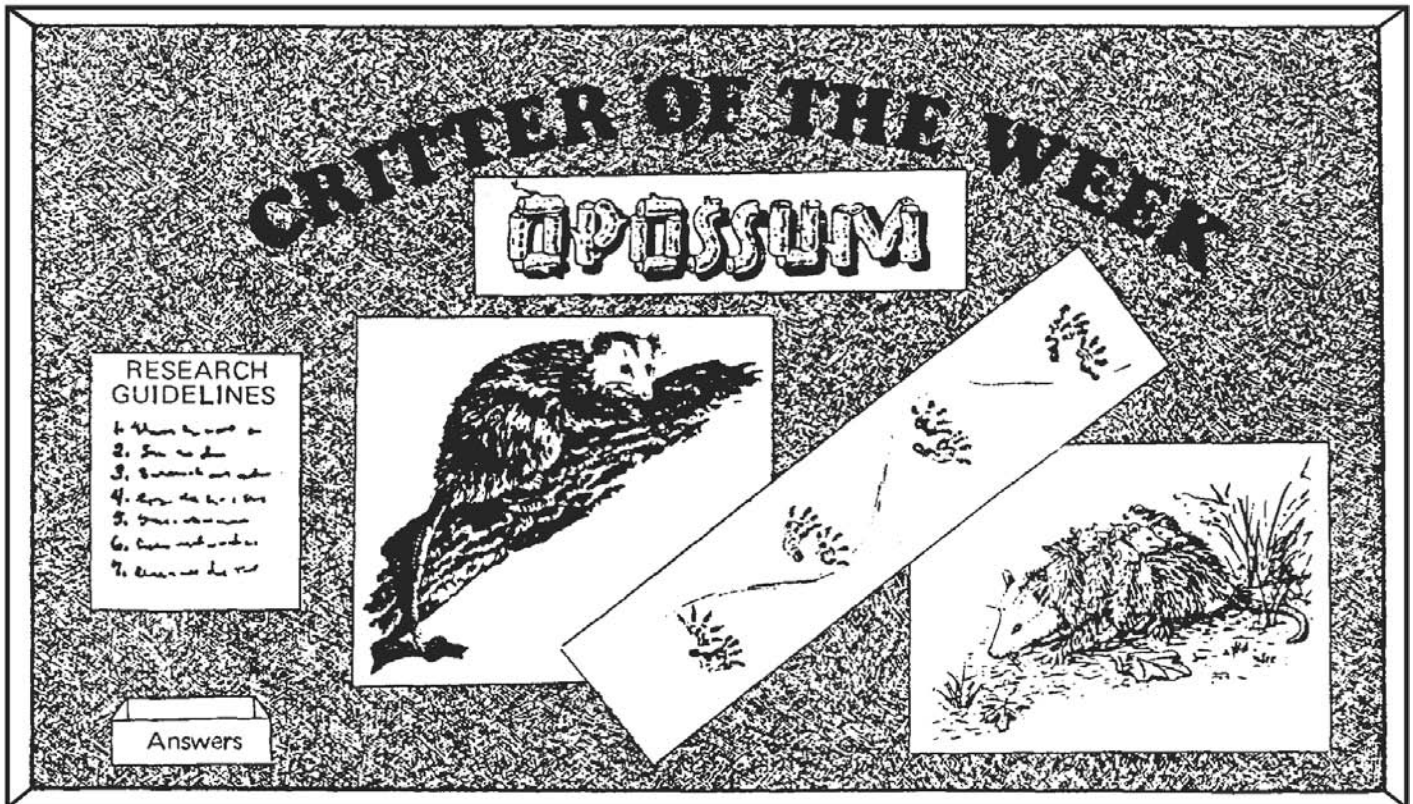
- and is designed to provide more habitats in Kansas. (T)
- The poisonous snakes of Kansas are: prairie rattlesnakes, timber rattlesnakes, massasauga, and copperhead. (T)
- Dead trees should always be removed from woodlands before disease spreads. (F)
- Western Kansas has abundant surface water resources for irrigation, municipalities, and wildlife for years to come. (F)
- Channel catfish have deeply-forked tails, barbs at the mouth, no scales, and has been stocked in many lakes and ponds. (T)
- The river otter is a mammal that was once found in Kansas, and will soon be re-introduced to the state. (T)
- An omnivore is an animal that eats both plants and animals. (T)
- A carnivore is a meat-eating animal. (T)
- An herbivore is a meat-eating animal. (F)
- Endangered species are protected by law. Some endangered species in Kansas are: the Neosho madtom, black-footed ferret, bald eagle, whooping crane, and peregrine falcon. (T)
- Removing a few animals from a healthy population of animals, such as bobwhite quail from a coyote mule deer from the herd will not harm the overall population. (T)
- Pintail, mallard, scaup, teal, canvasback, and shoveler are all names of ducks found in Kansas. (T)
- The Central Flyway refers to the route taken by airplanes on their north-south flights. (F)
- Migrations are the monthly moves from wintering grounds to breeding grounds and back. (F)
- All Kansas mammals hibernate. (F)
- When fish sleep during the fall, it is called estivation. (F)
- Reptiles and amphibians are cold-blooded animals. (T)
- Examples of amphibians are frogs, salamanders, and toads, (T; for an extra square forward, list the differences between amphibians and reptiles.)
- Rattlesnakes always give a warning "rattle" before striking. (F)
- A Conservation Officer is responsible for enforcing laws to protect wildlife and people. (T)
- Lakes and ponds may become too fertile by runoff from farms, cities, and industrial wastes. This causes an overproduction of algae, robbing the water of oxygen and causing fish to die. (T)
- Kansas has more prairie chickens than any other state in the U. S. (T)
- Pronghorn antelope have antlers. (F)
- Wildlife management programs are funded from hunting, fishing, and trapping license fees. (T)



CRITTER OF THE WEEK

by Joyce Harmon

We are at the time of year when spring seems a long way off and a fresh idea or change of pace is more than welcome: For those of you with "cabin fever," whether at home or in your classroom, here's an idea to see you through to spring.



Use a bulletin board, study center or one designated area. Select one wildlife species and allow the children to investigate more information about this animal.

-Here are some questions that will help guide their study:

- What does the animal eat?
- Is the animal a mammal, fish, amphibian, reptile, bird, etc.?
- Is the animal nocturnal (active at night) or diurnal (active in day light)?
- Is the animal a predator or prey species?
- How many young does the animal usually have?
- Where would you find this animal?
- If in Kansas, how many do we have?

- How long does this animal live?
- Do they migrate, hibernate or stay here for the winter?
- What other interesting information can you find out?

You may want to give the animal's name on difficult species or make the name a part of the research.

Use pictures from magazines, photos, or poster pictures, ideally showing the animal in several poses. The local public library or school library will have materials that will help you guide the children and will also have reference material.

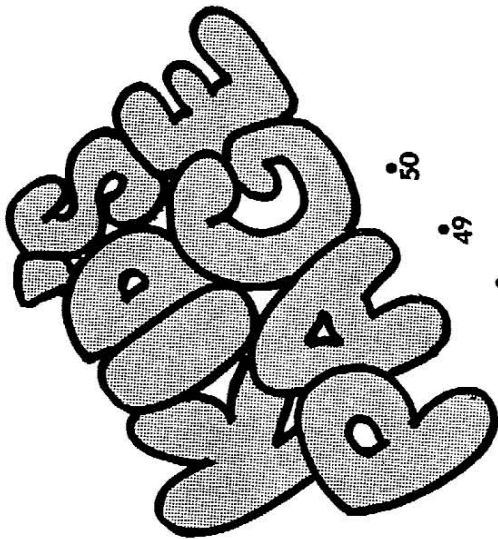
Make the investigation an adventure - challenging, but not impossible. Begin with a familiar

animal and advance to the less well known. Vocabulary is bound to come up that both child and adult may learn from. At the end of the week (or whatever predetermined time) read the research done by the children and discuss the discovered information with facts. To enhance your study, you might be able to find a study skin or skull of the animal you're studying. An art, math, or other curricula area project may be done on the animal as a follow-up activity.

Change pictures and begin again with a new species. You might allow a particularly interested student to pick out an animal of his or her choice.

Prairie dot to dot

Connect the dots to form this prairie animal.



by Joyce Harmon

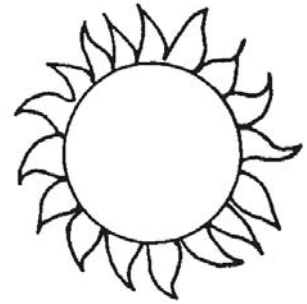
WILDLIFE'S RAINBOW

Have fun coloring these Kansas scenes.

Yellow is the color of sunflowers, wheat, bumblebees, dandelions, meadowlarks, and dried Kansas.

buffalo grass in the morning light. The sun shines

on the sunflowers, wheat, and sunfish we have in Kansas.

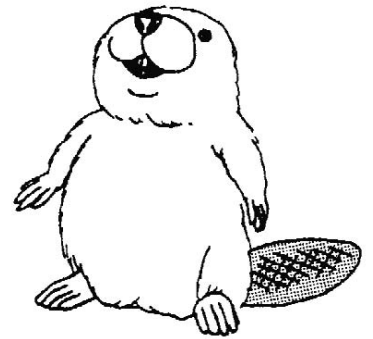


Black is the color of a blackbird's beak. Dark skunk's bushy fur, salamanders in the mud, crows, and the raccoon's mask.



by Joyce Harmon

SNOW SNAKES



The winter season brings about changes for many animal species. Several will migrate to a warmer climate, some hibernate or rest during the cold weather and others stay active but add a thicker fur to survive the season.

Reptiles are among the animals that hibernate during a typical Kansas winter. There is, however, one imaginary reptile that is found moving about only in winter. It is quite a unique creature and of interest to scientists and students alike. Capture the attention of scientists of all ages with the following activity.

Here's a fun way to spend time outside during winter, appreciate snakes - an animal that's often avoided, and allow a time for further winter observations. The "facts" about snow snakes are as follows. Be creative and add to these:

- Very little is known about these snakes. Their range is expanding southward and thought to be influenced by human and climatic factors. They travel along frozen ground or along cross-country ski tracks but leave little sign of their presence.
- The most common genus is *Glidurus*. The species within this genus vary in color and morphology. Some of the species within the genus *Glidurus* are: *G. mopandelus*, *G. sliperound*, *G. borealis*, *G. carvedbvus*, and *G. cottonwoodii*.

- The snow snake moves rapidly on icy terrain but only for short distances. This movement is similar to that of the otter.
- Habitat requirements are very flexible and the carrying capacity of an area is almost limitless.
- Reptiles generally are active during warmer temperatures and hibernate during winter. Contrary to that pattern, the snow snake is in an extremely rigid state during warm weather and observable only during icy and snowy times of the year.
- The only predators that have been observed at this time are porcupines, beavers and rabbits; although domestic dogs have been known to be curious.
- The low reproductive rate has been investigated by researchers and is reported to be gradually increasing in recent years.

There remains a great deal of research to be done before this fascinating and curious creature is fully understood. Your participation in this activity will add to the advancement of such research.

HOW TO ACQUIRE SNOW SNAKES IN A SAFE AND EASY MANNER

With limited skill in the areas of industrial arts and design, a fashionable snow snake can be acquired. Mop, broom, or any type of wooden handle can be used and decorated for a snow snake. Carving a spiral groove in the snake will add to its movement on icy terrain. The Indians


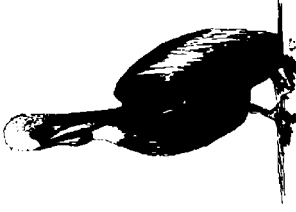

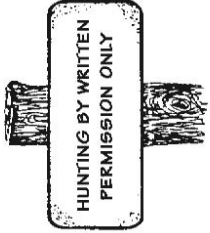
originated the idea and carved the end to be curved upward slightly, giving a toboggan effect on snow and ice.

A simple cage can be made to stimulate interest in participants before they discover that the animal is imaginary. A long box with air holes, rope handles and lettering on the box saying, "DO NOT FEED THE SNOW SNAKES" will add to the ruse.

Once your introduction is given and initial snakes are made, take your group outside and practice. Races can be organized along with follow-up activities done from this foundation. The potential for extended activities are endless. Some possibilities are studies of: Indian culture and history, scientific nomenclature, animal locomotion, animal coloration and camouflage, herpetology, winter adaptations, habitat, range and life requirements, population dynamics and densities, hibernation and estivation, and winter recreation.

(Thanks to Jim Heintzman, naturalist for Cerro Gordo County, Iowa, for introducing me to snow snakes.)

MARCH

<p>When one tugs at a single thing in nature, he finds it attached to the rest of the world. -John Muir</p>		<p>Write a short biography on naturalist John Muir. What impact did his work have on the environment?</p>	<p>March 1, 1922. Izaak Walton League of America was founded by Will H. Dill. Its primary concern was pollution control.</p>	<p>The Izaak Walton League has local chapters that are involved in a variety of conservation projects. Learn more of their important efforts.</p>	<p>The Izaak Walton League motto is: "Conserve, maintain, protect, and restore the soil, forest, water, air and other natural resources and promote the enjoyment of these resources through education."</p>
<p>March 6, 1877. First Kansas bounty on predators (wolf, coyote, wildcat, fox) enacted on this date. This \$1.00 bounty was later dropped. What are bounties and why were they eliminated?</p>	<p>March 7, 1877. A law approved in Kansas to protect all birds except geese, ducks, hawks, owls and snipe. What is the status of these birds today?</p>	<p>Refuge - A wildlife sanctuary. National wildlife refuges are located across the United States.</p>	<p>March 14, 1903. President Theodore Roosevelt issued an Executive Order, which made the Federal Government responsible for providing refuge for brown pelicans on Pelican Island.</p>		<p>The brown pelican has rapidly neared extinction because of human harassment in its nesting habitat.</p>
<p>Locate Pelican Island, a 2½-acre bird sanctuary off the east coast of Florida. The Executive Order made Pelican Island the first National Wildlife Refuge.</p>	<p>March 16, 1934. The Migratory Bird Hunting Stamp Act passed. This provided funds for refuges. Much of the money used to purchase waterfowl refuges comes from the sale of migratory bird hunting stamps.</p>	<p>Jay N. "Ding" Darling designed the first migratory bird-hunting stamp. Learn more of Darling's conservation artwork and the laws requiring the stamp. What does migratory mean?</p>		<p>Locate the National Wildlife Refuges in Kansas. Quivera, Kirwin, and Flint Hills National Wildlife Refuges are in Kansas.</p>	<p>Vernal Equinox - Approximately March 21st. First full day of spring. Day and night are equal in length. Check sunrise and sunset times to verify this.</p>
<p>March 1903. Appropriations were made to establish the first Kansas fish hatchery in Pratt. What stream supplies this hatchery with water?</p>		<p>March 10, 1934. The Fish & Wildlife Coordination Act requires that federal government construction activities include consideration for wildlife and water and provides for compensation for habitat destruction.</p>	<p>March 24, 1900. The last wild passenger pigeon died in Pike County, Ohio. What can you learn about the passenger pigeon?</p>	<p>Do a brief study on extinct wildlife of North America. Be as thorough as possible. Include the reasons for extinction.</p>	<p>Severe spring blizzards of 1959 caused a reduction in the quail population. Why is weather such an important factor in wildlife survival?</p>

by Joyce Harmon

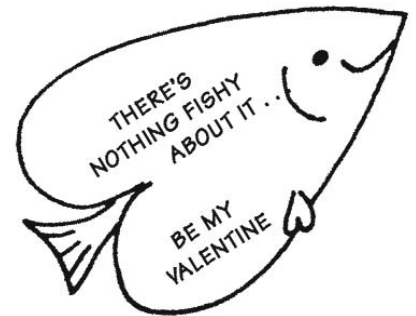
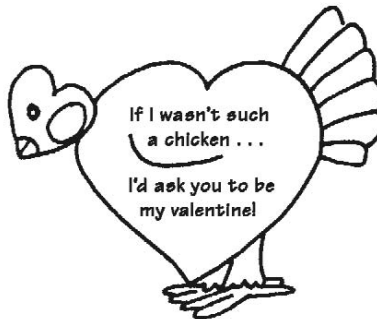
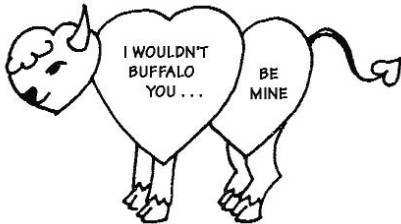
February The Month To Celebrate

Ground Hog's Day!
Valentine's Day!
Presidents' birthdays!



FEBRUARY 2nd . . . marks the date when ground hogs supposedly determine how much longer winter will last. As the legend goes, on February 2nd the ground hog awakens from hibernation to investigate the weather. If the sun is shining and the ground hog sees his shadow, he is frightened into hibernating another six weeks. If the day happens to be cloudy, preventing the ground hog from seeing his shadow, he stays out, looking for an early spring.

FEBRUARY 14th . . . can be celebrated with wildlife valentines. Valentines can be made easily out of construction paper, glue and a variety of art supplies.

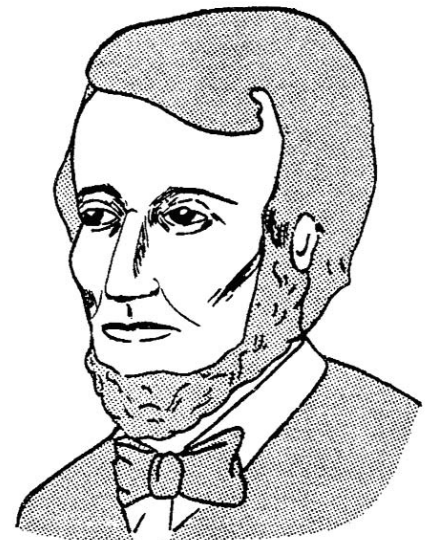


FEBRUARY 12th & 15th

When you celebrate the Presidents' birthdays, add an investigation of what Kansas was like during the days of Washington and Lincoln.

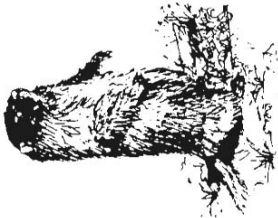

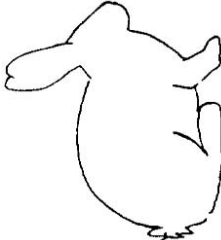


What wildlife species and quantities were present at that time?

Your local library or historical society may have sources of information for your study.



We celebrate Washington's and Lincoln's birthdays in February. During the month, investigate what the United States presidents have done for the environment.

FEBRUARY

<p>Die when I may, I want it said of me by those who knew me best, that I always plucked a thistle and planted a flower where I thought a flower would grow.</p> <p style="text-align: right;">-Abraham Lincoln</p>	<p>February 2nd GROUNDHOG DAY Legend states that if the groundhog sees its shadow on this day, there will be six more weeks of winter. The custom originated from the German Badger Day.</p>		<p>Groundhogs- Are members of the marmot family. What can you learn about this family of mammals? What other animals help predict the weather?</p>	<p>February 1967. One of the largest recorded fish kills in Kansas occurred in John Redmond Reservoir due to feedlot runoff. An early spring thaw and rain contributed to the disaster.</p>	<p>Locate John Redmond Reservoir. Write your own definition of "runoff."</p>
<p>"-ology" - Means the study of something. Scientists specialize in studying the environment. See how much you can learn about the following "-ologies."</p>	<p>Ecology - The study of relationships between living things.</p> <p>Zoology - The study of animals.</p>	<p>Ornithology - The study of birds.</p> 	<p>Mammology - The study of mammals.</p> 	<p>Herpetology - The study of reptiles and amphibians.</p> 	<p>Ichthyology - The study of fishes.</p> 
<p>"We loved a great many things - birds and trees and books and all things beautiful and horses and rifles and children and hard work and the joy of life." - Theodore Roosevelt</p>	<p>Research environmental efforts of presidents: Grover Cleveland, Calvin Coolidge, Theodore Roosevelt, Dwight Eisenhower, Gerald Ford, Ulysses Grant, Franklin Roosevelt, and Ronald Reagan.</p>	<p>February 18, 1905. Hunting licenses, bag limits, and State Fish and Game Deputies were established in Kansas.</p>	<p>Bag limit- The number of animals that may be harvested legally in a twenty-four hour period. A hunter may remove four pheasants each day. This a bag limit.</p>	<p>Extinct- Species that no longer exist. Examples include the passenger pigeon, the great auk, and the sea mink.</p>	<p>February 21, 1918. The last captive Carolina parakeet died. Carolina parakeets are extinct.</p>
<p>How many signs of winter camouflage can you find? Some animals have white fur or feathers in winter to match the snow. What does camouflage mean?</p>	<p>Fish don't hibernate for the winter; they slow their activities. Look up the words hibernation and estimation in a dictionary.</p>	<p>February 26, 1867. A House bill on gopher bounties was introduced. As a humorous gesture, the Senate changed the bill to grasshoppers instead of gophers and offered a bounty for "all scapls of grasshoppers furnished with the ears."</p>	<p>A sure sign that spring is on the way is the sound of birds singing. The birds are responding to the change in light, not to the weather. Tape-record the calls and songs to help in identification.</p>	<p>Be on the lookout for other signs of spring, such as migration, nest building, plants budding, and mating rituals</p>	<p>Most insects die each fall after leaving eggs or cocoons behind. Some insect species hibernate, and others are active during the winter. Look for signs of insect activity.</p>

Spring A Great Outdoor Time

by Joyce Harmon

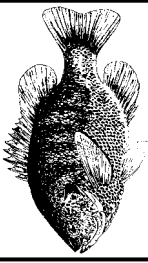

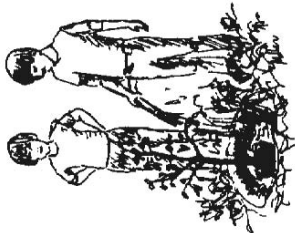
Have fun coloring
this Kansas scene.



Black is the color of a skunk's bushy fur, salamanders in the mud, and a caterpillar in the blackbird's beak. Dark clouds rain on chickadees, crows, and the raccoon's mask.

Spring is a great time for being outside-fishing, planting trees and discovering the activities of wildlife.

APRIL

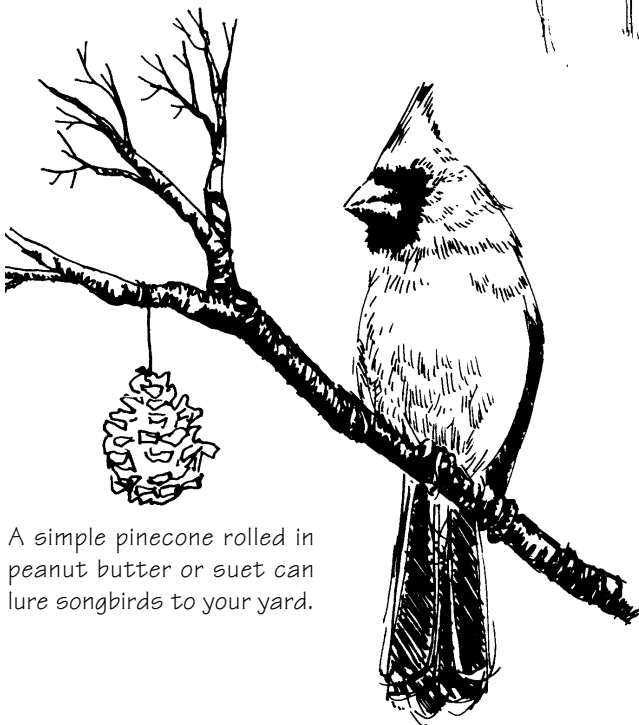
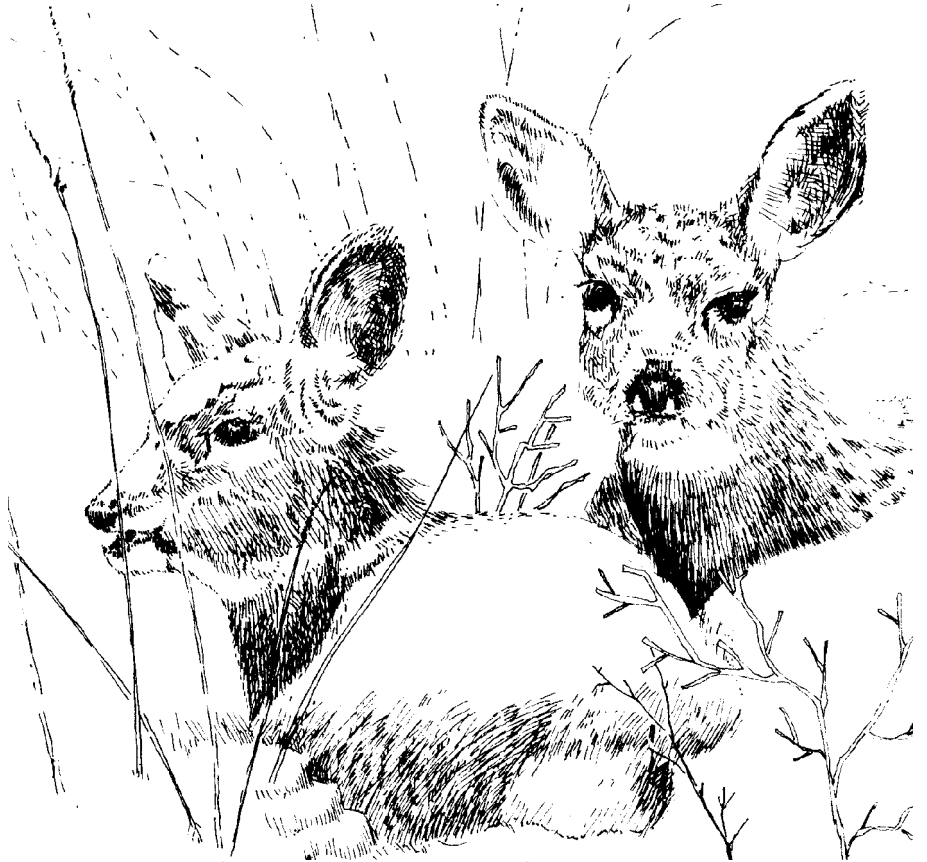
<p>Learn more about animal behavior and habitat selection by studying the following words. Name one species for each category.</p> <p>Aquatic - Living or growing in water.</p>	<p>Terrestrial- Living on the ground.</p> <p>Arboreal- Living in or among trees.</p>	<p>Play an April Fools prank by leading friends on an "Unnatural Hike." Hide several unnatural items such as pencils, cans, and books along a short trail. See how many of the objects they can find.</p>	<p>April 1906. Distribution of 3,342 Asian ringnecked pheasants began in Kansas. The birds were imported for \$11,739.77. They were released in 84 counties.</p>	<p>In 1982 1.5 million pheasants were harvested in Kansas. How would you evaluate the success of the pheasant-stocking program? Write your own definition for adaptation.</p>	<p>April 5, 1895. Fish wardens were required in every Kansas County that had ponds, streams, or other water capable of supporting fish. Today, the state is divided into 22 districts, each with a fisheries biologist.</p>	
<p>April 15. Taxes are due. The Kansas Nongame Wildlife Program is supported by donations made through the state income tax system. Can you find the "Chickadee Check-off" line on the Kansas tax form?</p>	<p>Xeric- Living in a dry environment.</p> <p>Psammittoral- Living among sand grains at the water's edge</p>	<p>The Nongame Wildlife Program supports many projects including reproduction of swallow-tailed kites and mountain plovers. It also has provided bird feeders, an observation tower; and educational materials.</p>	<p>April 18, 1980. Governor John Carlin signed into law the Income Tax Chickadee Check-off to provide funding for the Nongame Wildlife Program.</p>	<p>Tall tales and fish stories seem to go together. Chat with some of the experienced fishermen in your area. Record their tallest tales and share them with friends.</p>	<p>Here's a Kansas fish story that is hard to top: In 1856 a 250 lb. blue catfish was caught. It required the aid of a steamboat towline and a yoke of oxen to get the fish to shore.</p>	<p>Parasitic- Living on or in an organism or another species.</p> <p>Littoral- Living on the shore of a lake, sea, or ocean.</p>
<p>April 25, 1896. Congress created the Division of Biological Survey in the Department of Agriculture. What is the Biological Survey responsible for?</p>	<p>Limnetic- Living in an open, freshwater pond or lake.</p> <p>Arctic- Living at or near the North Pole.</p>	<p>Select one of Audubon's bird illustrations. Research this species and make your own sketches.</p>	<p>April 23, 1875. On Topeka's first Arbor Day, more than 700 trees were planted in the capitol square.</p>	<p>Celebrate Arbor Day in your community. What species of trees are most appropriate for wildlife habitat in your area? How do trees improve the environment?</p>	<p>The first Arbor Day was held in Nebraska on April 28, 1872. The first public planting of trees in honor of distinguished people was reported to have taken place in Cincinnati, Ohio.</p>	<p>What is the current state record for blue catfish? Stream alterations and land use practices have reduced the number of blue catfish in Kansas Rivers.</p>
<p>April 26, 1785. James Audubon's birth date. What can you learn about this famous ornithologist and artist?</p>						

by Dana Eastes

Watching Winter Wildlife

Winter is the best time to watch wildlife. The easiest way to watch wildlife in the winter without leaving your house is to put up birdfeeders. Sunflower seeds are best for attracting songbirds. To keep the birds coming back, you should fill the feeder regularly. A water source such as a birdbath or small pool or a pile of old firewood is good for wildlife.

Other methods of attracting wildlife to your house begin in spring or fall. Plant trees and shrubs and designate areas for



A simple pinecone rolled in peanut butter or suet can lure songbirds to your yard.

wildflowers and tall prairie grasses such as big bluestem.

What you're doing is providing food and shelter, basic requirements for any animal, including you. Don't be surprised at the variety of songbirds and small animals you can attract to your home, even if you live in an urban area.

If you want to watch water birds, game birds or larger animals like deer, bobcat and coyote, here are some things to think about.

**LAUGH AT COLD TEMPERATURES,
WIND AND SNOW.**

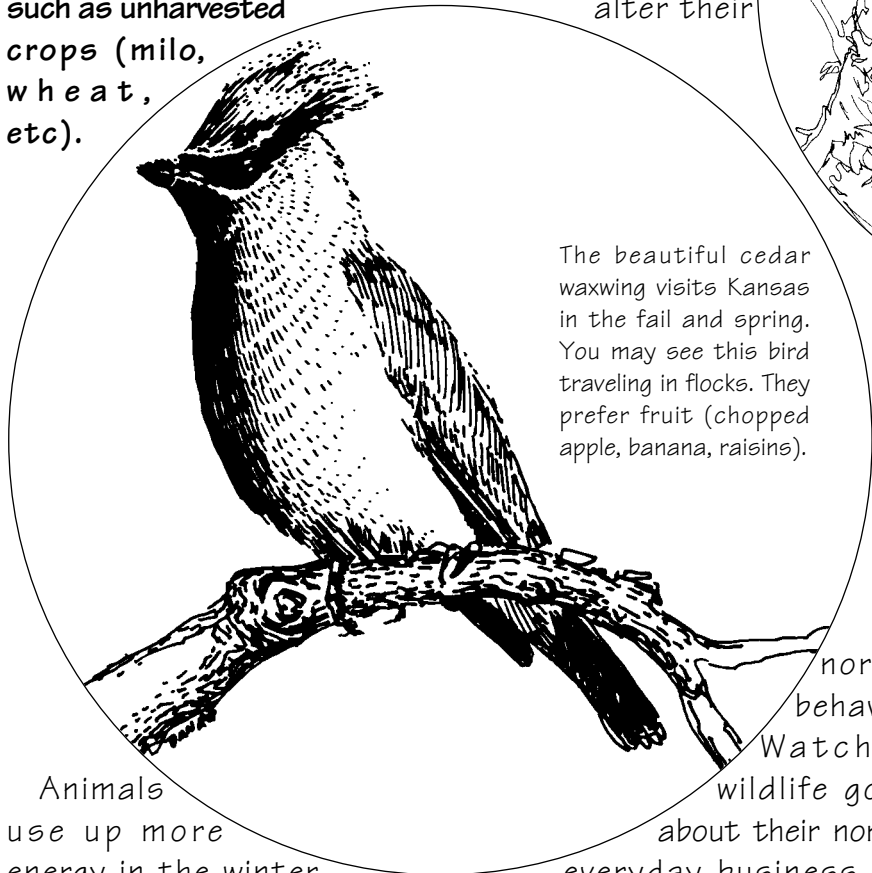
**You gotta love being out doors
even in the cold!**

Dress warm! Dress in layers: Know the warning signs of hypothermia and frostbite. Most of the time you'll be sitting quietly. The cold can sneak up on you if you're not careful.

Bring a good pair of binoculars or a spotting scope.

Always, always ask permission before you walk on someone's land.

Find an animal's food source, such as unharvested crops (milo, wheat, etc).



The beautiful cedar waxwing visits Kansas in the fall and spring. You may see this bird traveling in flocks. They prefer fruit (chopped apple, banana, raisins).

Animals use up more energy in the winter than at other times of the year. The more energy an animal uses, the more food it needs to maintain its body temperature, especially in the cold winter months. If you can find an animal's food source, you'll usually find the animal.

Also, animals will feed for longer periods in the day, meaning they may be out in the late mornings or early evenings.

Look for the "edge," where woodland habitat meets cropland or water meets tall grasses.

Find cover, sit and wait. Never chase wildlife or alter their



The southern flying Squirrel can be found in the northeast and southeast corners of the state.

A diary will give you better insight, into the behavior patterns of wild animals.

Check the hunting seasons. Don't be mistaken for a turkey.

If you're a beginner or seasoned wildlife watcher, check out the book called "Watching Kansas Wildlife: A Guide to 101 Sites." This book gives you the where, when and how to watch wildlife at 101 different public sites around Kansas.

Keep a diary of habitat, wildlife



The wood duck nests near water in the cavities of trees as the name suggests.

sightings, weather, etc.

Springtime and Wildlife

Spring

The days grow longer; early morning frost gives way to sun-warmed dew and songbird symphonies.

Mother Nature delivers when it comes to springtime. Not only does she deliver the weather, she also delivers wild babies. More wild animals are born in spring or early summer than at any other time of year. Every species has its own unique adaptations that have allowed it to survive through the years. Kansas has its own share of unusual courtship, birthing, and survival adaptations of wildlife young. Here are just a few.

Courtship

During the mating season, the sandhill crane puts on a

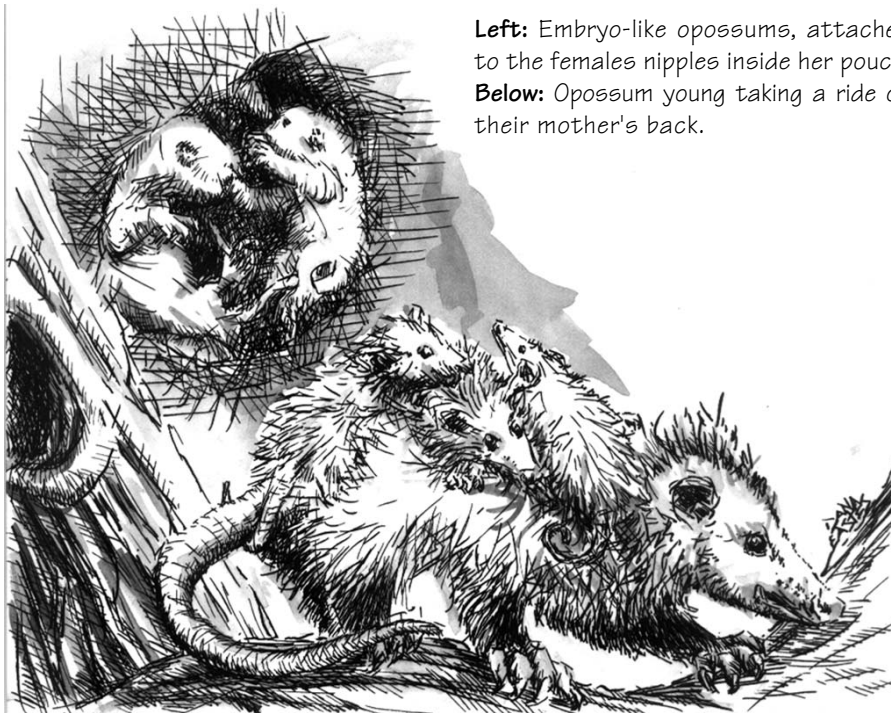
dance that would make MC Hammer jealous. Sandhill cranes have a unique ritual dance between pairs or among a group of mixed pairs. The sophisticated dance begins with the male bowing to the female and the female responding with a bow. As the excitement builds, the dance evolves into a series of synchronized leaps and bows, enhanced by loud croaking noises. The dance continues until both birds are exhausted.

Although mating takes place on the tundra of Alaska, Canada and Russia, sandhill cranes can be seen rehearsing their tundra-hopping tango while stopping to rest in Kansas. Sandhill cranes are generally monogamous, meaning they mate for life.

Birth

The opossum is a marsupial, the kangaroo of Kansas. A marsupial is





Left: Embryo-like opossums, attached to the female's nipples inside her pouch.

Below: Opossum young taking a ride on their mother's back.

a mammal that carries its young in a pouch. Opossums breed from January to mid-February, and just 13 days later these tiny, naked critters (usually 13 to 17) crawl into the female's pouch, latching on to one of the 13 nipples. After a couple of months, they open their eyes but remain in the pouch, nursing. In 80 days, they crawl out of the pouch and are ready for solid foods. After leaving the pouch, they still cling to the female, grasping on to the fur and wrapping their tail around hers. Not until around 100 days are they fully independent from the female, just in time for the next litter to make the trek into mamma's pouch.

Young Adaptation

During the first week of a whitetailed deer fawn's life, it remains

concealed while the doe feeds. During this time, the doe returns to the fawn only to feed it. She calls to find the hidden fawn, making a sound called a "bleat" that the fawn responds to. Fawns are born with a spotted coat to help camouflage them against predators. They lose their spots after three months.

If you see wildlife young, don't pick them up. A parent is usually close by. Most wild babies will die in the hands of human care. Mother, not "human," Nature should take care of them.



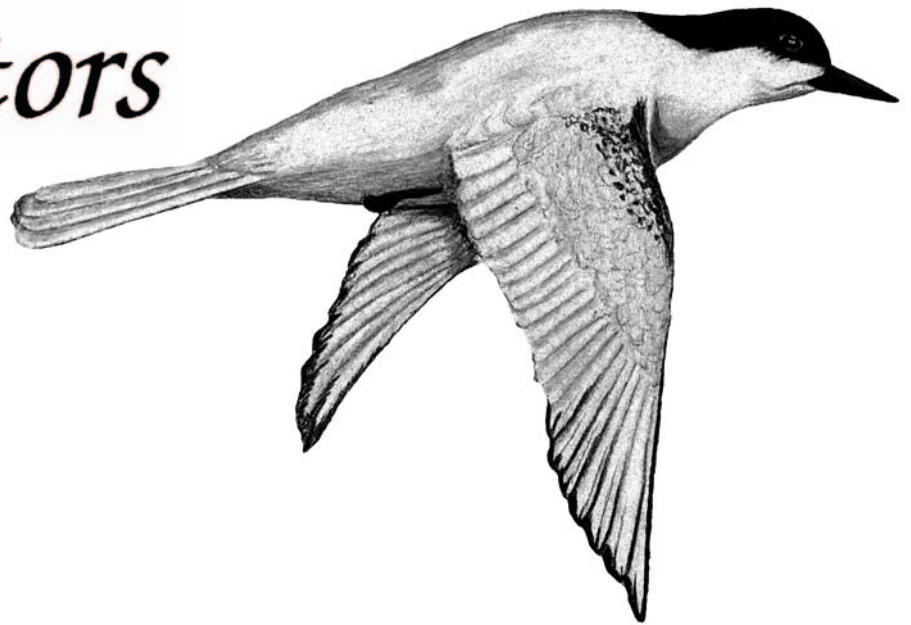
by Mark Shoup

Nature's Navigators

Like people, most animals have home areas, called territories. These territories are often breeding or nesting grounds. The most amazing thing about these territories is how animals can find their way back to them. It doesn't seem to matter whether the animal has left the area on its own or whether it has been taken away, it always seems to find its way back home.

Birds are masters at this navigation. The Arctic tern, for example, flies more than 11,000 miles each fall and spring. After nesting (or hatching) north of the Arctic Circle, it flies down the western coasts of Europe and Africa and across the Antarctic Ocean to its summer grounds not far from the South Pole. Because the sun hardly ever sets in summers at the poles, the arctic tern sees more daylight than any other creature on Earth. And it never loses its way back home.

How do they do this? From



memory? Perhaps, but homing pigeons can be taken from their lofts and released in strange places 100 miles away and fly straight home. It is known that pigeons do not do as well on cloudy days, so maybe they use the sun. But how do they know where home is in relationship to the sun when they don't know which direction from home they have been taken?

One of the most mysterious cases of homing navigation occurred when a scientist boxed up a Manx shearwater (a gull-like seabird) and sent it from its home on a British island to Massachusetts. The bird had never been to North

America before. It was released at Harvard University and within 12 days it was back in its burrow on Skokholm Island. It had traveled 3,050 miles -- 244 miles per day -- over Open Ocean, straight home.

Birds aren't the only great homing animals. Take the goby fish of the British West Indies. Each day after the ocean tide falls, the goby is trapped in small pools left on rocky shores. From its position, it has no way of knowing where the next pool is. Still, it leaps without error from one pool to the next until it finds the open ocean. Any mistake would leave it sun baked on the rocks.

Salmon are among the most famous navigators. Born in a specific portion of a stream, the young fish will stay within a few feet of that area for two to seven years, fighting the current. Then it will migrate from this small stream down through larger and larger streams until it reaches the ocean. After years at sea, the salmon will suddenly get the breeding urge and head directly home, perhaps a thousand miles away. Up one river into another and another and another it will travel until reaching that exact spot where it was born. There, it will breed and die. How does it know the way? Why does it do this?

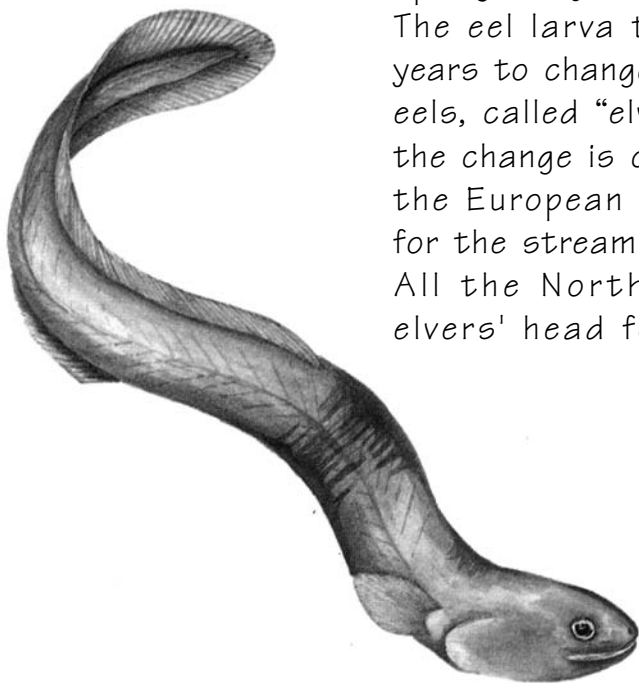


Eels are just as amazing. Eels in the freshwater streams of Europe and eastern North America are almost identical, except that European eels have more vertebrae. Each autumn, all the eels on both continents migrate downstream to the Atlantic Ocean. Their destination is a place near Bermuda called the Sargasso Sea where, in spring, they breed and die. The eel larva takes three years to change into young eels, called "elvers." Once the change is complete, all the European elvers head for the streams of Europe. All the North American elvers' head for the U.S.

How do they know where to go? How do they know who goes where? This certainly can't be done from memory, or from use of the sun or stars.

Seals, sea turtles, green sunfish, albatross, and many, many other creatures display equally incredible navigation skills. How do they do it? A mysterious built-in compass or clock? Memory? Use of the stars or the sun? Some or all of these things may be used. But the fact is, navigation and migration are still great mysteries to science. Why must a female salmon -- bloated with eggs -- navigate 1,000 miles to some remote, fast flowing stream, the only place on Earth where she will allow them to be fertilized?

We may never know. With some things, we can only wonder and be amazed, admitting that nature has an order beyond our understanding.



by Mark Shoup

HERDS AND KIDS

HERDS? KIDS?

The English language is always changing. Sometimes words are added, and sometimes others are forgotten. At one time, there were many words to describe groups of animals and their young. Today, there are not so many. Sure, we all know that cattle come in herds and their young are called calves, but there are many more interesting descriptions of groups and young.

See if you can match the young and adults on this page and the species and groups on the next. (Note that two of the young names match with the same adult name.)

Young

- | | |
|----------------|-------------------------|
| 1. squab | 13. tadpole |
| 2. eaglet | 14. cub |
| 3. caterpillar | 15. larvae |
| 4. fawn | 16. owlet |
| 5. duckling | 17. cygnet |
| 6. pup | 18. joey |
| 7. kit | 19. foal |
| 8. shoat | 20. gosling |
| 9. kid | 21. fledgling, nestling |
| 10. poul | 22. chick |
| 11. fry | 23. calf |
| 12. whelp | 24. elver |



Adult

- _____ bear, lion, shark, tiger
- _____ bird
- _____ fox, beaver, rabbit, cat
- _____ goat
- _____ swan
- _____ turkey
- _____ kangaroo
- _____ duck
- _____ owl
- _____ fish
- _____ eel
- _____ chicken, ostrich
- _____ frog
- _____ insect
- _____ eagle
- _____ hog
- _____ pigeon
- _____ goose
- _____ buffalo, antelope
- _____ dog, fox, seal, coyote
- _____ deer
- _____ zebra, horse

Answers: squab = pigeon; eaglet = eagle; caterpillar = insect; fawn = deer; duckling = duck; pup = dog, fox, seal, coyote; kit = fox, beaver, rabbit, cat; shoat = hog; kid = goat; poul = turkey; fry = fish; whelp = dog, fox, seal, coyote; tadpole = frog; cub = bear, lion, shark, tiger; larvae = insect; owlet = owl; cygnet = swan; joey = kangaroo; foal = zebra, horse; gosling = goose; fledgling, nestling = bird; chick = chicken, ostrich; calf = buffalo, antelope; elver = eel.

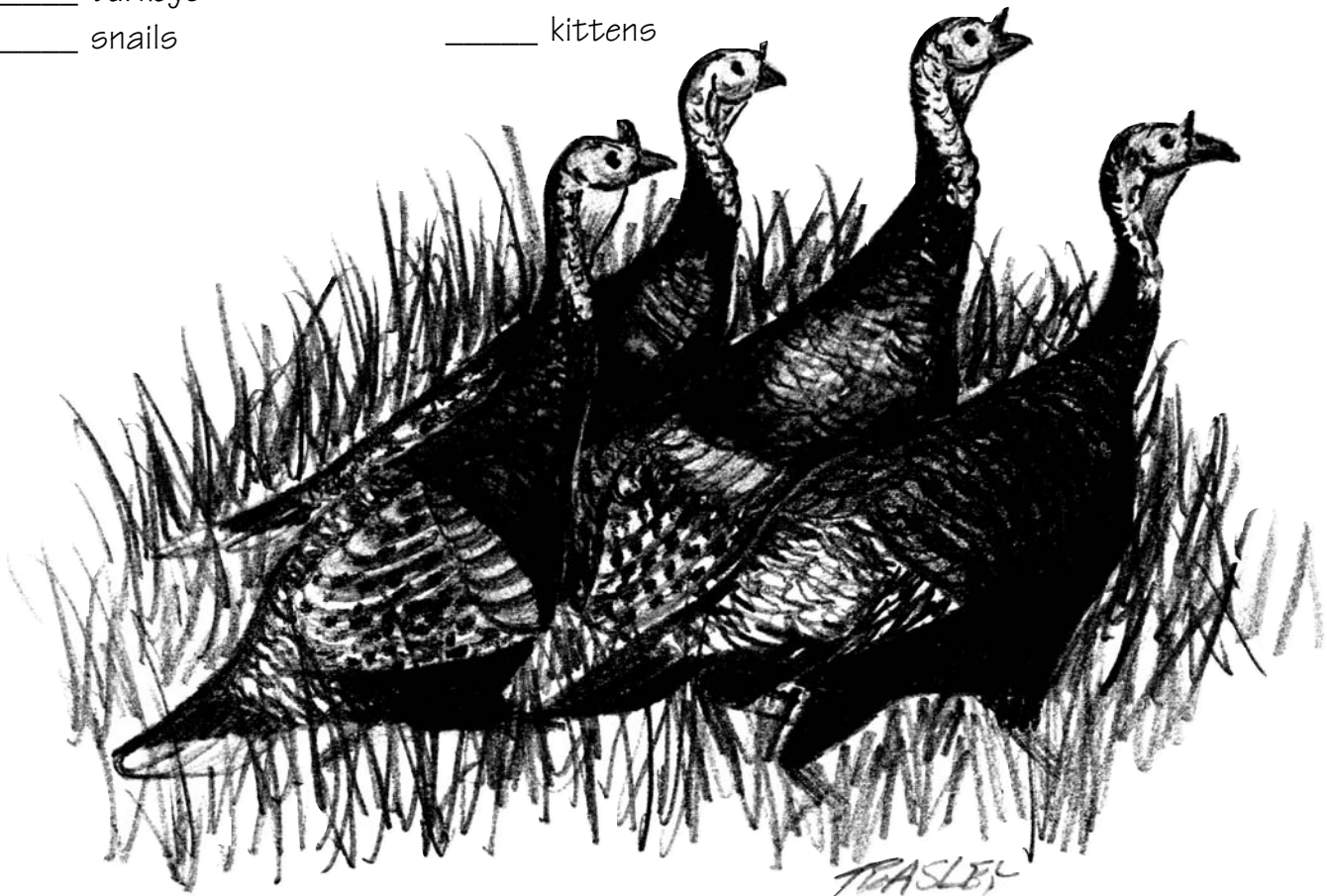
Species

_____ peacocks
 _____ hounds
 _____ whales, seals
 _____ lions
 _____ bears
 _____ fish
 _____ goats
 _____ kangaroos, monkeys
 _____ birds
 _____ worms
 _____ turkeys
 _____ snails

_____ leopards
 _____ quail
 _____ gorillas
 _____ ducks
 _____ hawks
 _____ cats
 _____ chicks
 _____ ants
 _____ coots
 _____ swine
 _____ sheep, cattle
 _____ geese
 _____ whales
 _____ elephants
 _____ hares
 _____ kittens

Group

- | | | |
|------------|------------|------------|
| 1. band | 11. gam | 21. shoal |
| 2. brace | 12. herd | 22. tribe |
| 3. cast | 13. warren | 23. troop |
| 4. clowder | 14. kindle | 24. volery |
| 5. clutch | 15. leap | 25. clew |
| 6. colony | 16. muster | 26. rafter |
| 7. covert | 17. mute | 27. walk |
| 8. drift | 18. pod | 28. covey |
| 9. drove | 19. pride | |
| 10. gaggle | 20. sleuth | |



Answers: a band of gorillas, a brace of ducks, a cast of hawks, a clowder of cats, a clutch of chicks, a colony of ants, a covert of coots, a drift of swine, a drove of sheep or cattle, a gaggle of geese, a gam of whales, a herd of elephants, a warren of hares, a kindle of kittens, a leap of leopards, a muster of peacocks, a mute of hounds, a pod of whales or seals, a pride of lions, a sleuth of bears, a shoal of fish, a tribe of goats, a troop of kangaroos or monkeys, a volery of birds, a clew of worms, a rafter of turkeys, a walk of snails, a covey of quail.

by Mark Shoup

KANSAS SHRIMP

What's the most fascinating critter in Kansas? The wily coyote? The secretive owl? The graceful deer? How about the seasonal shrimp?

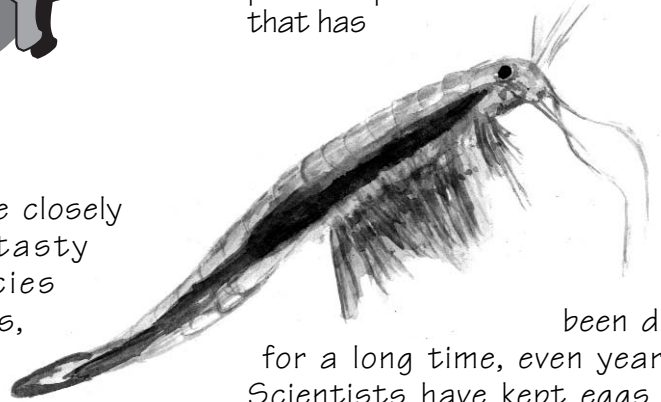
Nope, I'm not pulling your leg. While everyone is familiar with the common crawdad, perhaps the most fascinating but unknown crustaceans in Kansas are shrimp. Fairy shrimp, tadpole shrimp, and

clam shrimp are closely related to tasty marine delicacies such as crabs, lobsters, and shrimp that we all know.

So where are these critters found? In small, usually seasonal waters such as roadside ditches, grassy spring ponds, cattail marshes,

woodland pools, and playa lakes — anywhere except lakes and running water. However, most are only about 1/4 to 1 1/2 inches long, so they are seldom seen unless you go looking for them.

One of the most interesting facts about these critters is that they can appear suddenly in a small puddle or pond that has



been dry for a long time, even years. Scientists have kept eggs in dried mud for as long as 15 years before successfully hatching them!

How can this be? Fairy, tadpole, and clam shrimp eggs are blown, or carried on the bodies of other creatures, to dry spots where they lie dormant until conditions are perfect. These eggs can be frozen solid or scorched in the dry summer sun without dying. When spring rains fall, the eggs hatch, and these pools come alive with freshwater shrimp. When this happens, a dry, lifeless depression can suddenly become an important source of protein for shorebirds and waterfowl.

Two types of eggs are produced. Thin-shelled summer



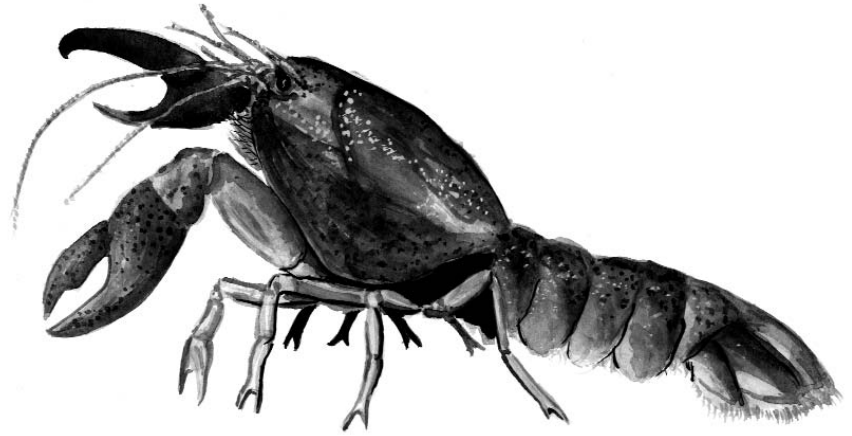
eggs hatch immediately. Thick shelled winter eggs are the ones that lay dormant for so long.

Another fascinating fact about freshwater shrimp is that they don't need both male and female to reproduce. Although both sexes are produced, males are often absent from a population. No problem. Freshwater shrimp are capable of developing fertile eggs that haven't been fertilized by a male — a process called parthenogenesis.

Fairy shrimp look much like their popular marine cousins, and they are the most common of the three. The tadpole shrimp looks just like the horseshoe crab common in many parts of the ocean. Clam shrimp have two shell-like shields that protect the body. All have multiple sets of legs, from a dozen to as many as 70. The fairy shrimp and the tadpole shrimp use these legs to swim, but the clam shrimp actually swims with its antennae.

Most are translucent to white, sometimes tinted a little gray, blue, green, orange, or red. They eat algae, bacteria, zooplankton, and bits of decayed matter in the water. Tadpole shrimp will also eat dead tadpoles, worms, and frog eggs, and some even eat other shrimp.

Although tricky, it's possible to recreate a freshwater



shrimp aquarium in your home or classroom, just to get a better idea of how they look and behave. The first trick, of course, would be to find a pool with freshwater shrimp. Talk to the county extension agent or wildlife biologist in your area. (Shrimp will be absent from any area that has been treated with pesticides.) Once you find an inhabited pool, collect some shrimp just to look at. Then write down the pool's exact location and wait.

After the first frost in the fall, go back to your pool and

shrimp. Melted snow or rainwater would be best. Add the dried mud and place a small amount of fertilizer or fish food in the water. The bacteria and algae that develop from this will provide food for the hatched shrimp.

Keep the water cool to allow early-hatching species the best chance to come on. If you are very lucky, you may be the first kid on your block to have an aquarium full of these awesome little critters.



collect a bucket of dried mud. Clean an aquarium and fill it with fresh water. Don't use tap water because the chlorine could kill the

by Mark Shoup

AT THE
Movies

From *Star Wars: Episode One* to *Indian In the Cupboard*, most kids love the movies. But did you ever consider getting a movie made by the Kansas Department of Wildlife and Parks? Did you even know the agency made movies? Well, they do. Whether you're interested in learning how to identify the birds at your feeder, conserve a wetland, or learn more about wild turkey or deer, Wildlife and Parks has a nature movie for you.

These video movies were photographed and edited by Wildlife and Parks videographer Gene Brehm of Pratt. And all were shot right here in Kansas. All these videos can be checked out by your teacher or group leader (such as scouts, 4-H, church organizations) FOR FREE. You may also purchase some of them for your home video library.

So the next time you want to go to the movies, check out these Wildlife and Parks selections. Then fix a big bowl of popcorn and relax at home. (Titles in bold may be purchased by calling [316] 672-5911.) Order one or several.

Floor of the Sky: The Short-

grass Prairie is a 24-minute video that highlights the stunning geology and habitats of the high plains of Kansas. While many wildlife species are highlighted in the program, the status of the swift fox and the black-tailed prairie dog are discussed in detail.

The Channel Catfish Story is

hot off the editing machine and details the hatchery processes that result in the production of catfish stocked into Kansas' public waters, a process that was developed more than 60 years ago in Kansas. This short video lasts 13 minutes.

Pheasants In Croplands promotes farm practices that are

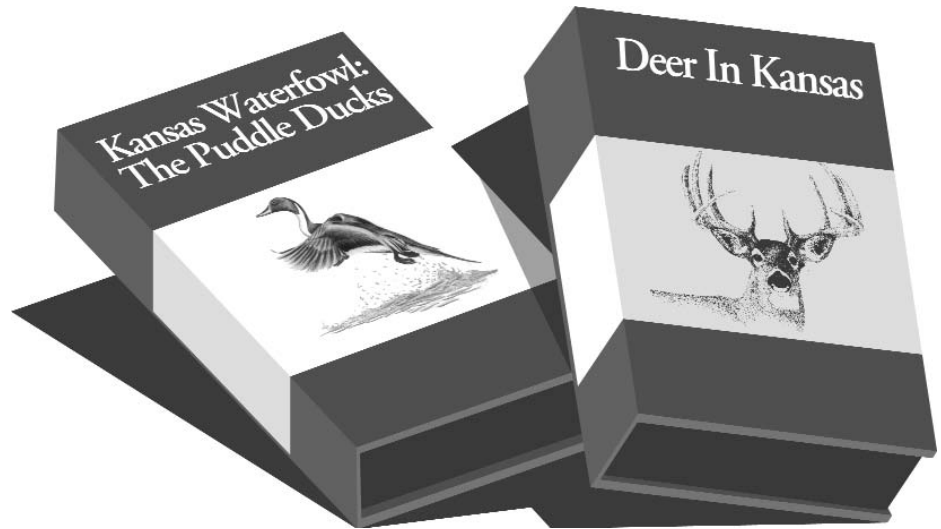


friendly to wildlife, especially pheasants. The main focus of this program is on the wheat-growing regions of western Kansas. Program length is 25 minutes.

Kansas Waterfowl: The Puddle Ducks has been produced in two versions. A public program version is 20 minutes long. The long version lasts 50 minutes and includes both natural history and identification of Kansas ducks.

The Birds In Your Backyard: A Video I.D. Guide gives you a close look at most birds commonly seen at bird feeders. This 20-minute program is offered for sale and also makes an excellent public program.

Two programs that help people manage or understand our natural resources are *Farming CRP Lands Wildlife Friendly* -- 23 minutes and -- *The Use of CRP*



Food Plots as Fire Guards on CRP Lands -- 18 minutes.

Wetland and Riparian Areas of Kansas is an entertaining look at the different types of wetlands in Kansas and their value in the water cycle. This video is 25 minutes long.

Programs from the natural history series, include **Deer In Kansas** and **The Wild Turkey Story**. Both of these videos are for sale. *Deer In Kansas* is a 43-minute video that details the natural history and behavior of deer. *The Wild Turkey Story* is a 43-minute video that recounts the reintroduction of the wild turkey into Kansas. Turkey natural history, trapping and transplanting, and important research programs are highlighted.

Cheyenne Bottoms: Building For The Future details the renovation of Cheyenne Bottoms. This 28-minute video highlights the value of this great marsh to waterloving birds and mammals. It also outlines

changes that have tremendously improved the water storage and handling capabilities available to managers of this special marsh.

The Grasslands Of Kansas is a 25-minute movie that identifies the tall, mixed, and short grass habitats of Kansas.

Walleye For Tomorrow is a 10-minute show that displays the entire process of walleye egg collection and hatching, from biologists working to collect walleye eggs to the processes that hatch the eggs.

A Boaters Guide to Kansas describes the rules and procedures of safe and legal boating on Kansas waters. Proper registration, legal equipment, and operating laws are all included in this 25-minute production.

For more detailed information on the movies for sale here, visit Wildlife and Parks' website at www.kdwp.state.ks.us and click "Outdoor Store."

Oh, Give Me
A Home



by Mark Shoup



... where the buffalo roam,
where the deer and the antelope play.

Every Kansas elementary school student is familiar with these lyrics; they're from the official Kansas state song, "Home On the Range" (lyrics by Dr. Brewster Higley, music by Daniel Kelley). It's the official Kansas state song because the Kansas Legislature made it so in 1947.

Most official Kansas symbols evoke the outdoors. The Sunflower State, as we are often called, officially gained statehood on January 29, 1861. It was named after the Indians that the Sioux called the Kansa, meaning "people of the south wind."

The official Kansas flag has a dark blue background with the state seal in the center. A sunflower on a bar of twisted gold lies above the seal. The seal contains a landscape that includes a rising sun, a river, and a man plowing a field. A wagon train heads west, and buffalo are seen fleeing from two Indians. Around the top of

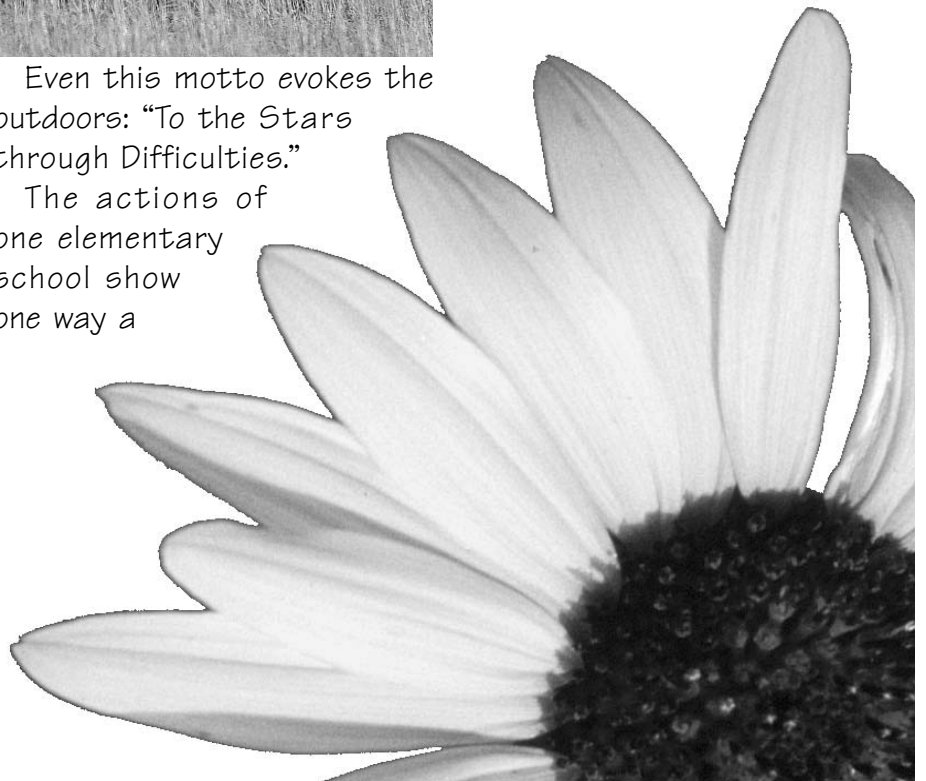
the seal is a cluster of thirty-four stars. The state motto -- Ad Astra per Aspera -- appears above the stars.



Even this motto evokes the outdoors: "To the Stars through Difficulties."

The actions of one elementary school show one way a

symbol becomes official. Caldwell, Kansas became the official ornate box turtle capital of the world in 1986 after a massive campaign by the 1985-86 Caldwell 6th grade class to have the ornate box turtle named the official state reptile. The turtle was named the state reptile on April 14, 1986, when Kansas Gov. John Carlin signed the official bill passed by the legislature.





In 1994, a similar effort by Wichita school children resulted in the barred tiger state mammal? Of course, it's the first critter named in the state song — the buffalo, more correctly called the American bison. This great animal once roamed the Sunflower State by the millions.

In 1937, the Kansas legislature proclaimed one of our more familiar wildlife, the meadowlark, the state bird because it is "preferred by a vote of Kansas school children."

And who could ignore the state flower: "She's a sunflower, /She's my one flower/She's a sunflower from the Sunflower State," as the song goes, and the sunflower holds a special place in the hearts of all Kansans. Thus, the legislature reasoned in 1903:

"This flower has to all Kansans a historic symbolism which speaks of frontier days, winding trails, pathless prairies, and is full of the life and glory of the

past, the pride of the present, and richly emblematic of the majesty of a golden future."

The legislature specified only the genus *Helianthus*, so take your pick of the several sunflower species found in Kansas.

As the Great Seal of Kansas depicts, Kansans are an industrious people, so what more appropriate symbol for the state insect than the honeybee? This interesting and beneficial animal was declared the state insect in 1976.

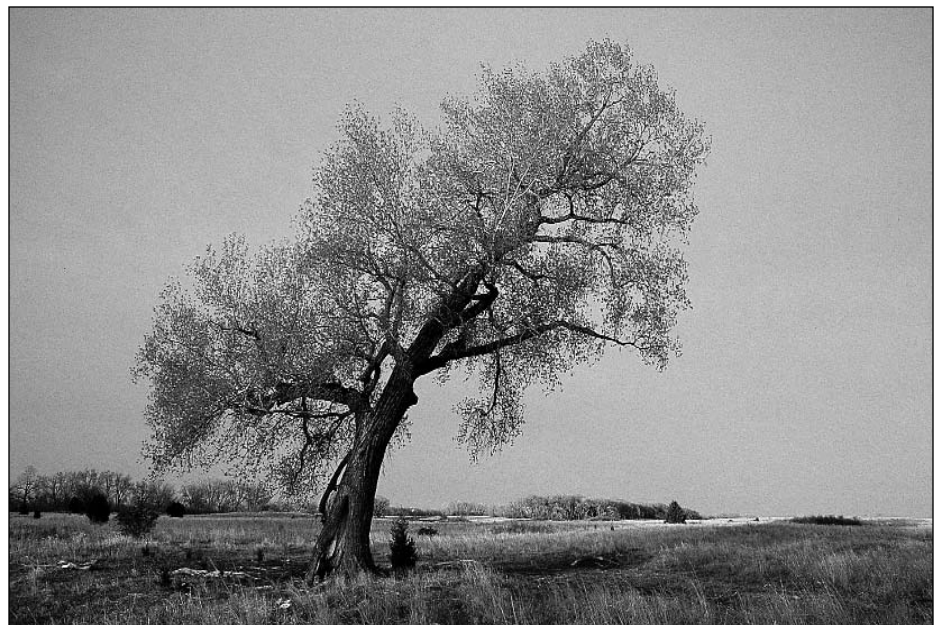
But if you were asked to pick a symbol of strength and majesty closely associated with images of the prairie, none would be more endearing than the giant cottonwood tree, found throughout Kansas. In 1937, the Kansas Legislature named this popular tree a Kansas state symbol.

Believe it or not, Kansas has a state soil. Harney silt loam was adopted as the Kansas State Soil on April 12, 1990,

when Governor Mike Hayden signed Senate Bill 96. Kansas is one of only seven states to have named a state soil. It took five years through a strong grass-roots effort to get Harney named as the state soil.



Is there anything left? Other suggestions for state symbols have been made, such as a state fish and a state fossil, but so far, they have not joined the elite — the symbols of a great state.





nature's notebook

CHAPTER TEN

INVERTEBRATES

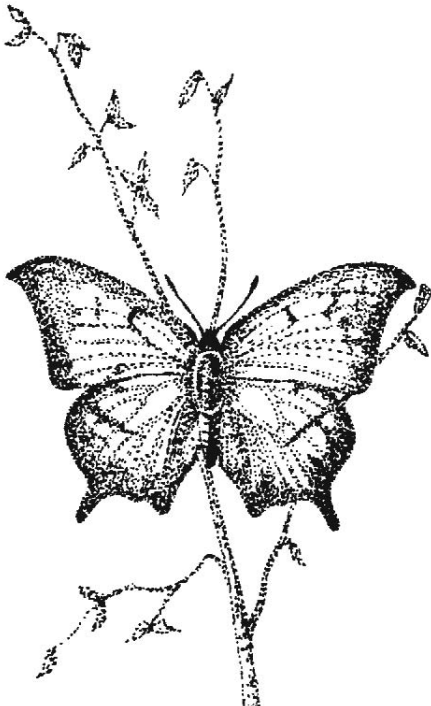
by Joyce Harmond Depenbusch

FLUTTERBOYS

Whether flying, crawling, or molting, butterflies are interesting creatures. Because butterflies go through four stages of development, they can be found in a variety of forms. They metamorphose, or change from egg into larva, or caterpillar,

Goatweed Butterfly

This kind of butterfly is found statewide, but especially in the east. They can be found near streams or trees in the prairie. The adults are attracted to ripe fruit, while caterpillars eat goatweeds. The undersides of their wings look like dead leaves. The larva hides in a rolled leaf during the day.

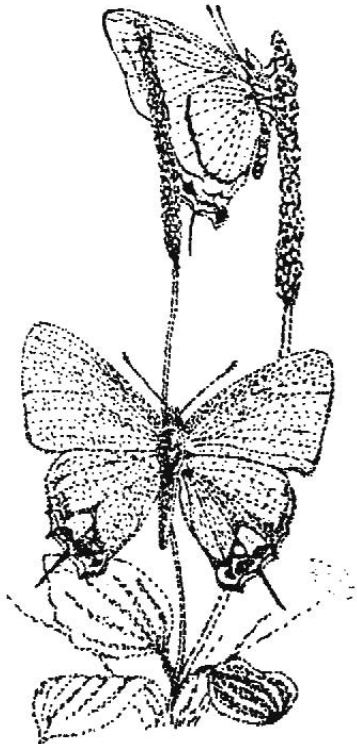


which feeds, grows, and molts to form a pupa. Eventually the winged adult emerges from the pupa case. Adult butterflies have a long sucking tube, or proboscis, to feed on nectar and other fluids. Caterpillars eat a variety of plants.

A few of the many butterflies found in Kansas are shown on these pages. See how many butterflies you can find and how much you can learn about these flying insects. For more information on butterflies, check your local library.

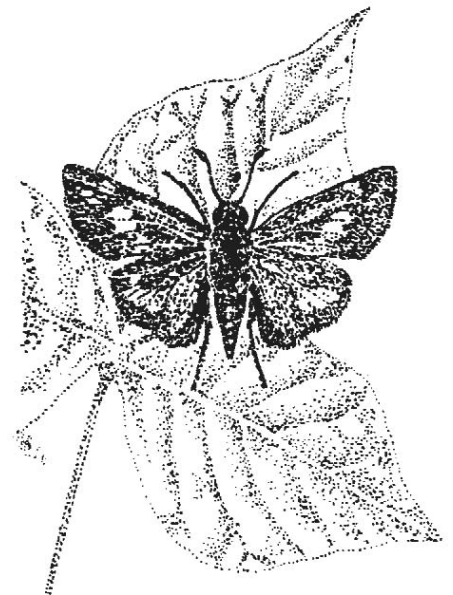
Mottled Skipper

Mottled skippers are fairly common in the east and central regions of the state, but are uncommon in extreme western Kansas. They are found in lawns, gardens and roadsides. Crabgrass and foxtail are some of the caterpillar's food plants. Skippers earn their name from their skipping flight and can be distinguished from other butterflies by their antennae.



Gray Hairstreak

Found in all Kansas counties, this butterfly species is attracted to flowers. Gray hairstreaks live in open areas, such as prairies, roadsides, and alfalfa fields. The larvae eat clover, mallow, vetch, and a variety of other plants. They have a swift, darting flight.



Regal Fritillary

This butterfly species is considered to be in "need of conservation" so that its numbers are not depleted. It has been found in about 50 eastern and central Kansas counties. It lives in prairies, near roadsides and occasionally flowerbeds. The violet is the caterpillar's food plant. The male and female can be distinguished by the number of rows of cream-colored spots on the hindwing markings. The male's wing has only the inner row of markings with these creamy spots.

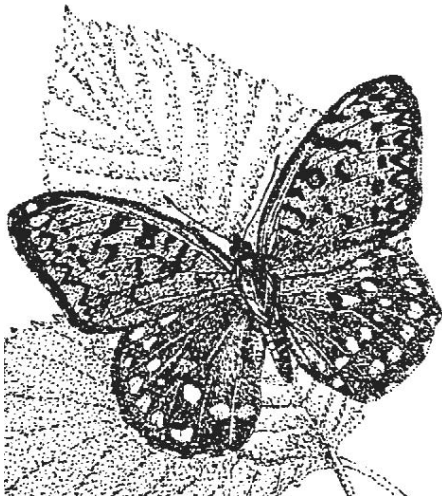


Painted Lady

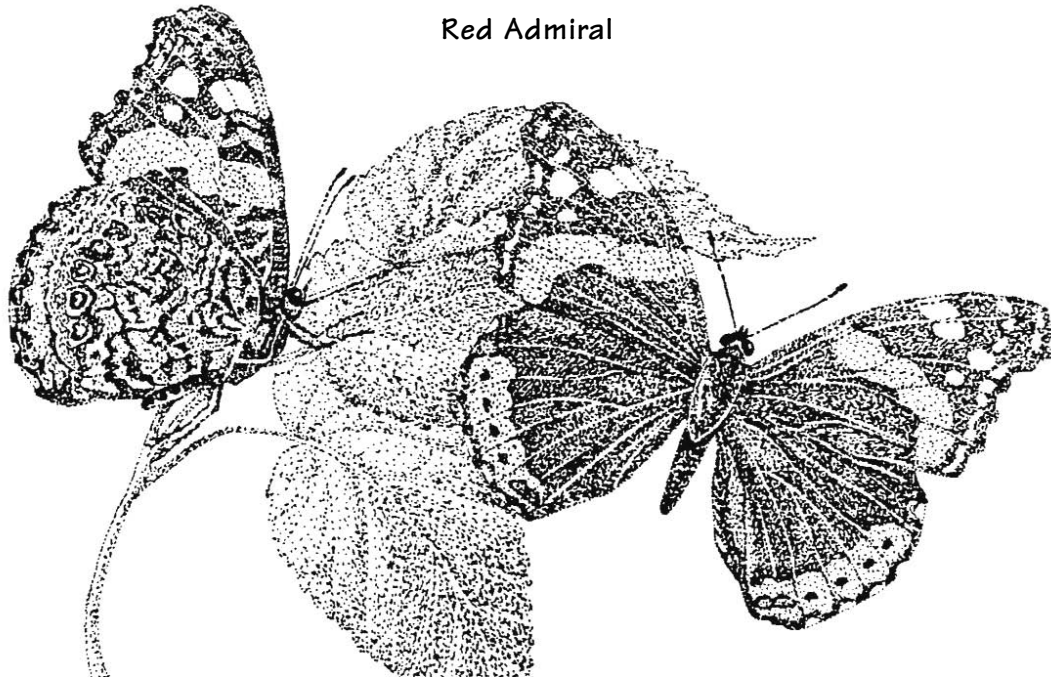
A nickname for this species is "the cosmopolitan" due to its wide range and abundance. Their numbers were so numerous in southwestern Kansas during one spring migration that driving was hazardous. Alfalfa fields, flowerbeds, or any open habitat is preferred by the painted lady butterfly. Flowers and rotting fruit attract this species. The spiny caterpillars feast on a variety of plants, including sunflowers and thistles.

Monarch

Monarchs are common all over Kansas. They make their homes in or near fields, roadsides, and prairies. During migration they can be found anywhere, especially if there are flowers close by. They generally make their fall migration in September. The male monarch has dark scales in the center hindwing that serve as scent glands. Milkweed and dogbone are eaten by the caterpillars.



Red Admiral



by Mark Shoup

KING of BUTTERFLIES



September is a beautiful month. Why? Because school has started, right? Well, as I remember, those first few days of school -- walking to and from the playground in the warm September sun -- always filled me with the excitement of change. School, of course, is only one change brought on by September. No matter what the weather, you can always feel the seasons about to change this time of year.

One of the most fascinating things about September is the migration of monarch butterflies. If you happen to be in a monarch migration path, it's like being in an animated movie. Orange and black wings surround you, bobbing silently in the air. But watch out! Butterflies can be dangerous. I remember once in seventh grade football practice, the monarchs were so thick that a kid sucked one through his mouthpiece and swallowed it!

Seriously, nothing spells "September" like MONARCH.

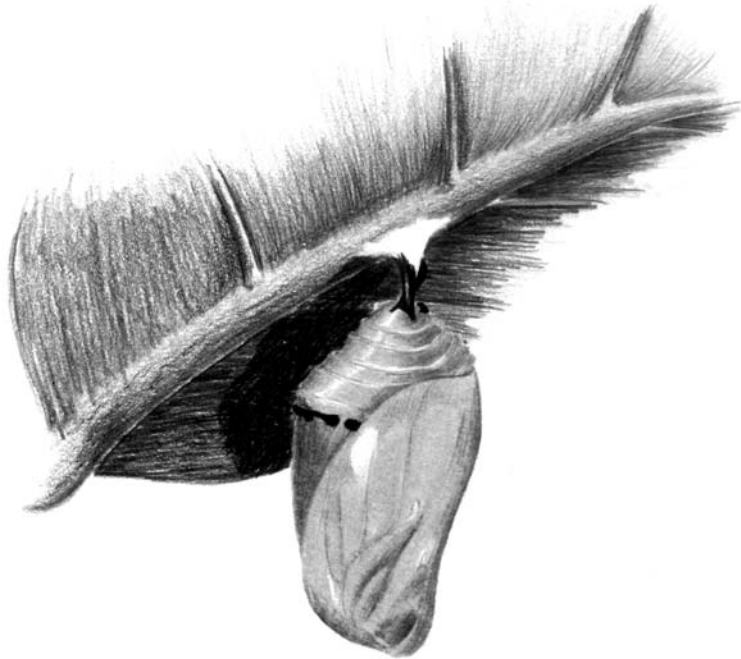
Doves are in flight, the weeds, trees, and grasses are changing, and a rich new aroma fills the air. But add monarchs, and that's all you'll notice. They fill the air. Sometimes, they cover entire trees.

Monarchs are big and beautiful, and their migration flocks are huge. But the migration itself is one of the most amazing events in nature. None of the individual monarchs you see this September were alive during last spring's migration north. So how do they

know where they're going? Apparently, it's all in the genes. Somehow, from egg to caterpillar to chrysalis to adult, the monarch is "born" with the knowledge of where to go.

About 5 million monarchs live west of the Rocky Mountains. All monarchs east of the Rockies (about 100 million) winter in the Oyamel fir forest mountains of central Mexico. Unfortunately, these forests are being destroyed by logging, both legal and illegal, which





could endangered the entire eastern monarch population.

In spring, eastern monarchs mate, and the males die soon after. Females lay eggs on milkweeds on their way back north in the spring. Most of these females will only get about as far as the southern U.S. before they die. After the eggs hatch, caterpillars spend 10-12 days munching milkweed before spinning a chrysalis. Then the adults emerge and continue the migration north about a month after the eggs hatch-ed. The individuals in this next generation mate, lay eggs, and travel as far north as they can before dying.

And so on, as far north as Canada. But the monarchs born in late summer and early fall are different

from the previous leap-frogging generations. They make the trip all the way back to Mexico and do not mature until the following spring.

If you're lucky, you may find a monarch caterpillar in your backyard. If you do, take advantage of this opportunity to witness the magic of metamorphosis.

Place the caterpillar and a good sprig of the plant you find it on in a large covered container with plenty of air holes. An aquarium with a screen over the top is ideal. Don't use a fruit jar. It's not big enough to accommodate the emerging butterfly's wings.

In a few days -- maybe overnight -- the caterpillar will spin a beautiful blue-green chrysalis ringed with gold beads. Then in 5-7 days, the monarch butterfly will emerge from a blackened cocoon. If you're lucky again and happen to be around when it happens, you'll see the whole drama unfold in a matter of seconds.

Once the butterfly has emerged, leave it alone for a few hours until its wings harden. Then take it outside and let it go. It will soon find its soul mates and become a part this wonderful September event. And you will have been a part of it.



Fly SWAT Team

After reading the following paragraphs, answer the questions below. Then see if you can make a three-dimensional model of a housefly. The pattern can be glued onto heavier paper, or a master can be made, with copies run on construction paper.

Houseflies, (*Musca domestica* - Order **Diptera**), are among the most common, and probably the most pesky, kind of wildlife we see. But, it's surprising how little we know about this two-winged species.

For an animal only about three-eighths of an inch long, it can be a bother. Houseflies are found almost anywhere there are people. These in-

sects have reddish-brown **compound** eyes. The female has eyes further apart than the male. Their wings are **transparent**. It might feel like you've been bitten by a housefly, but actually, their mouth parts are more like a sponge for sucking. Sticky pads on their feet allow them to walk nearly anywhere.

The female lays up to 600 eggs from summer to frost. In warm weather the eggs hatch in eight to twelve hours. The fly larvae, or **maggots**, eat decaying plants and animal matter. Flies often spread bacteria because they lay their eggs on decaying material. Adult flies can spread diseases, such as typhoid,

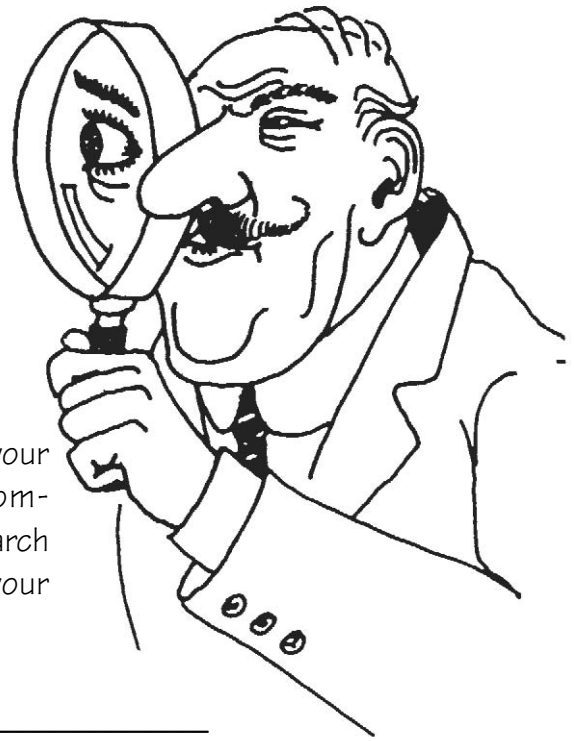


dysentery, and cholera, by emptying their stomach contents at each place they feed, and by carrying diseases on their feet.

It is difficult to control the number of houseflies in an area because 10 generations can be produced in one year. That means that one female might have five and one-half **trillion descendants**, or offspring, from April to September! Now you know why you can swat flies all day and never get the last one.

1. Flies have _____ eyes.
2. Diptera means _____.
3. The genus-species name of the housefly is _____.
4. One female fly could lay _____ eggs.
5. Fly larvae are called _____.
6. Look up the definitions of each of the words in bold type.

RESEARCH Made Easy



B iologists research wildlife and habitat. Try your wildlife so they are hand at research by better able to man- completing the following research age it. The more they know, form on the species of your the more they can benefit choice.

Name of species: _____

In what type of habitat is this species found? _____

Food preferences _____

List predators and prey (if any) _____

Number of young per year _____

Average life span (days, months, years) _____

Animal classification (mammal, bird, -etc.) _____

Approximate size: Length _____ ; Weight _____

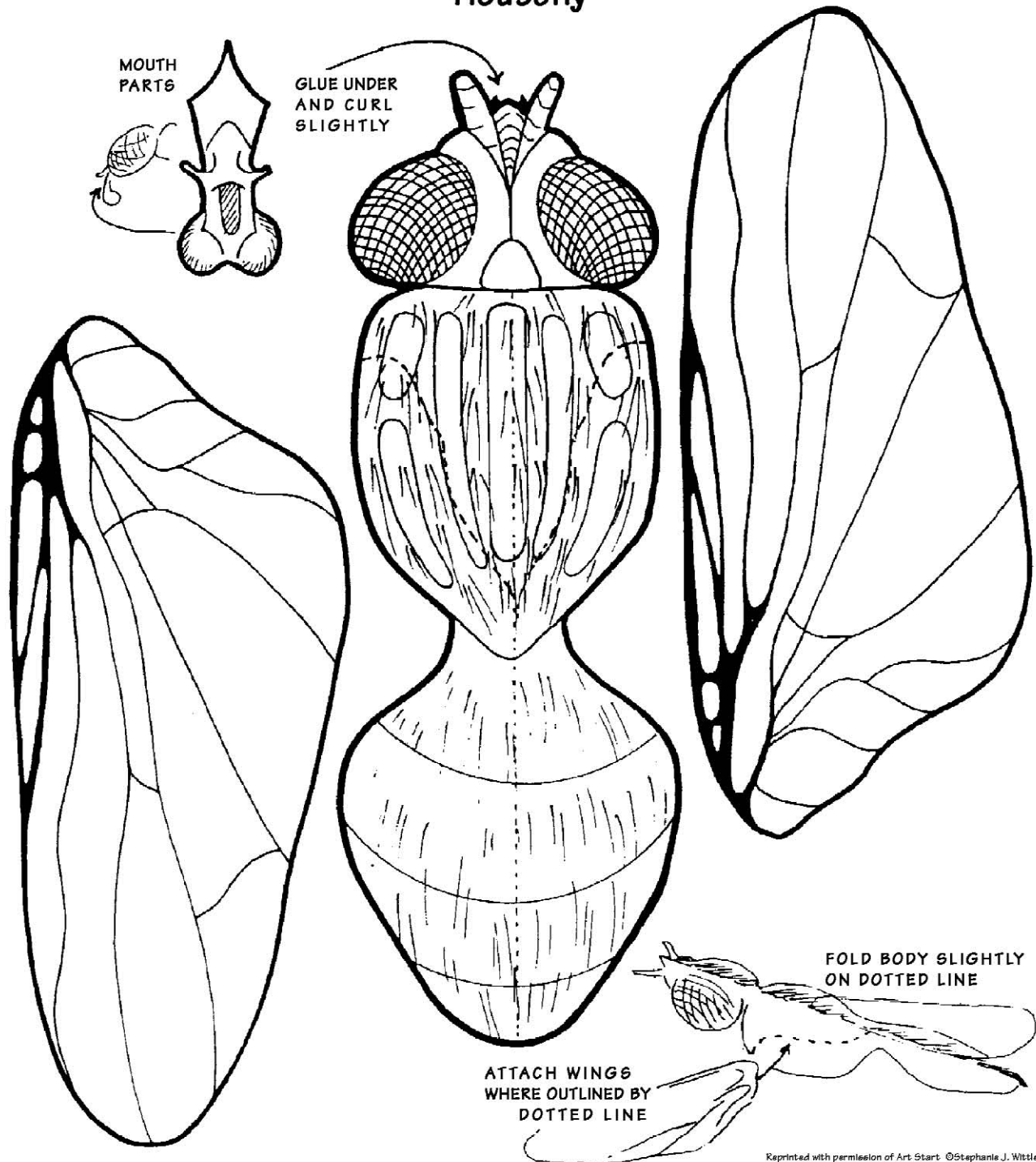
Write at least five sentences that further describe the animal.

Draw a picture of the species:

WILDLIFE IN ANOTHER DIMENSION

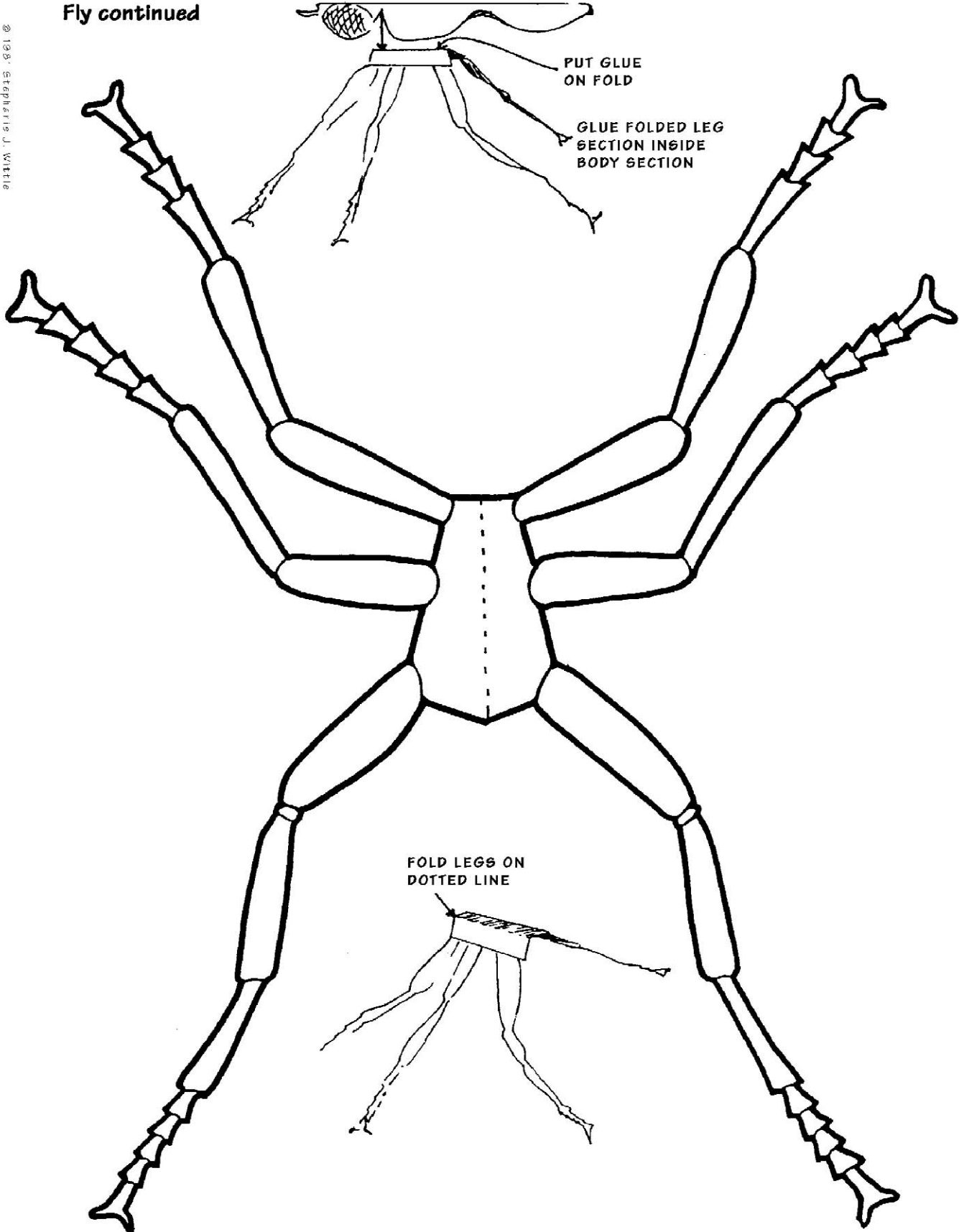
by Joyce Harmon

Housefly



Reprinted with permission of Art Start. ©Stephanie J. Wittie

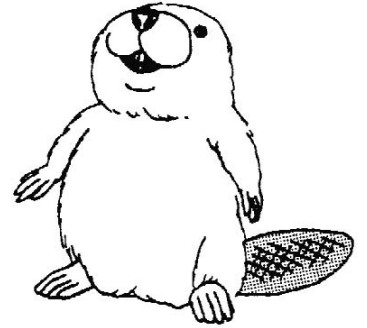
Fly continued



© 1997 Stephanie J. Wittie

by Joyce Harmond Depenbusch

SPECTACULAR SPIDERS



Spiders are interesting creatures that are not always well liked or well known. The next few pages reveal some information and activities to learn more about those **SPECTACULAR SPIDERS**.

Scientists have named about 30,000 species (kinds) of spiders. There are thousands of others that are yet unnamed. What we know about spiders and their behavior fills several books but there is much more to be learned.

Spiders belong to the phylum Arthropoda, those animals with jointed legs and a hard outer skeleton. They are in the class Arachnida, which includes animals with, four pairs of legs, two body sections (abdomen and cephalothorax), and no antennae or wings.

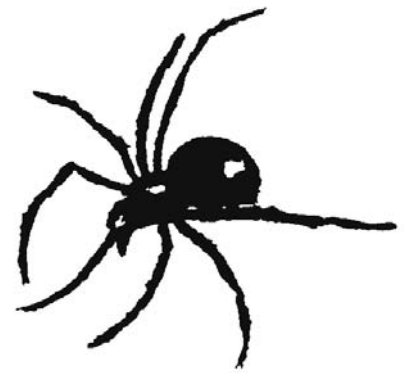
The abdomen of a spider is attached to the cephalothorax by a narrow stalk. The eight

legs are attached to the cephalothorax and have two or three claws at their ends. The claws help web spiders to move along on the silk. Spiders have jaws with fangs at the ends to capture food. Between the jaws and the first legs are pedipalps, used in mating. Spiders usually have eight simple eyes and some have excellent vision.

Spiders are capable of producing silk that comes out of their bodies through the spinnerets located at the end of the abdomen. Different kinds of silk are used in building webs, snares, trap doors, egg sacks, and linings for burrows and tunnels. Most spiders make egg cases from silk and some even make a nursery from silk for their spiderlings. Prey is often wrapped in silk until the spider is ready to eat it. Silk may stretch 25 percent of its length without breaking. The silk of the *Nephila* spider is the strongest natural fiber known.

A spider must shed its exoskeleton (outer layer) in order to grow. It does this from four to twelve times before it is full-grown. When molting, a spider may replace a lost leg with a

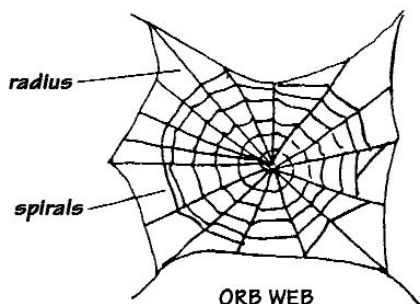
new, smaller one. Most spiders live one or two years. The female of the Orthograph

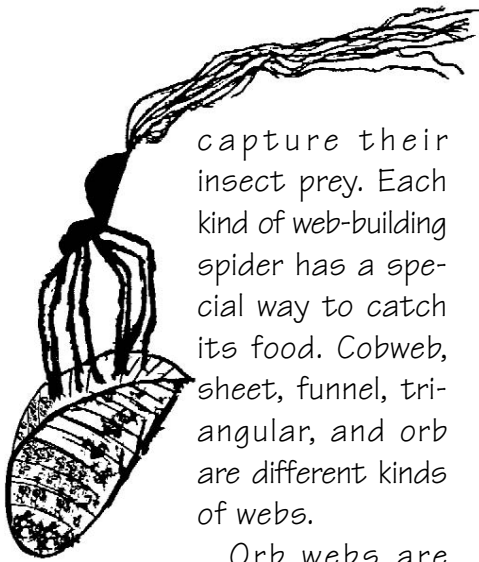


spider may live more than twenty years.

A spider's enemies include other spiders, some kinds of insects and birds. Predators, parasites, and the amount of available food keep spider populations in control. Spiders do their part in controlling the prey they eat. Most spiders eat insects and are, therefore, helpful to humans. The South American bird spider is big enough to catch small birds, lizards, or small snakes. Fishing spiders can catch tadpoles and small fish.

Spiders may use a snare to

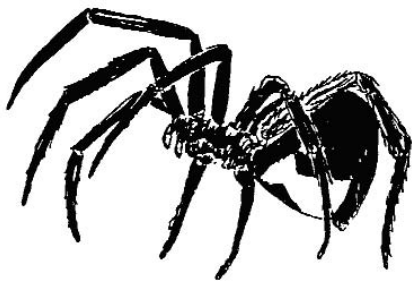




capture their insect prey. Each kind of web-building spider has a special way to catch its food. Cobweb, sheet, funnel, triangular, and orb are different kinds of webs.

Orb webs are built by many species at night, each with slight variation. The radii and spirals of the web are generally replaced daily. Some species have a central decoration in the web; others make a hiding place at the side. The spiders are able to feel the vibrations made by insects caught in the web. Do you think a spider ever gets caught in its own web?

Not all spider silk you see is for a web or snare. Spiders lay down draglines as they travel. They are safety lines and also allow the spider to retrace its path home. Spiderlings (baby spiders) release silk which is caught by the wind and drifts the little spider to a new loca-



BLACK WIDOW

tion. This is called ballooning and the threads are called gossamer.

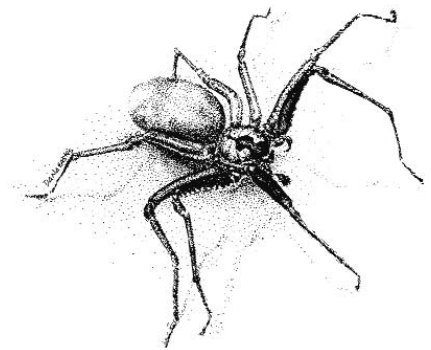
Spider silk was used by rifle manufacturers for the cross-hairs in scopes. People were hired to tickle the abdomens of spiders so that they would spin more silk. Can you imagine being an "arachnid tummy tickler?"

Most spiders are helpful to have around your yard and garden. Two spiders you should be more aware of are the black widow and the brown recluse. These spiders do not look for people to bite but will bite in self-defense and are poisonous. "The black widow is a cobweb weaver found in most warm parts of the world. This spider usually lives under objects near homes, buildings, trash, and dumps. It has a solid black body with a red or orange abdomen. Female black widows measure about one to one-and-one-quarter inches in diameter, including the legs. The male is about one-half the size of the female.

The bite of the female and immature male black widows is poisonous to humans. The bite may not at first be noticed but results in abdominal muscle pain and difficulty in breathing and speaking. Victims may be nauseous, sweat profusely, and have swollen eyelids. Physicians should be contacted to relieve the severe pain produced by the nerve toxins.

Brown recluse spiders are

generally found in the southern United States. A small brown spider with a darker brown fiddle-shaped mark on its back, the recluse has six eyes and weaves a sheet of sticky silk to capture its insect prey. The female brown recluse is about the size of a quarter. The male is slightly smaller. Their eggs are in a loose sac in the web. The brown recluse can be found near the foundations of build-



BROWN RECLUSE

ings, or in dark places inside homes or sheds.

In cases with severe bites, the venom results in the skin turning red at the site of the bite, which forms an open ulcer in one to two weeks. The wound may enlarge and not heal for several months. The victim may develop chills, fever, and nausea.

With any poisonous spider bite, a physician should be contacted when the symptoms appear. Victims should be kept inactive and warm until a physician can be reached. An ice pack may be applied at the location of the bite to localize the venom.

KIDS' PAGE

spectacular spiders



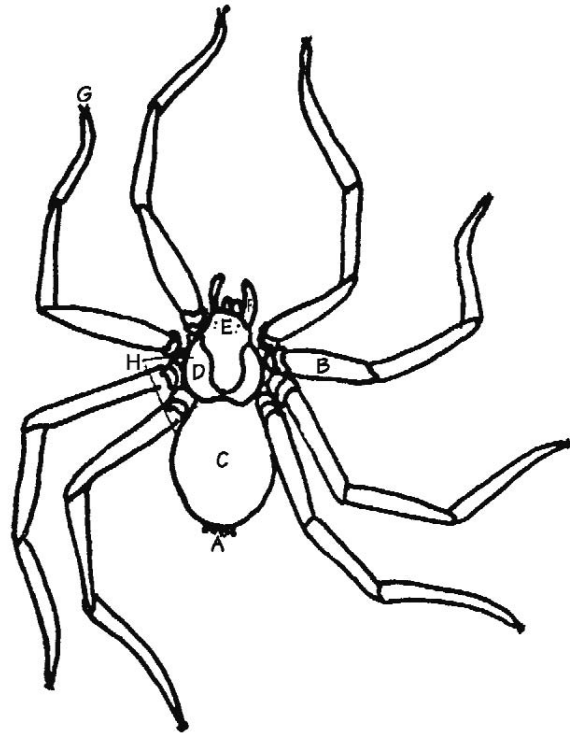
by Joyce Harmond Depenbusch

Fill in the blanks below with 2, 4, 6, 8.

- Spiders have ___ main body parts.
- Spiders have ___ legs.
- Spiders usually have ___ eyes.
- Spiders have ___ (or three) claws at the end of each leg.
- Spiders shed their exoskeletons ___ to 12 times before they are full-grown.

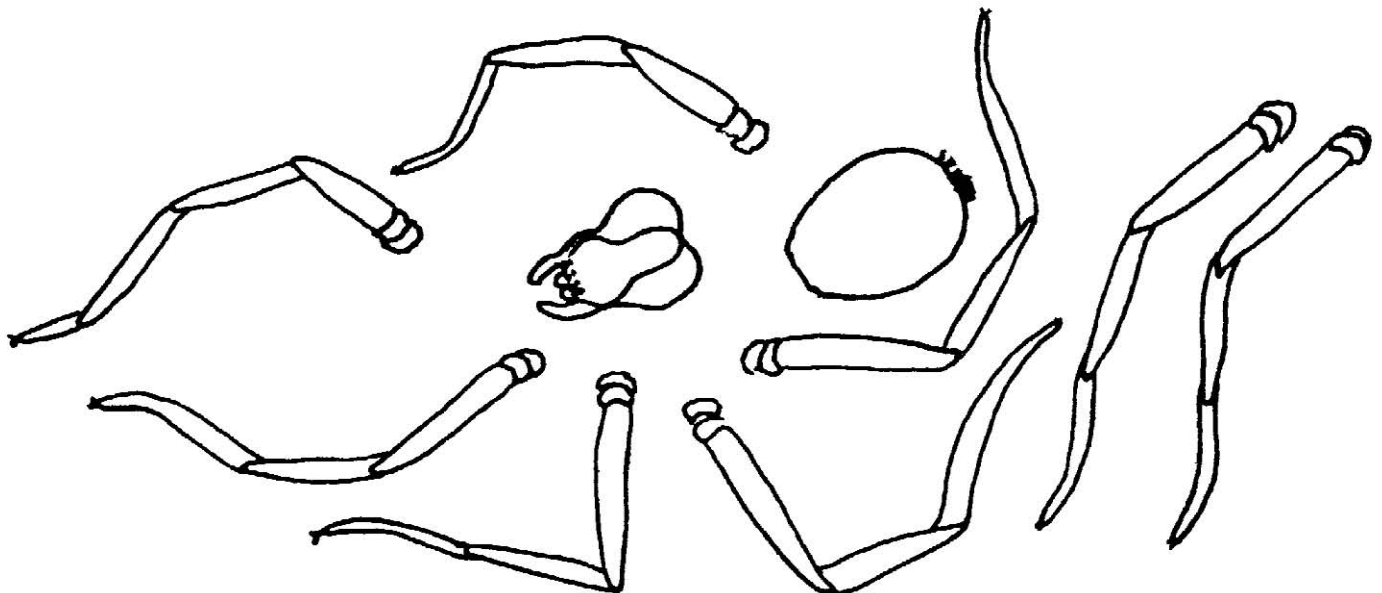
The spider at right has letters on its body. Draw lines connecting the letters in the column below left with the correct term in the column next to it.

- | | |
|---|---------------|
| A | Eyes |
| B | Leg |
| C | Cephalothorax |
| O | Abdomen |
| E | Pedipalp |
| F | Claw |
| G | Spinnerets |
| H | Exoskeleton |



KEY---A, spinnerets; B, leg; C, abdomen; D, cephalothorax; E, eyes; F, pedipalp; G, claw; H, exoskeleton.
KEY---2, 8, 8, 2, 4

(Build your own spider from the pieces below)



Learn more about spiders and their habits by doing the following activities:

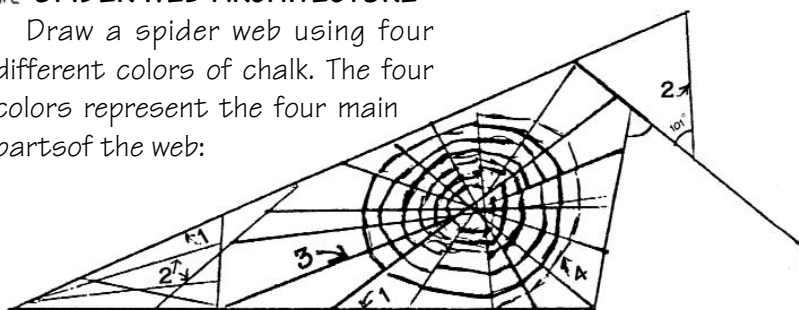
SPIDER WEB PRINTS

Find a spider web and gently remove the spider if present. Spray the web with a quality white enamel spray paint. Find a sheet of black construction paper that is a little larger than the web and spray the paper with a clear drying fixative spray or clear enamel spray until the paper is wet. Place the construction paper carefully against the painted web. Cut the strands of silk that attach the web to the supporting object. Display the captured webs. Make a study of the variety of spider webs.

Morning dew makes webs more visible. Webs can be studied without being removed by gently spraying them with water from a plant mister.

SPIDER WEB ARCHITECTURE

Draw a spider web using four different colors of chalk. The four colors represent the four main parts of the web:



1. Cables - The web is attached to nearby objects for support.
 2. Roadways - Provide routes for the spider to and from the center of the web and send vibrations caused by captured insects.
 3. Spokes - Give the web structure by providing the framework.
 4. Sticky threads - Catch the insect prey. (The other threads are not sticky.)
- Observe real spider webs and

find the parts of the web. What routes did the spider use to move around on the web? Extend your study of geometry to the spider web by measuring the angles used to construct webs. What geometric shapes can be found in the webs?

SPIDER BEHAVIOR

Divide group into teams of two to four. Each team gathers spider food such as flies, grasshoppers, and other insects and finds an active spider web. The teams will make careful notes about the reaction of the spider to the food they add to the web. The spider may move slowly toward the prey and wrap it in silk or it may ignore the food or it may stay where it is but move its legs, signifying awareness of the food. The teams should compare results. Did one kind of food work best? What kind of spiders were you observing? Do you think the spider would have behav-

ed differently if you weren't there? Where were the webs located? Check an old web to see if it is still sticky.

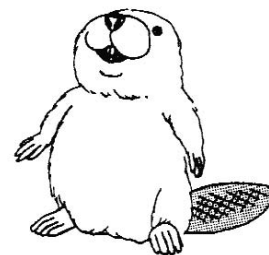
REFLECTIVE EYES

Many nocturnal (active at night) animals have eyes that reflect light. The wolf spider is such an animal and the light that is reflected is bright white or green. You can find these spiders by

scanning an open field with a flashlight at night. Hold the light at eye level and thoroughly scan the area, looking for small glimmers of green or white light. When you find what you think is a spider, keep your flashlight on the object and walk toward the spot. With practice you can spot spiders at a long distance.

WEB WEAVING STRING ART

Now that you know so much about web construction see if you can build one yourself. You may want to watch a spider in action before you begin. When you're ready, gather a piece of cardboard or plywood and pins or nails. (If you're using plywood, you'll need to use a hammer and nails.) Position your pins or nails on the board at the points where the cable threads are attached for support and at each point where two or more threads come together. When you complete this, the general shape of the web should be visible by the pins and you are ready to weave your web. Tie thread or string at one cable end and make the shape of the web by wrapping the string around each pin as you go. Add pins and string to make the web more intricate. Compare your work with a real web. Can you build one as quickly as a spider? The female is generally the web builder while the male builds a nest nearby. Can you find his nest?



by Dana Eastes

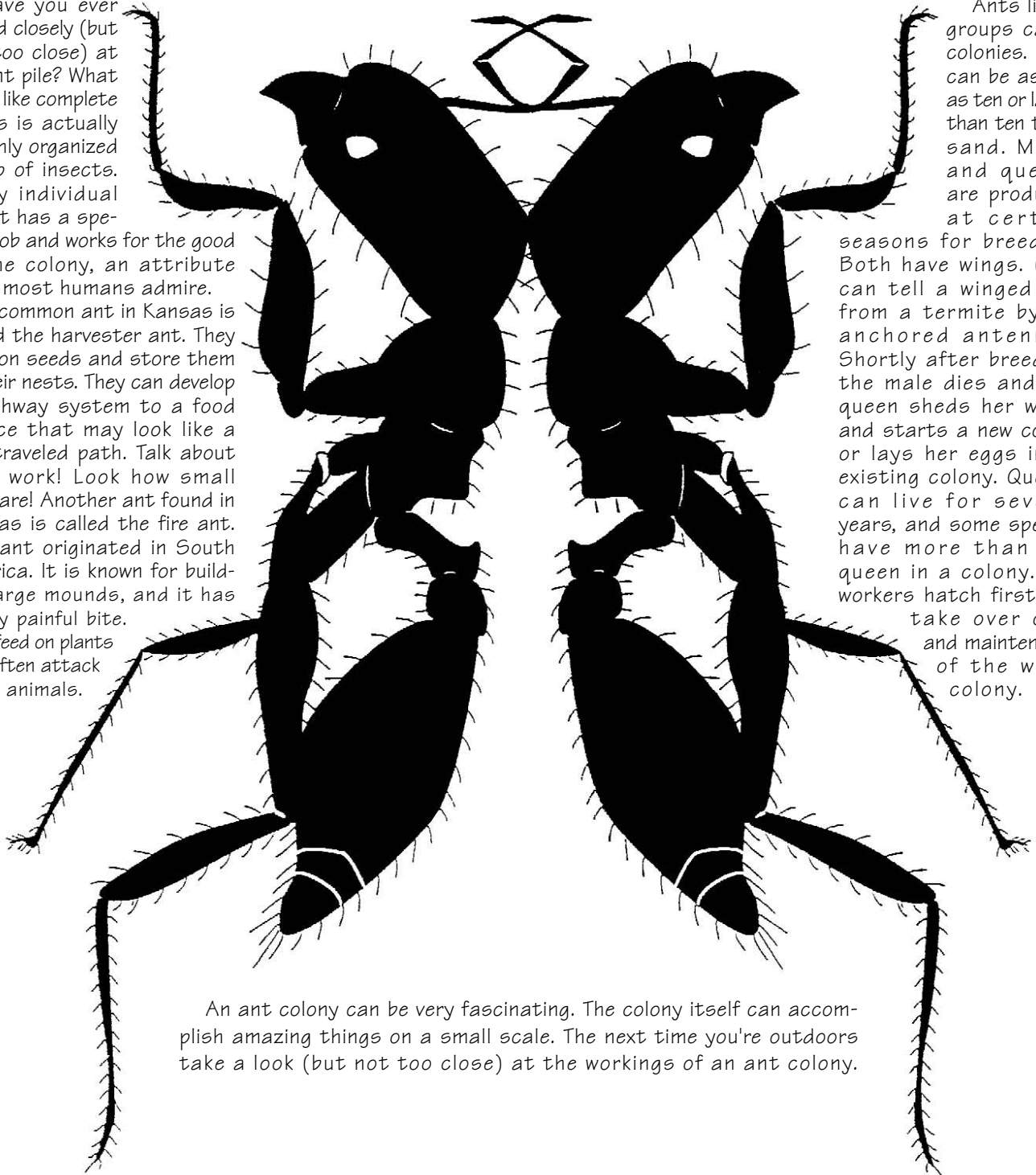
When *ants* Come a Crawling

Have you ever looked closely (but not too close) at an ant pile? What looks like complete chaos is actually a highly organized group of insects. Every individual insect has a specific job and works for the good of the colony, an attribute that most humans admire.

A common ant in Kansas is called the harvester ant. They feed on seeds and store them in their nests. They can develop a highway system to a food source that may look like a well-traveled path. Talk about hard work! Look how small they are! Another ant found in Kansas is called the fire ant. This ant originated in South America. It is known for building large mounds, and it has a very painful bite. They feed on plants and often attack small animals.

Ants live in groups called colonies. They can be as few as ten or larger than ten thousand. Males and queens are produced at certain

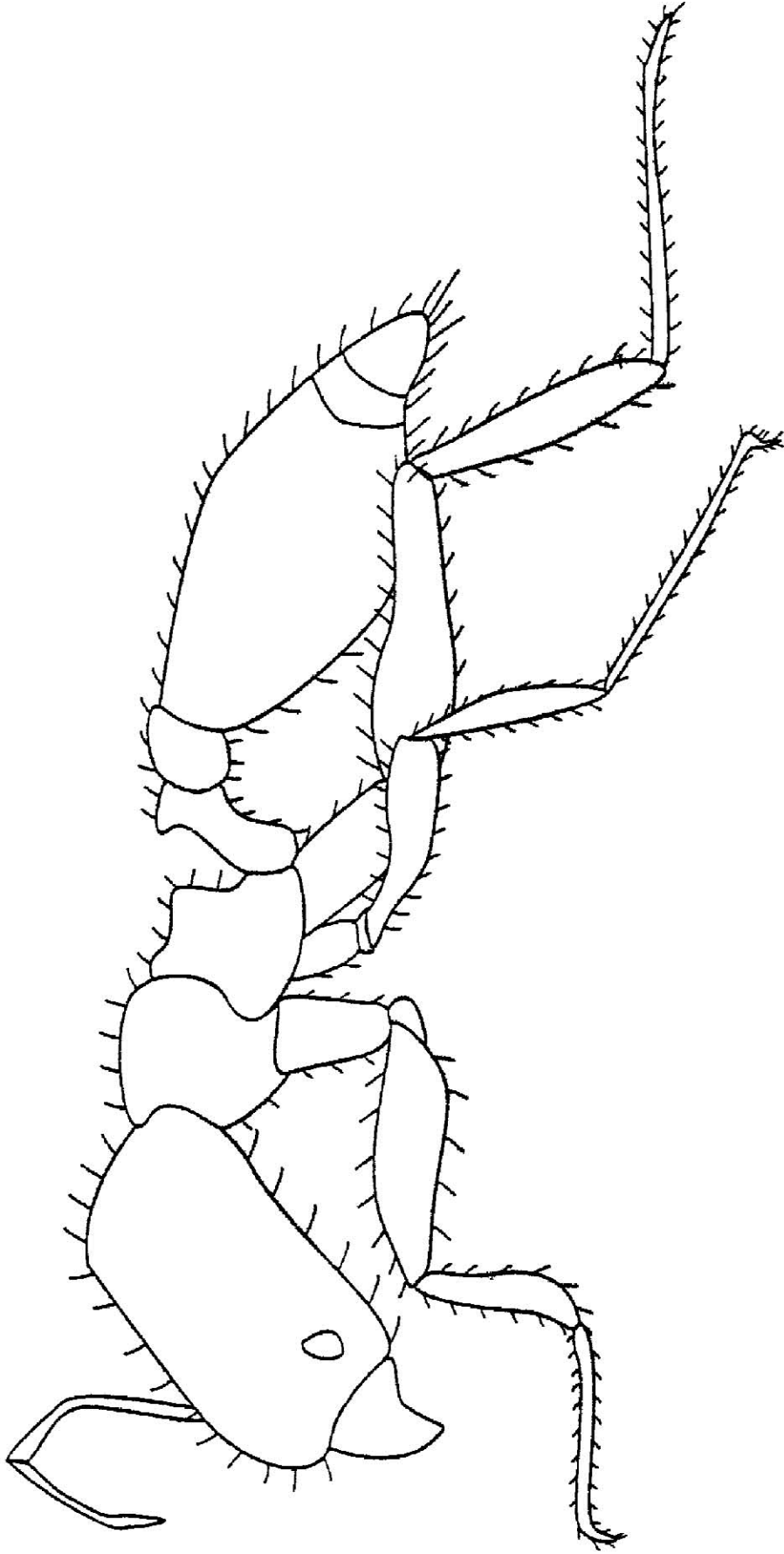
seasons for breeding. Both have wings. (You can tell a winged ant from a termite by its anchored antenna.) Shortly after breeding, the male dies and the queen sheds her wings and starts a new colony or lays her eggs in an existing colony. Queens can live for several years, and some species have more than one queen in a colony. The workers hatch first and take over care and maintenance of the whole colony.



An ant colony can be very fascinating. The colony itself can accomplish amazing things on a small scale. The next time you're outdoors take a look (but not too close) at the workings of an ant colony.

Wait !!! Don't step on me !!!

COLOR ME !!!



HARVESTER ANT

Pheidole bicarinata vinelandica

by Mark Shoup

Don't BUG Me!

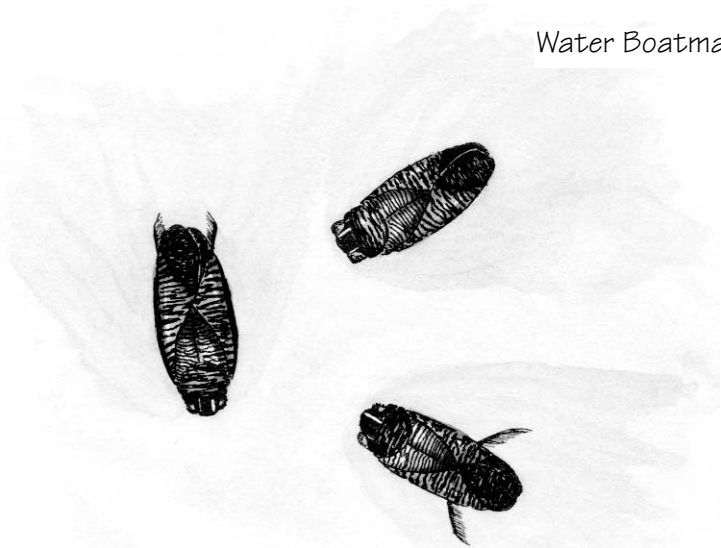
Everybody loves bugs, right? Well, okay, not everybody. And not all bugs. Nobody likes the mosquitoes and flies that bite in summertime. Ticks and chiggers are a real pain, and roaches are just plain creepy. Nobody likes wasps, either, but they make cool nests. Bees are pretty neat, as long as you don't get too close. Water boatmen are fun to watch as they zip across the surface like little aquatic bumper cars.

Of course, you could never say an unkind word about butterflies. It would take a hardcore grouch to say, "Don't bug me!" to one of these beautiful "bugs."



Simple Metamorphosis
of an Assassin Bug

Water Boatman



However, it probably surprises you to know that only one of these critters — the water boatman — is really a "bug." Ticks and chiggers are actually eight-legged critters

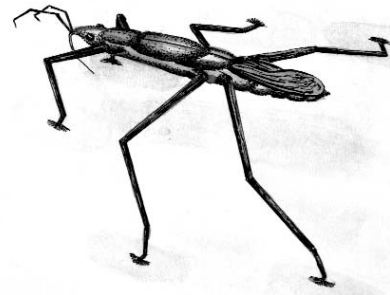
called arachnids. (Arachnids include spiders, scorpions, and daddy longlegs.) Yes, the others are insects, but they are not true bugs.

Scientists who study insects are called entomologists, and they classify true bugs in the order Hemiptera. True bugs have piercing or sucking mouthparts for feeding on plants. The bases of their front two wings are leathery while the tips of these wings are membranous, or flimsy kind of like cellophane. Their two hind wings are completely membranous. When a true bug is at rest, its wings lie flat

against its body.

Another characteristic of true bugs is that they go through simple metamorphosis. Metamorphosis means change, and most insects change form during their lifetimes. Everyone is familiar with the caterpillar that spins a cocoon and then breaks out as a butterfly. This is called complex metamorphosis.

In simple metamorphosis, true bugs hatch from an egg as a nymph. The nymph has a protective covering called a serosa. Once it sheds this covering, the bug goes through several stages called instars. In each of these stages, the bug looks much like it will as an adult, except that its wings are not yet developed.



Water Strider

Some common true bugs are water striders, stink bugs, leaf bugs, bed bugs, assassin bugs, and chinch bugs.

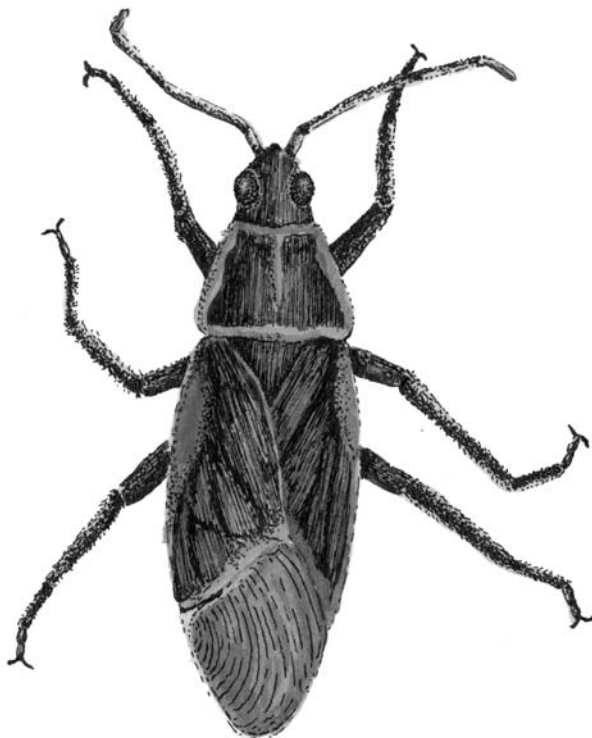
It's January now, and bugs probably haven't been on your mind too much. Still, you may have noticed a funny-looking bug crawling around your windowpanes, just hanging out in the house. It's black with orange stripes, and it doesn't

seem to do much. Although it can fly, it's easy to catch. It's not really a bother, except that it's there -- in your house.

What you've been seeing is the boxelder bug. It comes from a family of bugs called scentless plant bugs. Most scentless plant bugs feed on grass and weeds, but the boxelder's diet consists mostly of box elder tree leaves.

If it likes leaves so much, what's it doing your house? The answer is simple; it's looking for a place to sleep. The boxelder bug hibernates in winter, and the best place to do that is in a warm place, like your home. In late fall, they seek out places to hibernate, and like magic, they appear in our houses about November.

Boxelder bugs won't really do any damage in your house. You may even find them interesting. But true to their name, they can bug you, especially if you find one next to your toothbrush in the morning.



The Good, The Bad, and The Ugly

by Mark Shoup



includes such “creepy crawlers” as scorpions, mites, and ticks.

Spiders come in a wide variety of shapes, sizes, and looks, from the classic, smooth-bodied orb weaver (remember Charlotte’s Web?) to the hairy mygalomorphs. You’ve never heard of a hairy mygalomorph? Okay, this spider is more commonly known as a tarantula in the United States. Everyone has seen movies where a sleeping person is threatened by a tarantula creeping up their arm. Of course, they always wake up in time to save themselves from certain death, right?

When you mention spiders, most folks would probably describe them only in terms of the bad and the ugly. Nothing could be further from the truth. There are many good spiders, and if you kill one, you’ve likely opened the door for some real pests because most spiders eat insects.

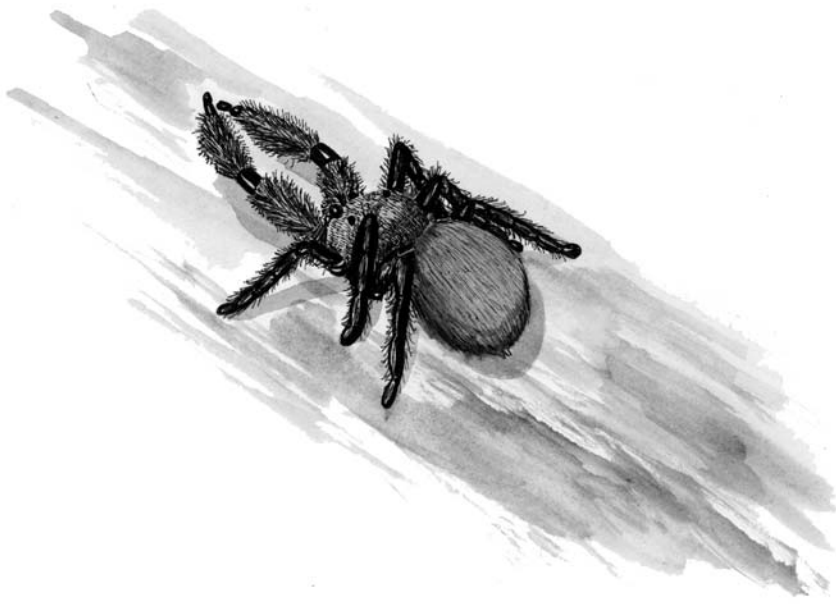
In North America, there are about 3,000 spider species. Of these, only the widows and the brown spiders are poisonous. In Kansas black widows are rare these days, but brown recluses are common. Fortunately, this shy spider prefers to stay away from people, so bites are rare.

Spiders belong to a class of animals called Arachnida, or arachnids, which also

Wrong. About 80 species of tarantula can be found in the U.S. None are poisonous although their bite can sting. In fact, these spiders are gentle enough that they are often kept as pets.

The most familiar spiders are the orb weavers, such as the common garden spider and the shamrock spider. These animals weave the beautiful webs that everyone associates with spiders. The golden silk spider’s silk is the strongest natural fiber in the





world and is used by South Sea Islanders for bags and fish nets.

Jumping spiders are another common species. You might see one outdoors or in your home. These are the “cutest” of all spiders. They are small and fuzzy and come in many colors. You’ll notice that these spiders seem very alert when you near them. That’s because two of its eight eyes are very large, giving it some of the best vision of all spiders or insects. It can also

change the color of its eyes.

Jumpings do, indeed, jump. They can jump several times their own body length to catch prey. Before jumping, however, they secure a silk dragline to pull themselves back, if necessary.

Most spiders lay down draglines of silk that they use to pull themselves from place to place, usually up and down. And of course, many spiders use silk to trap their prey.

Not all spiders weave fancy webs. Some just use silk for egg cases or for a nursery for the young spiderlings. Others hide in silk tunnels or make trapdoors of silk.

Spiderlings release many strands of silk into the wind from a high perch. As the strands lengthen, the spider is lifted into the air, and many young are able to spread their numbers across the countryside and avoid over-crowding. This process is called ballooning. On fall

days, these thread masses — called gossamer — can be seen floating in the air.

Another fascinating spider fact is that they shed their “skins,” called molting. Like insects, arachnids carry their skeleton on the outside because they have no bones. This is called an exoskeleton. When the spider molts, the inside layers of the skeleton are digested, leaving the outside paper-thin. The spider then raises its blood pressure and pumps its body until the outer skeleton splits, freeing the spider to grow more. If a spider has lost a leg before it molts, a new leg may replace it.

Many people have been taught to fear spiders, but they are among the most interesting creatures on earth. Take a morning or evening walk in a garden or park. Keep an eye out for one of these active, complicated little animals. Who knows? You may learn how to make a fishnet.



by Mark Shoup

Pollination Partners

Flowering plants produce seeds through a process called pollination. While some flowers have both male and female plant parts within the same flower, many others rely on the environment to carry pollen from male to female plant parts, making seed production possible.

Wind plays a big part in this process, but perhaps the most fascinating pollination comes when birds or insects feed on pollen and carry it from one flower to the next. It's also a process that's easy to observe. This kind of relationship is called "symbiosis," meaning that it benefits both species. The plant gets pollinated, and the critter gets fed.

How do birds and insects know where to find that

delicious pollen? Of course, the answer is in the flashy flower. Bright colors attract the animals, and they are rewarded with a meal. It's like putting out a neon sign that says, "Eat Here." To enhance this attraction, flowers are also blessed with attractive aromas, some strong enough to attract humans.

In Kansas, pollinating birds are few and far between. In some areas of the state, ruby throated hummingbirds can be found, and they are vigorous flower feeders. A few other hummingbird species occasionally show up in the Sunflower State, but they are rare. Trumpet vine is one plant that particularly attracts hummingbirds. Oranges and reds are their favorite colors.

Paper Flowers

Conduct this activity on a warm, bright day when insects are most active. Make paper flowers using a variety of bright reds, oranges, yellows, greens, blues, and whites. Glue the flower on a stick and place it in a vacant lot or field.

For 10 or 20 minutes each day, note what birds or insects show interest in what flowers. From these records, decide what colors are most attractive to each insect or bird. Which color was the most popular?

Compare your results observing real flowers.

Beetle



Fly



Bee



Wasp



Butterfly



Moth



Hummingbird





By far the most numerous pollinators are flying insects, particularly butterflies and moths. The large sphinx moth, in fact, is often mistaken for a hummingbird as it zips from one honeysuckle flower to the next, never landing. Bees are also very active and seem to be attracted mostly to blue and yellow flowers. In fact, many honey growers are paid to put their hives on alfalfa fields because the bees enrich the field's growth through pollination. The end product may find its way to your breakfast table!

While hummingbirds and

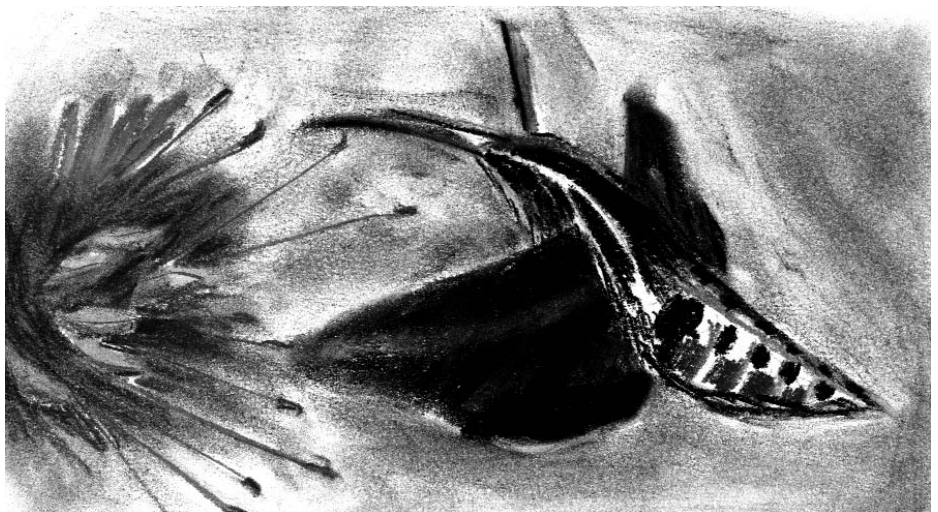
sphinx moths flit from flower to flower -- their rapidly-beating wings keeping them airborne even while feeding -- the honeybee must land to feed. When you see this activity, take a closer look. You might find the bee

inside the flower, its legs covered with pollen.

Unlike these other critters, butterflies have no sense of smell, so they rely on bright color to find food. Butterfly milkweed planted in your backyard is a sure-fire butterfly magnet. In late summer and early fall, butterflies of all variety will literally smother Autumn Joy sedum.

Your local library should have a number of different books that can show you how to plant a butterfly garden in your backyard. Planting a butterfly garden is not just fun, it provides hours of entertainment each summer as these most beautiful of insects discover your home.

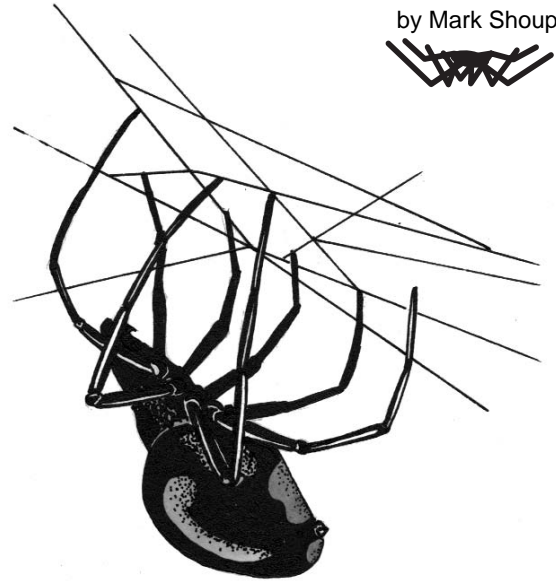
Find out what kinds of insects in your area are pollinators.



by Mark Shoup



EYES in the NIGHT



In the popular Harry Potter books, one of Harry's best friends, a giant named Hagrid, has a spider named Aragog that is the size of an elephant. Aragog protects Hagrid and his friends. While you'll never come across a spider like Aragog in real life, the creatures that inspired this tale are equally fascinating.

Early fall nights in Kansas are much like the summer -- warm, but with a soft breeze -- and this is the perfect time to go spider hunting. That's right, spider hunting.

If you're afraid of spiders, don't panic. I'm not talking about crawling through caves or tunnels like Indiana Jones, where giant spiders wait in humongous webs for unsuspecting victims. Just a stroll through your lawn will do.

And you might find things even more interesting than Aragog: an orb weaver, for instance, such as a shamrock spider; several varieties of jumping spiders; wolf spiders;



and if you're near water, fishing spiders. While orb weavers are among the web-weaving spiders, jumping spiders, wolf spiders, and fishing spiders are wandering hunters.

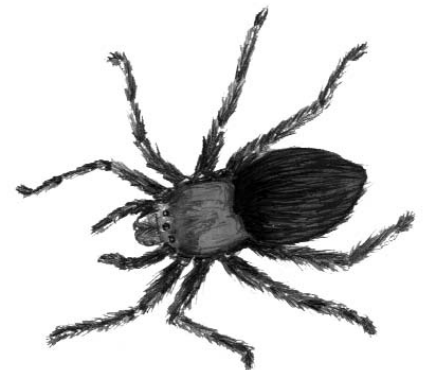
Orb weavers can be easily found by their perfectly shaped webs, but to find wandering spiders, you need a flashlight or, better yet, a "headlight" -- a flashlight that straps to your head.

When searching for wandering spiders, avoid streetlights and other sources of light because they make the spiders more difficult to spot. Shine your light at the ground or toward low vegetation about fifteen feet ahead of you. Move the beam very slowly until you see a small shining spot resembling a tiny star. This light -- called "eye shine" -- is the spider's eyes and is usually light green. A whitish shine may be a drop of a dew or rain, and a red or orange shine may be a moth or a June bug.

Perhaps the easiest to spot and among the most fun to watch are the burrowing spiders, such as the burrowing wolf spider. These are

large spiders that live underground and at night sit outside the burrow -- a hole about the size of a nickel. From here, they wait for movement in the grass that indicates the presence of an insect. Once a burrowing spider hole is found, you can return to the same spot each night to observe it.

You can also spot web-building spiders with a light. If you see a light spot suspended in air in your beam of light, you're in for a treat. Both the orb weaver and its web will shine, and watching a busy orb weaver in the night is a fascinating experience.



The shiniest silk is that in a tangled web close to the ground, which belongs to the widow spiders. The black widow is the only one of these species in Kansas, and it is rare. Still, black widows are poisonous, so learn to identify them. The female has a reddish hour-glass marking in the center of the underside of the abdomen, and her body is smooth and black. A black widow web, like that of many other spiders, is irregular, very stiff, and difficult to break when touched.



beneficial creatures that eat many pesky insects invading our homes and gardens. (In Kansas, only the brown recluse and the black widow are poisonous.) And they've been appreciated throughout the world for centuries. The newsletter, "The Talking Leaf," relates this spider legend:

"In Scotland it is said that King Robert the Bruce who had fought the English in several battles, losing each one, took shelter in a cave. There he watched a spider building its web. Each time the spider laid a strand, the wind blew it away, but the spider did not give up. Eventually, after countless attempts, the strands held, and with the web built, Robert the Bruce saw it take its first dinner. This was said to inspire the Great King of Scotland to eventual victory over the English at the Battle of Bannock Burn."

(if you're in the catching mood).

So what do you do once you've captured one of these eight-legged critters? Identify it first. Get a copy of the Golden Guide, *Spiders and Their Kin*, available for \$5.50 from the Pratt Operations Office and many state park offices, to help identify your catch. If you really get into it, you can put soil in an open aquarium with a small wet sponge, leaves, rocks, and a branch and observe the spider for a few weeks. See what kind of insects it eats and what its web, if it spins one, looks like. How does it hunt? How does it react to light, noise, heat, and cold?

Many people are afraid of spiders, but they are fascinating and

Their industrious nature and intricate hunting and web-weaving habits make spiders one more reason to get out and enjoy the warmer evenings of the year. This year, try spicing up a September evening with a spider hunt.



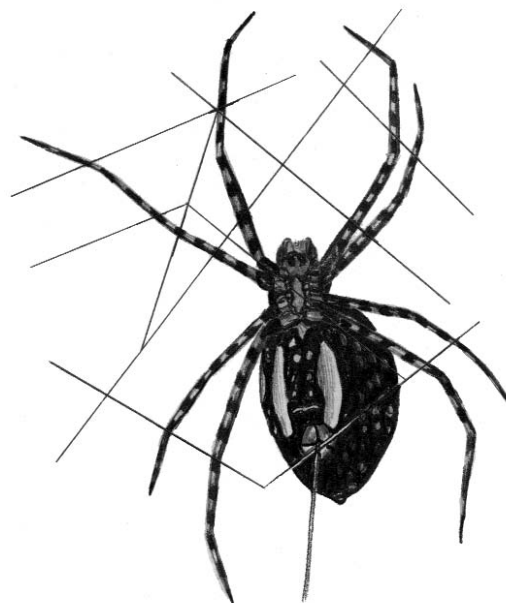
Once you spot eye shine or a glimmering web, hold your light on the spot and move closely toward it. The spider will be blinded by the light, allowing you to approach and capture the little creature.

Placing a jar over the spider is one way to catch



it. Sometimes, you can hold the jar on the opposite side of the spider and chase it into the

jar. Because spiders found in trees sometimes drop to the ground on their silk dragline when disturbed, hold a collecting jar beneath them



'Baccy Chewin' Hoppers

by Mark Shoup

*The poetry of earth is never dead:
When all the birds are faint with the hot sun,
And hide in cooling trees, a voice will run
From hedge to hedge about the new-mown mead;
That is the Grasshopper's--he takes the lead
In summer luxury,--he has never done
With his delights; for when tired out with fun
He rests at ease beneath some pleasant weed.*

--from "On the Grasshopper and the Cricket"
by John Keats

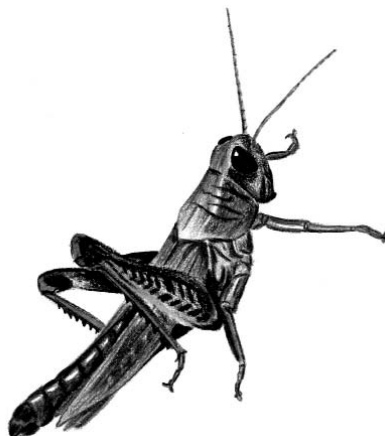


Lots of kids have had warts on their hands, and most have heard the myth that warts come from handling toads. But have you every heard that you can get rid of warts by rubbing grasshopper spit -- often called "chewin' tobacco" -- on the warts. Well, toads don't cause warts, and while grasshopper saliva may gross out its enemies, it doesn't cure warts.

Kansas has lots of kinds of grasshoppers, including bush katydid, meadow grasshopper, spur-threaded grasshopper, and one of my favorites, the band-winged grasshopper. Grasshoppers are everywhere in some years, and while they provide great food for wildlife, they can be pests to gardeners and farmers because they love to eat plants.

Grasshoppers belong to an

order of insect called Orthoptera, which includes grasshoppers, crickets, and cockroaches. Most are various shades of brown. The katydid is green. They have big eyes, two pairs of wings and, yes, big hind legs for jumping. At the end of the grasshopper abdomen, the male has a hard plate and the female has two pairs of valves used to dig a nest in the sand.



Birds, fish, lizards, preying mantises, spiders, and even some mice will eat grasshoppers.

Grasshoppers can be found almost anywhere in spring and summer: vacant lots, grassy fields, gardens, or any old weed patch. They may even fly to your porch light at night.

Some people collect and raise grasshoppers as a hobby. This may seem weird, but it's a fun way to learn about insects and the workings of nature. An insect net and a jar with holes in the lid is about all you need to start. Sometimes, a grasshopper will hop right into the jar if you move slowly toward it. When handling hoppers, be sure to be gentle; their wings are delicate.

To get started raising grasshoppers, you need an aquarium with a screened lid, a desk light with a screened bulb socket (left on

about 16 hours a day for warmth), and a cup of sand for egg laying. The sand should be moist but not soaked, so you'll have to add water from time to time.

For food, you can mix lettuce, cabbage, grass, or whatever veggies are handy. Make sure they are fresh, though. Bran cereal is good, too. Don't leave old food in the cage. Hoppers get all the water they need from their food, so you shouldn't need to water them.

Clean the cage every day. Hold hoppers by the sides between the head and the legs. Never grab the legs.

When eggs are laid, cover the sand with a jar to keep the sand moist, and try to keep the temperature about 83 degrees F.



Don't put too many grasshoppers in your cage. Four to six should be plenty to start. Keep the cage out of direct sunlight, away from heating and cooling vents, and in a place where it can get plenty of air.

Grasshoppers are entertain-

ing critters, and you'll probably get to know each one in your "colony" by name. This is a great summer project. Keep notes. Read about grasshoppers at the library or on the internet. This would even make a good scout or school project.

Screened lid

Light & heating source

Aquarium or gallon jar

Moist sand for egg laying

Fresh plant matter

Bran or wheat germ



nature's notebook

CHAPTER ELEVEN

MAMMALS

by Joyce Harmond Depenbusch

BISON

The American Bison, more commonly called the buffalo, has been the Kansas State Animal since 1955.

In the early 1800s, millions of bison lived in the North American Prairie. In Kansas, hundreds of thousands of bison were found in the Flint Hills and Smoky Hill River areas. In 1871, one herd in southwest Kansas was estimated to have over four million bison.

The demand by homesteaders for the land, the attempt to reduce Indian tribes who depended on bison for food and clothing, as well as commercial hunting of bison for their meat, hides, and bones eliminated free roaming bison herds.

Today, only small herds can

be seen across the state, mostly on Wildlife & Parks lands.

The adult bison is dark brown to almost black. Bison calves are generally born in late April or May. Calves stay with their mothers throughout their first winter.

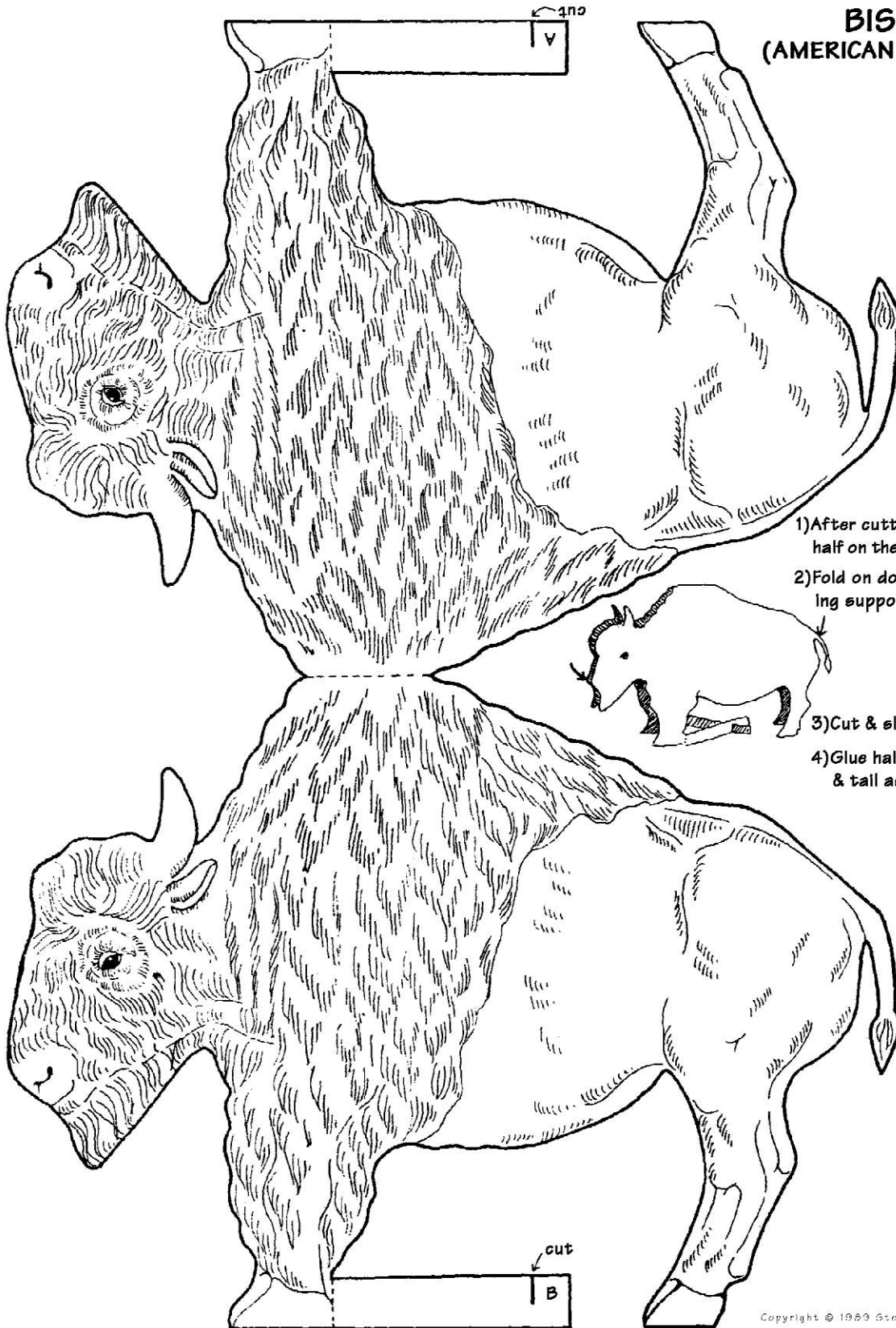
Bison are herbivores, or plant eaters. They live in herds, or groups. Bison cows, calves, yearlings, and two-year-old calves make up the herd. The bulls stay near the herd in small groups or alone. Adult male bison weigh between 900 and 2000 pounds.



Build your own model by following these directions:

1. Trace or make duplicate copies of the models.
2. Color the models with crayon or marker.
3. Reinforce the back of the model with construction paper if necessary.
4. Fold on all dotted lines, cut on solid lines.
5. Use glue to assemble.

BISON (AMERICAN BUFFALO)



- 1) After cutting, fold bison in half on the dotted line on the hump.
- 2) Fold on dotted lines on the standing supports on the front feet.
- 3) Cut & slide slot "A" into "B".
- 4) Glue halves together at the nose & tail as shown by the arrows.

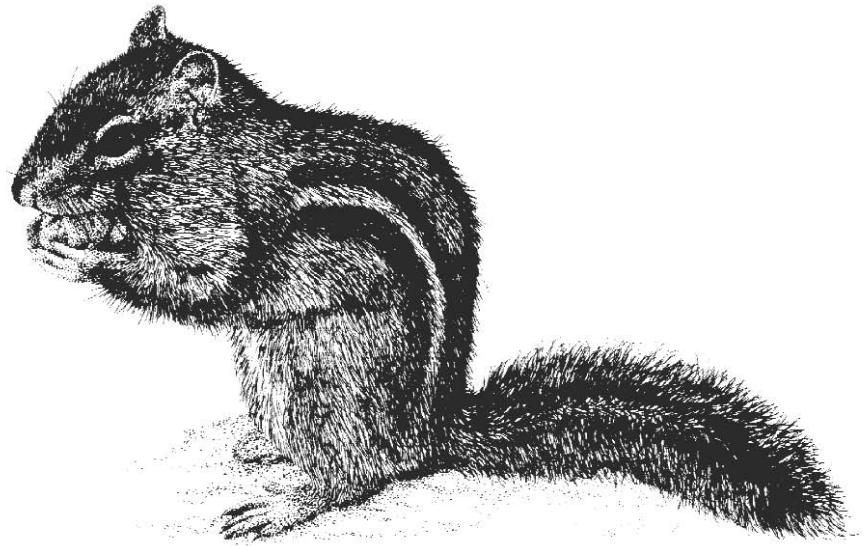
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by Joyce Harmond Depenbusch

CHIPPIE, THE STRIPED TREASURER

The Latin name, *Tamias striatus*, truly describes the eastern chipmunk. *Tamias* means "a treasurer" because of the chipmunk's ability to store food in its pouches. *Striatus* describes the black stripes down its back, tail and near its eyes. The upper fur of the chipmunk is reddish brown or gray, while the under fur is cream-colored.

Chipmunks are active during the day, or **diurnal**. These small animals search for a variety of nuts found in their oak-hickory forest home. Acorns, hickory nuts, hazel nuts, berries, grain, seeds and even a few insects make up the chipmunk's meals. The little treasurer packs food into its cheek pouches using its front feet. Once the chipmunk is in the safety of its home, the pouches are emptied. The food is stored in **caches**, underground chambers connected to the nest by a series of tunnels. The underground home of the chipmunk has an entrance that's often hidden by rocks, leaves or a log. Alternate exits and extra chambers to store soil left from building or rebuilding tun-



nels are also a part of the burrow. Chipmunks often have a lookout point where they watch for predators, such as owls, hawks and foxes. Besides hiding in their burrow, chipmunks are able to climb trees and swim to avoid predators.

The nickname "Chippie" was earned from the nervous, high-pitched "chip-chip" sound signaling alarm. Tail flipping from side to side and a trill "chip-r-r-r" signals surprise.

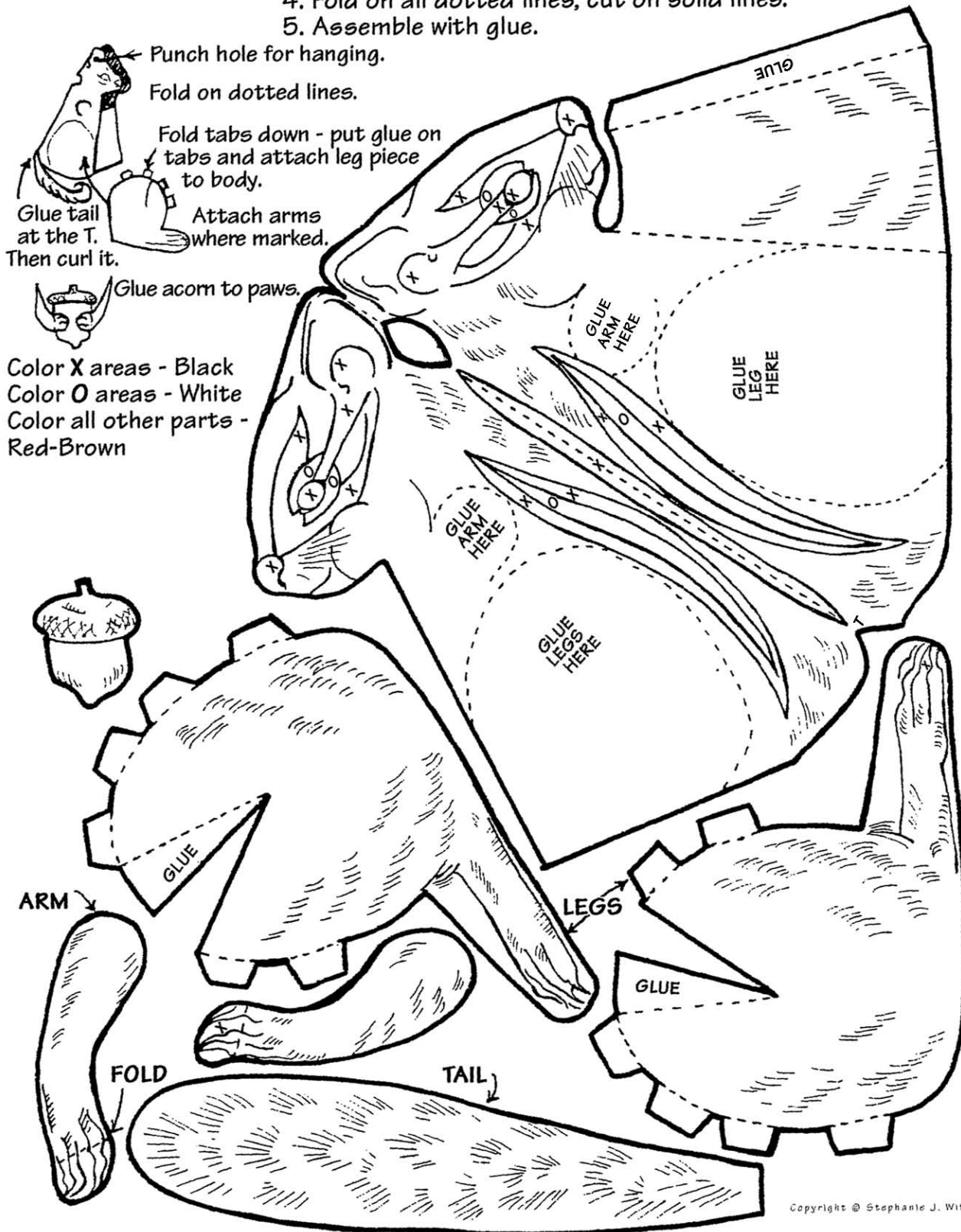
Male chipmunks court females in March and sometimes again in early summer. Generally four or five hairless young are born a month after mating occurs.

Six weeks after birth, the young will venture out of the burrow and begin to feed on their own.

In Kansas, chipmunks once lived only in wooded areas in the east. Due to a **reintroduction** program by the Department of Wildlife and Parks, these small **mammals** can now be found in parks in Lawrence, Emporia, Wichita, and at Big Hill Reservoir. Eastern chipmunks were released in these sites by the Chickadee Checkoff Nongame Wildlife Program. The chipmunks were released from 1983 through 1986 and are doing well in their new homes.

CHIPMUNK **Directions to make a chipmunk model.**

1. Trace or make duplicate copies of the model.
2. Color the model with crayon or marker.
3. Reinforce the back of the model with construction paper if necessary.
4. Fold on all dotted lines, cut on solid lines.
5. Assemble with glue.



Punch hole for hanging.
 Fold on dotted lines.
 Fold tabs down - put glue on tabs and attach leg piece to body.
 Attach arms where marked.
 Glue tail at the T. Then curl it.

Glue acorn to paws.
 Color X areas - Black
 Color O areas - White
 Color all other parts - Red-Brown

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by Joyce Harmond Depenbusch

On The OPOSSUM PATROL

What Kansas mammal has a pouch to carry its young, **prehensile** tail (adapted for grasping by wrapping around an object), five-clawed toes, hind feet with **opposable** thumbs that have flat nails instead of claws, a long white, hairless face, and is related to the kangaroo? The opossum.

The opossum is found statewide, but is more common in eastern Kansas. These animals prefer woodlands bordered by pasture and near water. They den in tree holes, rotten logs, or cliff cavities. Opossums eat nearly anything and everything. They'll eat any kind of **carion**, or dead animals, invertebrates, small mammals and birds. They hunt frogs, tadpoles, crayfish,

clams, and bird eggs. Because of their slow pace, predators can easily prey on

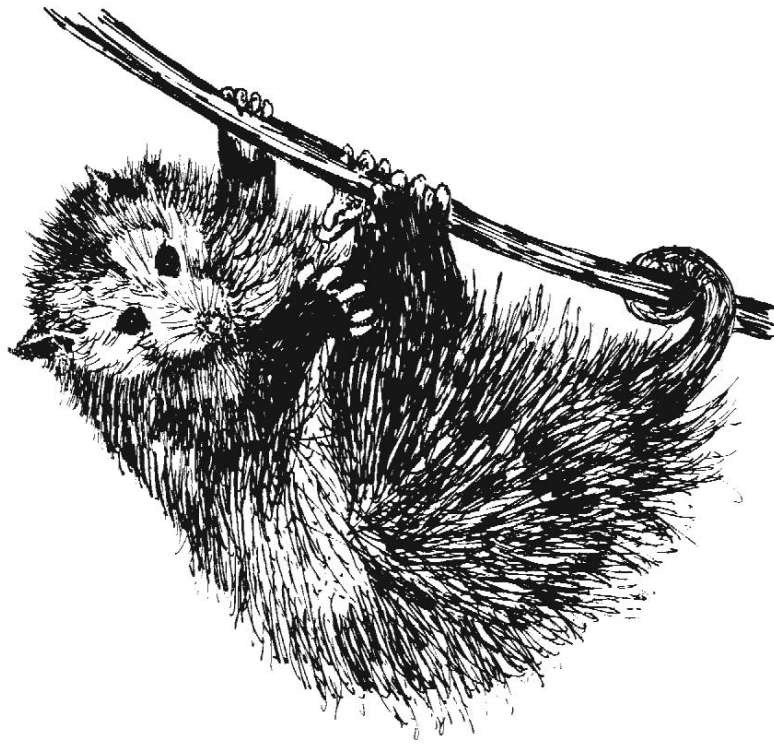
they are lucky, enemies may leave thinking they're dead.

Considering the opossum



them. Coyotes, bobcats, foxes and great-homed owls readily make a meal of opossums. Opossums respond to danger by "playing 'possum." They go into shock, remaining motionless until they no longer feel threatened. If

is a relic from the dinosaur era (remaining unchanged from a million years ago) it



is well adapted for the 20th century. The opossum's prehensile tail is used when climbing. It acts like a fifth limb, and if curled can carry nesting material. Opossum tracks are easy to spot due to their opposable thumb and wide spacing

between their toes. The opposable thumb is like that of humans, allowing greater movement and flexibility.

Like the kangaroo, opossums are among the group of mammals called **marsupials**, which carry their premature young in a pouch.

The first litter is born in late February, each weighing an eighth of an ounce and about one-half inch long. They do not have external ears or eyes at birth. The three to seventeen young crawl into their mother's pouch and attach themselves to one of the twelve to thirteen nipples. If there are more young than nipples, some young die. After two months their eyes open and they let go of the nipple, but continue to nurse from the pouch. One hundred days after birth, they are on their own and leave the female. A second litter may be born in May or June.



by Mark Shoup

KANSAS MONKEY?

Everyone's heard of playing 'possum, but if you really got into it, you'd find it requires much more than just pretending that you are dead. Imagine climbing trees like a monkey, hanging by your tail, running through alleys like a rat, or carrying a dozen babies on your back.

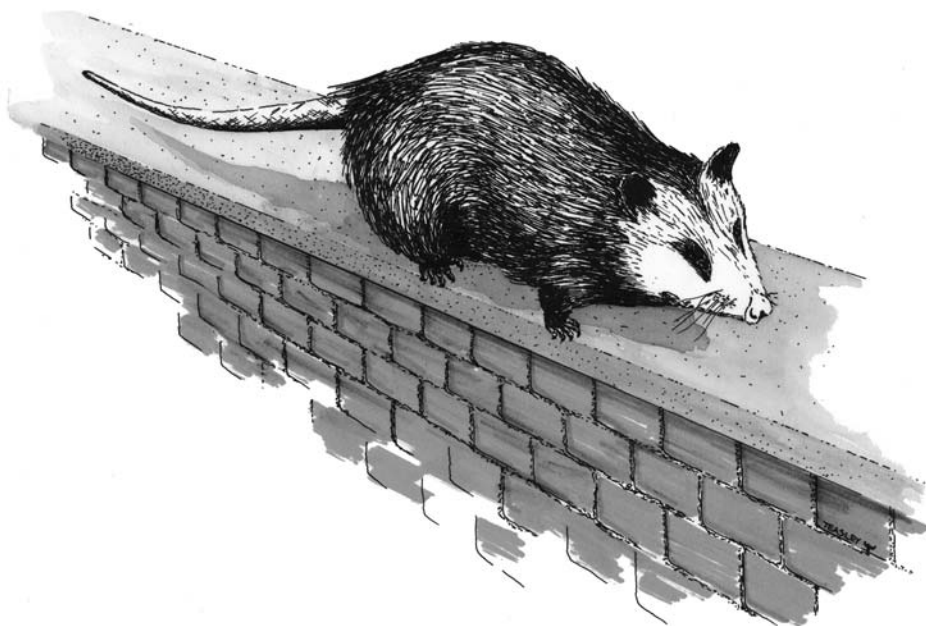
In the May/June issue of *Kansas Wildlife and Parks* (Page 43), you

learned that the opossum (pronounced "uh-possum" or just "possum") is a marsupial, meaning that the young are born hairless and quite undeveloped. Then they spend 80 days in the mother's pouch before venturing out into the world. Still, for the next 20 days they cling to mamma's back wherever she goes. The female

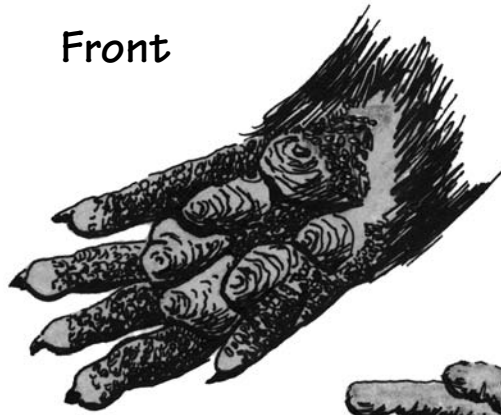


usually has two litters each year.

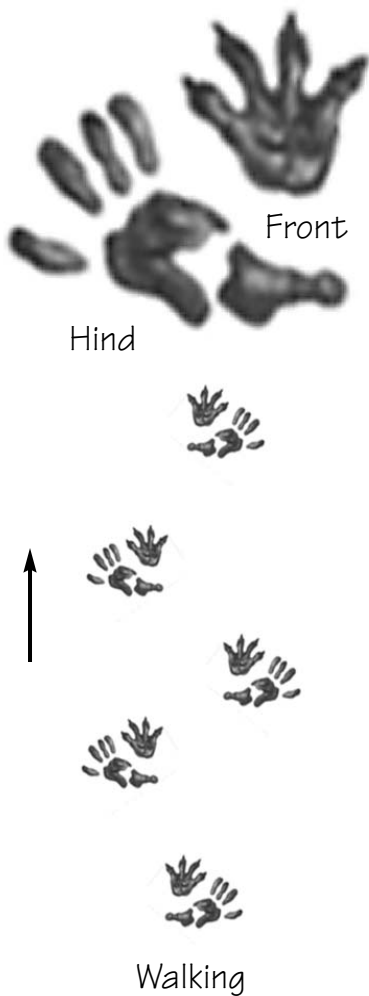
The opossum is an adaptable critter that is often seen in both town and country. While it may look like a rat, it is not even remotely related to that common rodent that everyone loves to hate. The Virginia opossum — the one we see in Kansas — is from an ancient group of animals more than 75 million years old and is actually related to the kangaroo. It has 50 teeth -- more than any other North American land mammal. Its long, naked tail is prehensile, meaning



Front



Back



that it can be used for grasping things by wrapping around them.

Like most mammals, the opossum has five front toes with claws, but its back feet are really unusual. Instead of claws, they have flat nails, and one toe on each back foot is actually a thumb much like a human's.

The opossum can be found throughout the state, but it prefers more forested areas like those along

rivers and in eastern Kansas. They will eat nearly anything, from frogs and crawfish to bird eggs, dead animals, and berries.

The opossum is a slow-moving animal, so it usually comes out only at night in order to avoid danger. Still, great-horned owls, coyotes, and other predators often eat opossums.

Of course, the most famous opossum of all was Pogo, created by the late cartoonist Walt Kelly.

by Joyce Harmon

NIGHT STALKERS

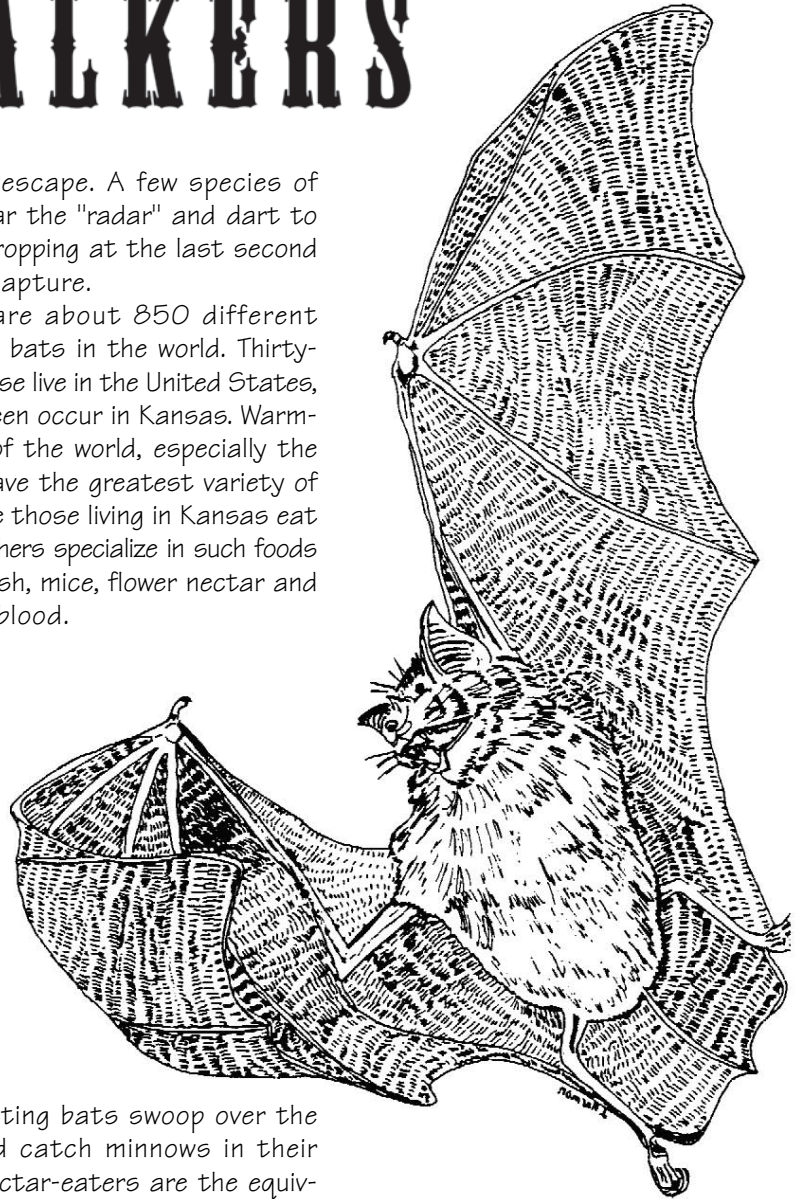
Which Kansas animal hibernates during the cold winter to save energy, catches flying insects in total darkness and sleeps hanging upside down? The bat, of course. That spooky night flier of the vampire movies.

Over the years bats have developed a poor image. Stories are told about them flying into little girls' hair, spreading tuberculosis, sucking blood and giving everybody rabies. Hollywood depicts them as Count Dracula in disguise and messengers of witches. These fairy tales aren't believed by all people. The Chinese saw bats as symbols of good luck, long life, wealth and virtue. Central American Mayan Indians worshipped these flying mammals as gods. Modern scientists know that bats are radar-equipped to play a unique and beneficial role in nature.

As bats make their way through the night, they emit high-pitched noises and listen for the echoes. From them they can hear the location, size, shape, texture and speed of moving objects. This important talent is called echolocation, and bats depend on it to earn their dinner. When a bat hears a potential meal—a moth, for instance—it speeds up the sounds with its larynx (voice box) and picks up more echo information. It captures the prey by scooping it up with its wings and pushing it into its mouth. In order to hear better, most bats have oversized ears. They can detect their echoes as far as six feet. Bats may often dart at insects close to people, giving rise to the "hair tangle" stories. Some use their noses to misdirect sound and confuse insects

trying to escape. A few species of moths hear the "radar" and dart and fro, dropping at the last second to avoid capture.

There are about 850 different species of bats in the world. Thirty-nine of those live in the United States, and fourteen occur in Kansas. Warmer parts of the world, especially the tropics, have the greatest variety of bats. While those living in Kansas eat insects, others specialize in such foods as fruit, fish, mice, flower nectar and yes, even blood.



Fish-eating bats swoop over the water and catch minnows in their talons. Nectar-eaters are the equivalent of night-flying hummingbirds, lapping the sweet juices from flowers with their long tongues. Fruit bats have wide molars for chewing and vampire bats have sharp incisors to painlessly puncture their victim's skin. They're a lot like mosquitoes, but instead of sucking blood, they lap it up. All Kansas bats feed on insects. Even though they consume about half their body weight in beetles, moths and bugs each night, many people still think they are dan-

gerous, filthy animals riddled with diseases and parasites. In reality, bats spend a good deal of time grooming to keep themselves, especially their wings, clean and in perfect flying condition. Bat parasites are no worse than those in dogs, cats or birds, and almost none of them are harmful to humans. In contrast, the chemicals some people use to kill bats are very dangerous to human health.

It is true that bats can become a

nuisance in buildings where they frequently roost during daylight hours, but there are better ways to remove them than poisoning. A practical approach is to block entry points under eaves, near chimneys and attic vents with fine mesh screen or weather-stripping. Do this just after dark when the critters are out feeding or in late fall when they are hibernating elsewhere. Some species hibernate in attics. Be sure you don't lock any in.

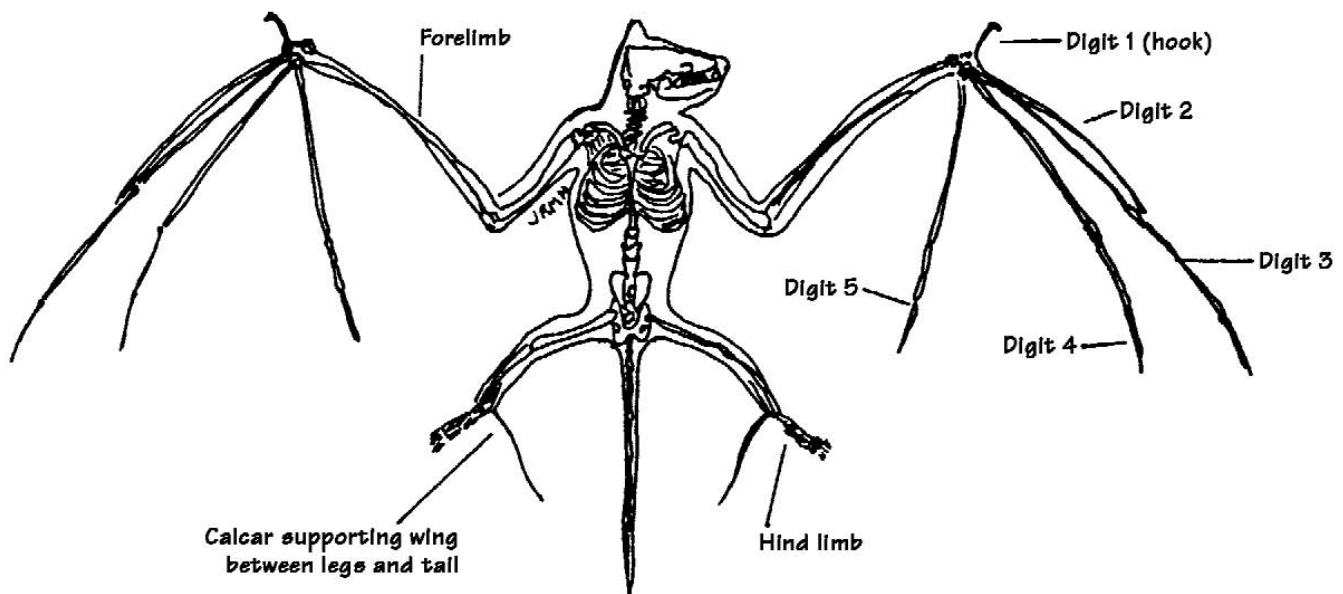
A bat's skeleton looks remarkably like a human's, having five bones in the wing comparable to our fingers. They are hollow, to make flying easier. The first digit, or thumb, is a claw

and nurse their young. Even though young bats can use echolocation to find food when they're just two weeks old, they take milk from their mothers for at least two more months while they perfect their hunting skills. Female bats can tell their young from others by sound and smell. Most bats care for their own young, but a few species that live in colonies care for any hungry youngster.

The phrase "blind as a bat" is left over from the day when people thought bats couldn't see. Actually, they can in daylight, but not as well as most diurnal (daytime) animals. Since bats are active at night, they function much better with ears than eyes.

mammals can die before spring. Several hibernation caves (hibernaculae) have been fenced off to protect threatened or endangered bats from curious people. In Kansas, the gray bat is listed as endangered.

Other Kansas bats are: little brown cave, Keen's, small-footed, silver-haired, eastern pipistrelle, big brown, red, hoary, evening, Townsend's big-eared, pallid, and Brazilian free-tailed. They range in weight from three grams for the small-footed up to 35 grams for the hoary. Besides humans, they are preyed upon by owls, raccoons, snakes and bluejays. Average life span varies from species to species, but can be from two to



used like a hook to grab and cling to bark, rock and other perches. The other four supports a thin, rubbery membrane stretched between them to form the wing. It is attached to the leg and continues to the tail. A special bone called a calcar supports the outside edge of the wing between the legs and tail. Bat skulls are like bird skulls; they are "honeycombed" to keep them light. In fact, bats take the place of birds as the night shift insect patrol.

Like all mammals, bats are warm-blooded (body temperature remains constant except during hibernation)

Bats in northern climates like ours hibernate during winter to conserve energy. Their "insect food supply is gone, so they find caves and other crannies that stay warm enough so they don't freeze, yet cold enough so their stored body fat will not be used up too soon. Some species hibernate in large groups to conserve body moisture and possibly heat. At these times bats are sensitive to disturbance, and the slightest intrusion from people can cause them to stir and lose precious energy reserves. If too much is lost, thousands of the insectivorous

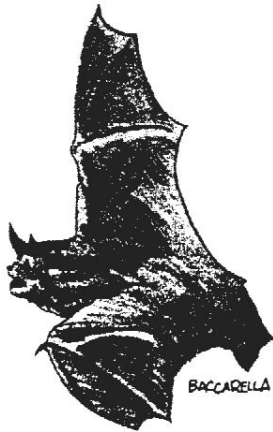
thirty years, an abnormally long time for a small animal in the wild.

Some spring or summer evening when the sky is still light, watch for nature's radar-equipped, flying insect control. Then see if you can find their daytime roosting sites. Some like to hang from tree branches and look like withered leaves. Others prefer to cling to rafters in barns and buildings or crevices in cliffs and caves. Enjoy studying them, and don't worry about them tangling your hair. Any creature that can hear a moth won't have any trouble avoiding us.

THE BAT

by Ogden Nash

*Myself, I rather like the bat,
It's not a mouse; it's not a rat.
It has no feathers, yet has wings,
It's quite inaudible when it sings.
It zigzags through the evening air
And never lands on ladies' hair,
A fact of which men spend their
lives
Attempting to convince their wives.*



To appreciate the varied and fascinating behavior of bats even more, or at least to reduce fear of them, try the following activities:

HIBERNATION HUDDLE

While hibernating, bats gather in groups and clump their bodies close together. They rotate positions, so that each has a chance to be snug in the center. Children can imitate hibernation by huddling close together and trying to wiggle their way into the center of the group with their eyes closed and hands at their sides. Stop periodically for them to see how they have progressed.

CAVE MAZE

Construct a "cave" from chairs, tables, and dishes. Children work

their way around the obstacles while blindfolded. Locate what you think are good roosting locations. Bats return to the same roosts year after year.

EASY ECHOLOCATION

One participant produces a faint sound just loud enough to hear from a short distance. The others, blindfolded and disoriented, try to find their way to the sound.

THE JURY IS OUT ON BATS

Hold a hearing of the case, "Little brown vs. the people of Kansas." Judge, jury and lawyers are selected. Each side presents its case to be determined by judge and jury. Specify instances such as disturbance

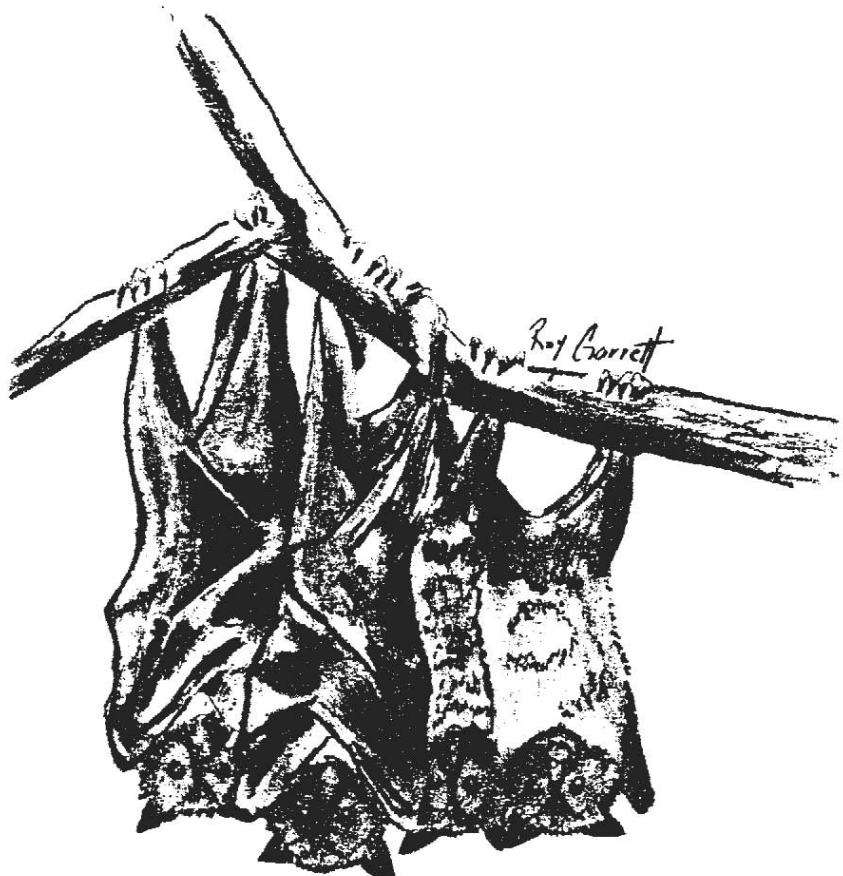
of hibernacula (hibernating habitat) or indiscriminate killing. Judgment is based on the arguments. See if compromises can be made such as blocking bat entryways in homes but replacing the lost habitat by constructing bat towers.

BAT MOBILE

Mobiles have been made of nearly everything else; why not one of bat drawings? Some research on Kansas species would provide background for the drawings of a variety of bats in different poses.

READING ADVENTURES

Read stories and poems about bats and other nocturnal animals. Then try your hand at writing your own.



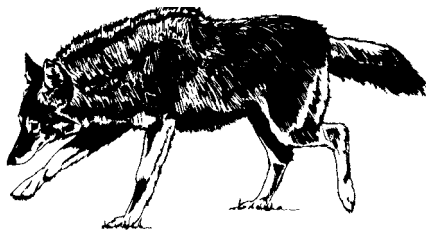
by Joyce Harmon)

FURBEARERS

It might seem unusual to credit wild animals with helping to settle America, but that's just what furbearers did. Native Americans had made use of furbearers as a source of food and clothing for thousands of years. When Europeans began to explore North America, they found the fur from these animals to be of great value for warm clothing, and they used the furs as a unit of currency in the unsettled land. Wealthy Europeans paid high prices for fashionable clothing made of mink, beaver, and other furs. The popularity of felt hats made from beaver fur caused a deeper search into the territory for those animals.

coyote

Nocturnal scavengers and predators, coyotes are respected for their craftiness and cunning. Their adaptability has enabled them to expand their range despite large-scale attempts to reduce coyote numbers. They prefer semi-open country and establish dens in unused fields and pastures. They also may establish residence under hollow trees, in rock cavities, and under deserted buildings. Although they



do occasionally kill young livestock and poultry, they have often been blamed unjustly for damage done by free-running dogs. They rely on rabbits, mice, and other small rodents for the bulk of their diet, as well as carrion and some plant foods.



raccoon

Expert climbers and swimmers, raccoons usually live in hollow trees near streams, lakes and marshes. They are nocturnal, foraging from dusk to dawn on a diet more varied than that of any other furbearer. Crayfish, clams, fish, insects, frogs, snakes, turtles, wild fruits, grasses, and nuts make up a large part of their diet. They use the tactile senses in their front feet to locate food groping in shallow pools, under rocks, or in rotting logs. On rare occasions, they can cause problems for rural residents by feeding on corn, eggs, or poultry. They also can be a suburban nuisance by taking up residence in and around buildings inhabited by humans.



beaver



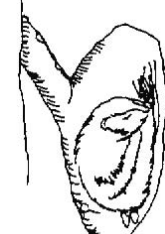

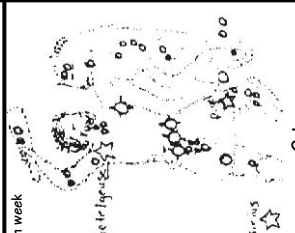
The beaver, largest of North American rodents, is famous for its dam-building capabilities. Beavers customarily confine their activities to a small home range, subsisting largely on the cambium of tender twigs, young trees, and woody plants. They are especially fond of cottonwood and willow bark. Beavers are nocturnal but may be seen during the day, especially in the fall when they are busiest with dam construction. Their dams can stabilize stream flows and control runoff, but sometimes cause problems by backing up water and

flooding roads, meadows, and crop fields. Their tree-gnawing tendencies also can cause damage in orchards located near beaver habitat.



When the days get cooler and you're spending more time indoors, take some time to discover more about Kansas wildlife through books and observations.

DECEMBER

<p>1st week</p> <p>There are some who can live without wild things, and some who cannot. Like winds and sunsets, wild things were taken for granted until progress began to do away with them. Now we face the question of whether a still higher 'standard of living' is worth its cost in things natural, wild and free.</p>		<p>-Aldo Leopold</p>	<p>December 1, 1967. Marion Reservoir formally Army Corps of Engineers acreage, was added to the lands managed by Kansas Fish and Game. Locate Marion Reservoir and research the Corps of Engineers.</p>	<p>December 2, 1921. A \$1.00 trapping license was required for the first time. 1982 was the last year trapping licenses were sold in Kansas. Now trappers and hunters of furbearers need a furbearer license.</p>	<p>December 4, 1843. Manila paper was patented on this date. Use some manila paper and a crayon to make a study of textures in nature.</p>	<p>December 6, 1886. Explorer William T. Hornaday killed a 1,700 lb. bull buffalo while gathering specimens for the Smithsonian Institute. What is the average weight of buffalo today?</p>
<p>2nd week</p> <p>December 7, 1873. Willa Cather, author of My Antonia and other prairie pioneer books, was born on this date. Go to the library and find out more about this author and her books.</p>	<p>Decorate a pioneer style Christmas tree for the birds. Pinecones stuffed with peanut butter and rolled in seeds make great edible decorations, along with sunflower heads, balls of suet, and chains of popcorn.</p>	<p>Hibernation - Spending winter, or a portion of it, in a state of sleep; a torpid or resting state.</p>	 <p>Don't forget the ground - feeding birds!</p>	<p>Keep a record of the length of the days and nights. What pattern can you observe? What marks the beginning of winter?</p>	<p>Once you begin to feed the birds, don't stop! They'll learn to depend on you for food to survive the winter.</p>	<p>Woodpeckers, nuthatches and chickadees can use the fat of suet for heat energy. You can get suet from a meat market or save cooking grease.</p> 
<p>3rd week</p> <p>Some animals hibernate during winter. Make a list of true hibernators.</p>		<p>Watch for tracks and traces of wildlife after a snow.</p>		<p>December 28, 1973. The Endangered Species Act of 1973 came into existence. This Act attempts to protect many species of wildlife from further reduction in number.</p>	<p>After the holidays, gather Christmas trees from your neighborhood to build a brush pile for wildlife. They make a good shelter from predators and the wind.</p>	<p>Observe the winter sky for constellations that are visible this time of year. Keep a look out for Orion. The two bright stars, Rigel and Betelgeuse, will guide you.</p>
<p>4th week</p>  <p>Orion</p>	<p>Other winter constellations you might observe are: Auriga, Cassiopeia, Taurus the Bull, Canis Minor the Dog, and the Big and Little Dippers.</p>	<p>December 30, 1981. Further acres of the Mined Land Area in southeast Kansas were donated to the Kansas Fish and Game Commission by Gulf Oil and Pittsburgh & Midway Coal Mining Company. Locate the area and list the wildlife you'd find there.</p>				

by Joyce Harmon

FURBEARER REVIEW

1. List those species that are predominately nocturnal.
2. What special adaptation do raccoons have to help them find food?
3. Which furbearer listed is a member of the dog family?
4. Mink depend on which one of their senses to locate food?
5. List the furbearers that are rodents and explain similarities and differences of these species.

muskrat



Muskrats are good swimmers, generally seen with their heads just above water, the remainder of their body submerged. They can stay under water for fifteen minutes. Musk rats prefer still or abundant vegetation along the shore. They usually build their houses out of vegetation, with an entrance tunnel that opens under water; or dig their homes in a stream bank. During most of the year a muskrat lives alone, but several may bunch together in a den or lodge during winter. Chiefly vegetarians, they prefer the roots of aquatic plants, but also will feed on snails, crayfish, fish, frogs, reptiles, and young birds. They sometimes cause problems by tunneling in and around dikes and earthen dams.

slow-moving water with the shore. They usually



mink

A basic requirement for mink is permanent water. Mink live alongbanks of streams or shorelines of lakes and marshes, making their homes in cavities excavated in stream banks, or under logs or stumps, in hollow trees, or in abandoned muskrat lodges. They are primarily nocturnal and live solitary lives except during rearing of their young. They are aggressive and often attack animals larger than themselves.



Their eyesight is not acute, but they rely heavily on a highly developed sense of smell to locate prey. Mice, rabbits, and other small terrestrial animals, as well as fish, crayfish, frogs, and other small aquatic creatures are preferred mink food. Their living habits cause humans few problems.

bobcat



Primarily nocturnal and seldom seen by humans, bobcats prefer life in lightly populated areas of broken terrain. They depend on keen eye sight and superlative hearing for their nightly hunting forays. Bobcats are good climbers and readily take to trees to rest or observe their surroundings. Although capable of killing an animal as large as a deer, they primarily consume rabbits, squirrels, mice, rats, shrews, opossums, small birds, and carrion. Their reputation for controlling populations of rodents is tarnished by occasional reports that they destroy domestic fowl and young pigs. Their dens are usually located in inaccessible areas, often in rocky cliffs or hillsides.

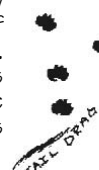


they destroy domestic fowl and young pigs. Their dens are usually located in inaccessible areas, often in rocky cliffs or hillsides.

otter


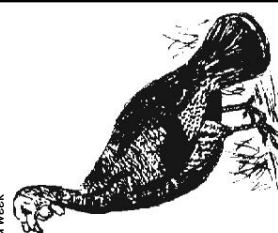

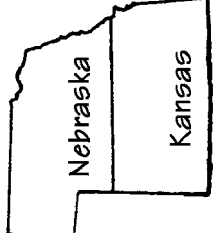


River otters have regained residency in Kansas just this year when they were reintroduced along the Cottonwood River. Otters are known for their agility in water and their abilities as predators. Fish of all kinds make up much of their diet, with salamanders, crayfish, frogs, birds, snakes and insects added for variety. Primarily nocturnal but also active during the day, otters forage along streams and rivers. Dens are constructed near water, possibly under tree roots, fallen logs, or in abandoned burrows and thickets. Otters mark their territory with scent posts, informing other otters of their presence. Breeding season may find otters away from a large body of water as they search for a mate. Future reintroductions will expand the otter's range in Kansas.



Celebrate the birthdate of Kansas' statehood as you go through the month learning about the diversity and beauty of the state.

JANUARY

<p>1st week</p> <p>"We believe in Kansas, in the Glory of her Prairies, in the Richness of her Soil, in the Beauty of her Skies and in the Healthfulness of her Climate." -Charles Moreau Harger From 1927 Kansas Facts</p>	<p>Make a New Year's Resolution to save and restore wildlife habitat. What components are necessary for good wildlife habitat?</p>	<p>January 1, 1865. A census of buffalo in the plains estimated the number to be 15,000,000. Imagine what Kansas was like then!</p>	<p>January 2, 1920. Birth date of science fiction author Isaac Asimov. Read a science-fiction book. Then, attempt to write some of your own.</p>	<p>DO SOMETHING WILD</p> 
<p>2nd week</p> <p>January 1970. U.S. National Environmental Policy Act (NEPA) started. Designed to prevent environmental problems, it required that federal agencies prepare a detailed statement, now known as an Environmental Impact Statement.</p>	<p>Write an Environmental Impact Statement for a new project going on in your area. Research what impact this project will have on your environment now and in the future.</p>	<p>January 11, 1872. A severe storm, combined with a buffalo herd, caused a Kansas Pacific Railroad engine to halt. The herd moved across the tracks and crowded on the lee side of the engine to get away from the storm.</p>	<p>Lee - The side or part that is sheltered or turned away from the wind.</p>	<p>Here's your chance to help nongame wildlife by donating money to the Nongame Wildlife Improvement Program (also called "Chickadee Checkoff"). This program works on projects for all wildlife that is not hunted, fished or trapped. Taxpayers can make donations to the program on their state tax form each year. Your help is needed.</p>
<p>3rd week</p> 	<p>How do Rio Grande turkeys differ from Eastern wild turkeys?</p>	<p>January 1966. 125 Rio Grande turkeys were transplanted into Kansas from the King Ranch in Texas.</p>	<p>League of American Sportsmen established by George Oliver Shields on January 18, 1898. Main goals of this group were to protect wildlife, enforce game laws, and promote stewardship of natural resources.</p>	<p>Stewardship - The concept of land responsibility; that we do not own land but are managers of the resource and responsible to future generations for the condition of the land when we leave it.</p>
<p>4th week</p> <p>Ornithology - The branch of zoology that deals with birds. An ornithologist is someone who studies birds. How many famous ornithologists can you discover?</p>		<p>The Western meadowlark was selected in 1924 as the State bird of Kansas. The Kansas Chapter of the Audubon Society had school children vote for their favorite bird. Runners up included quail, cardinal, and robin.</p>	<p>January 29, 1861. KANSAS DAY Kansas became the 34th state in the United States. Look at what wildlife Kansas had in 1861 and compare it to 1984. How has the variety and abundance changed?</p>	<p>Ducks Unlimited, a nonprofit organization dedicated to restoring and creating habitat, was incorporated in Washington D.C. on January 29, 1937. Contact your state or local group to see how you can help.</p>
	<p>1854. Senator Stephen A. Douglas of Illinois reports a revised Nebraska Bill, which calls for the creation of two territories - Nebraska and Kansas.</p>	<p>January 31, 1876. A bill (H.R. 1719) was introduced to prevent the useless slaughter of buffalo within the U.S. territories. Research what factors played a part in the reduction of buffalo.</p>		

If you've ever tracked through your home with dirty shoes and been caught, you know about

by Joyce Harmon

TELLTALE TRACKS

From tire tracks to tennis shoe imprints to bobcat paw prints, tracks are all around us. Mud, sand, snow, and wet cement make excellent mediums for these trademarks. Tracks leave behind a tale or story about their source, direction of travel, and size of the animal or machine that made

them. Winter provides many opportunities to observe tracks in snow or mud and learn about animals we may never actually see.

Warm clothes and the curiosity of a detective are required for this expedition. Go outdoors and search for as many different kinds of

tracks as you can find. Include tracks made by tires, shoes, animals, sleds, skis, etc. Keep a lookout for unusual tracks and ones that may be hard to identify. Make a list of what you find and see if you can answer the following questions for each track or your favorites.

1. Where was the track located (i.e. in mud on the side of the stream bank)? Draw a map of the location, and a picture of the track.
2. Did an animal or machine make the track?
3. What direction were the tracks headed?
4. What can you tell about the size of what made the track (i.e. small with four legs or has big feet with webbed hind toes)?
5. How do you think the track was made? By walking, running, sliding, rolling, hopping, jumping, skidding, falling, etc.
6. Where would you guess you'd most likely find this track again (i.e. in a driveway, near a tree, etc.)?
7. Can you follow the track to a den or nest?
8. What made the track?
9. Make up a story about what you think happened to make this track. . Share what you discovered with a friend or classmate.

To help tell animal tracks apart, here are a few points of interest:

Members of the cat family (house cats, bobcats, lynx, etc.) have retractable claws. When they leave a track behind there are no claw marks. Members of

the dog family (coyote, fox, wolf, etc.) make a claw mark as well as the mark from the footpad.

Animals with hooves make a distinct round or triangular print.

Birds and mammals with webbed feet are easy to distin-

guish by their "signature" of skin between toes.

Rabbits and hares have "snowshoes" of thick fur that helps spread their weight over a large area. They tend to stay on top of the snow instead of sinking into it.

Tracks can be preserved for further study in two ways. Probably the most common is by making plaster casts. To begin with, you'll need to find an undamaged track. Look around until you find a particularly good one. Moist clay soil and silt along shorelines are especially good places to find quality tracks. Carefully remove any litter that may be in the track. Excessive moisture can be absorbed from tracks by dusting them with dry plaster of paris.

Once a track has been selected, fit a construction paper or oak tag collar around it. Strips of paper 1 inch wide and 13 to 17

plaster until it fills the collar to a 3/4-inch thickness. The cast should dry in 20 to 30 minutes. When the plaster has hardened, loosen the soil around it. Brush off any excess soil when the cast is completely cured. Record the date, place track was found, and species of animal that made it.

PARAFFIN CASTS can be made in a similar manner. Melt wax in a tin can and pour slowly into the track. It will harden in minutes.

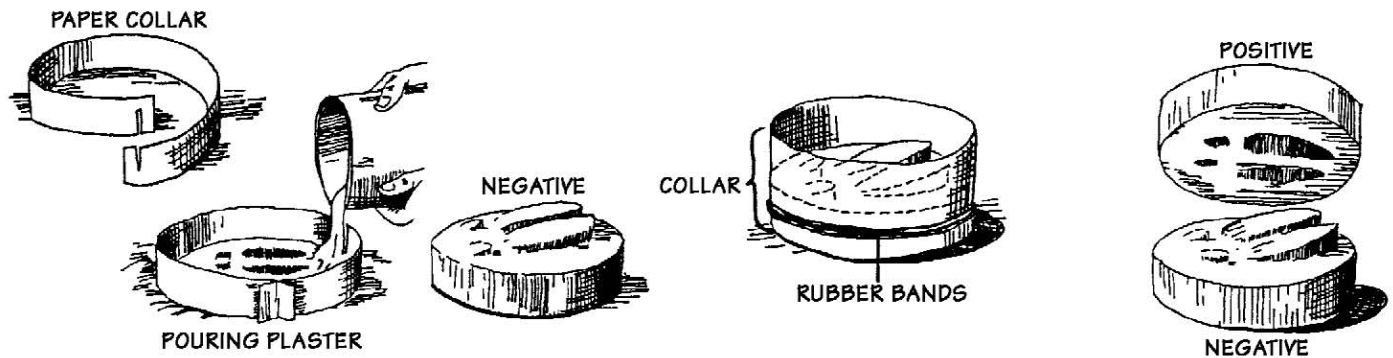
Your finished track casts will be "backwards" and raised rather than sunk. To make them look "natural," as if the animal had

pletely hardened, it can be carefully cleaned with a small brush.

Boiling them in a Borax solution can harden plaster casts. Varnish, paint, or decorate them and make a display.

If you want to avoid the mess of plaster casts, collect tracks on smoked paper. Hold shelf or poster paper over a burning candle, but don't let it burn. Carbon from the smoke will coat the paper. Anything that touches it will leave a mark.

You can lure animals into a tracking pit with food. The pit is a cleared area, 4 to 6 square feet, on a level spot near vegetative cover. Rake the area



inches long, stapled or paper clipped into a circle, make the collars. Mix plaster of paris and water in a tin can or plastic container. Sprinkle plaster into the water without stirring until the proportion is about 7 parts plaster to 4 parts water. Stir the mixture gently with a stick until it is smooth and the consistency of pancake batter. Too thick plaster will not pour; too thin plaster will take too long to harden. A small amount of vinegar in the plaster mixture slows the hardening. A pinch of salt speeds it up. Pour the

stepped in your plaster, you'll need to coat your "negative" cast with liquid soap or oil and pour another mound of plaster or wax over it. Of course, you can't pour hot wax over a wax negative without melting it.

Casts can be made from snow tracks if the temperature is below freezing. Fill the track with a dusting of dry plaster followed by a gentle misting of cold water. Allow the track to freeze. Push the edge of the cardboard collar into the snow around it. Pour the plaster as before. When the track is com-

smooth and dampen the ground for sharp tracks. Distribute appropriate bait in the pit.

NOTE:

Also, a reminder to teachers and youth leaders interested in National Wildlife Federation's annual Wildlife Week celebration. Informational packets can be obtained at no cost by writing to: Dept. KWW, National Wildlife Federation, 1412 16th St., NW., Washington, D. C. 20036. This year's theme is "This Is Your land" and begins March 20.



Illustrations by Alan Baccarella

by Joyce Harmon

WHO GOES THERE?

Match the Kansas mammal to its track.



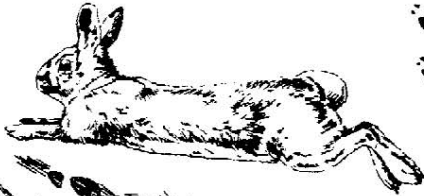
Badger



Prairie Dog



Bobcat



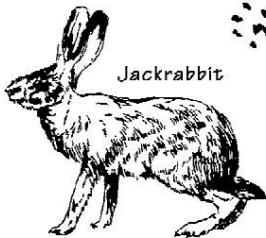
Cottontail



Skunk



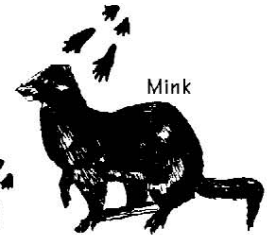
Raccoon



Jackrabbit



Red Fox



Mink

14 tracks are scattered across the page, each labeled with a number from 1 to 14. The tracks vary in shape and size, representing different mammals. Track 1 is a long, narrow, parallel line of small prints. Track 2 is a series of small, circular prints. Track 3 is a series of small, circular prints with a distinct pattern. Track 4 is a series of small, circular prints. Track 5 is a series of small, circular prints. Track 6 is a series of small, circular prints. Track 7 is a series of small, circular prints. Track 8 is a series of small, circular prints. Track 9 is a series of small, circular prints. Track 10 is a series of small, circular prints. Track 11 is a series of small, circular prints. Track 12 is a series of small, circular prints. Track 13 is a series of small, circular prints. Track 14 is a series of small, circular prints.



1. PORCUPINE 2. DEER 3. SKUNK 4. COYOTE 5. JACKRABBIT 6. BISON 7. KANGAROO RAT
 8. BOBCAT 9. WHITE-FOOTED MOUSE 10. COTTONTAIL-RABBIT 11. BEAVER 12. MINK 13. RACCOON
 14. SQUIRREL 15. PRAIRIE DOG 16. BADGER 17. FOX 18. OPOSSUM

KEY:

Illustrations by Alan Baccarella

Do **B**adgers **B**urp?

Well, maybe after dining on a prairie dog or two, but you'll never get close enough to find out. You wouldn't want to. Badgers are fierce fighters and will defend themselves if they have to.

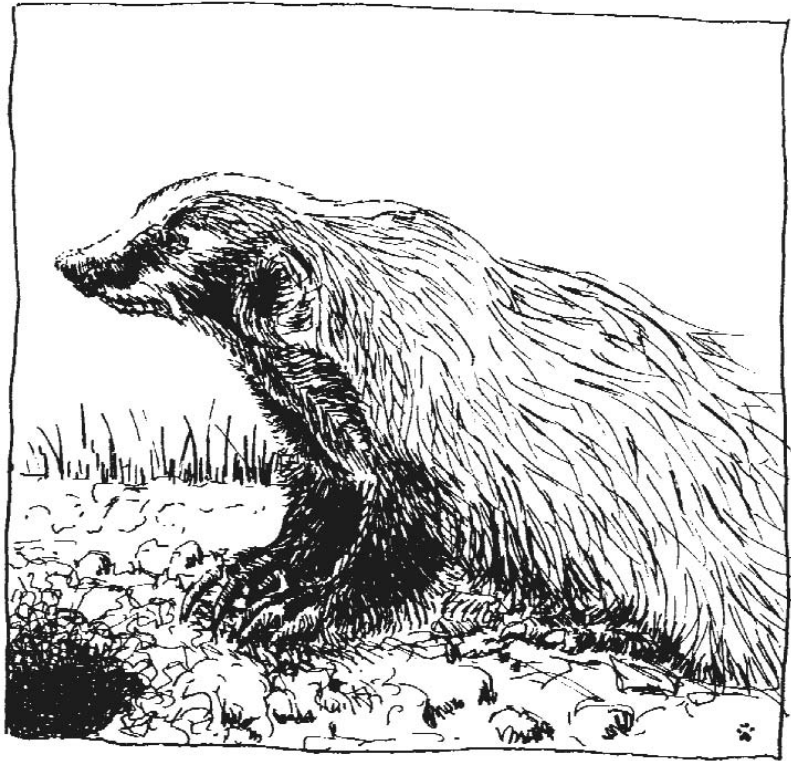


Badgers are strong and stocky. They are burrowing animals and are built for digging. The short legs and long, curved claws of the badger make excellent digging tools.

Badgers are active mostly at night. They do not hibernate in the winter. They eat small rod-

ents; including prairie dogs, pocket gophers, ground sq-

uirrels and rabbits, or whatever prey is available.



Badgers are solitary animals. They are found throughout Kansas, but prefer the prairie grassland habitat and are rarely seen in wooded areas.

BAD to the BONE



One of the most interesting critters in Kansas is the American badger, *Taxidea taxus*. Closely related to the wolverine, it is also one of the most ferocious animals in the state although it will seldom attack unless cornered.

A squat creature, the badger is wider than tall with short, bowed legs. Its coat is shaggy and coarse, gray to brown with short, bushy, yellowish tail. Like Zorro, the masked man, the badger's face is dark brown or black with white cheeks, and narrow white stripe runs from above the nose and over the head. The resemblance to

The masked man ends there, however. The badger's snout is flat and slightly upturned, giving it a bearish appearance.

The male is larger than the female and may be 20 to 30 inches long, 6 inches tall, and weigh more than 25 pounds.

Although badgers breed in July and August, the furry but blind young are not born until March or April. They are weaned by June.

A badger den is usually a burrow about 8 to 10 inches in diameter surrounded by large mound of earth and running out of sight at about a 45-degree angle. Dens may be found in open plains and

prairies, farmland, and sometimes edges of woods.

This powerful burrower usually hunts at night but is often active by day, waddling about at a clumsy trot. To cool itself off in summer, it will swim or even laze about in shallow water. Like a cat, it will bury its droppings and clean itself frequently, swallowing loose hair licked from its coat.

During the coldest parts of the winter, the badger's metabolism may slow down to the point that it becomes "torpid," meaning that it cannot move around much. This condition is not like hibernation, where an animal "sleeps" throughout the



winter.

Like most predators, the badger is an opportunist that will eat invertebrates, birds, reptiles, and carrion. Primarily, however, badgers eat ground squirrels, pocket gophers, rats, mice, and other burrowing mammals. Although these critters are generally considered pests, the badger's burrowing can be destructive to alfalfa fields and other agricultural areas. In addition to its hunting activity, an active badger may dig a new sleeping burrow every day during the warm season.

Sometimes, the badger will simply wait in abandoned dens for potential prey looking for an easy hiding place. Occasionally a badger will dig itself into an inhabited burrow and await the occupant's return. Coyotes often lurk nearby as badgers dig for prey, waiting for the

chance to steal a meal as the rodent attempts an escape.

Amazingly, the badger is not harmed by rattlesnake bites, unless struck on the nose, and often hunts these dangerous snakes.

If you've ever seen a badger, you know that this fascinating creature is a loner. Seldom will more than one

be seen at a time, unless it is a mother and her young, which leave her in late summer.

Few animals dare to take on the badger. Its thick fur, loose, tough hide, and heavy neck muscles protect it as it bites, claws, and exudes a repellent musk, all the while snarling, squealing, growling, and hissing. Add to this its short, stocky build, which allows it to get underneath its opponent, and you have the most ferocious mammal on in the Great Plains. Still, the badger will usually beat a retreat rather than fight, if it can.



by Mark Shoup and Dana Eastes

A Prickly Subject

Porcupines in Kansas? "No way," you say. Or, "Where?"

"Many places," say Deb Bennet, Robert S. Hoffman, and James W. Koepl, who write about mammals in *Native Kansas*. Porcupines (*Erethizon dorsatum*), they say, can be found almost anywhere in Kansas "because they survive best along forest edges and can eat a wide variety of foods." Although this limits much of western Kansas, "forest" can apply to draws, canyons, and streambeds that are heavily treed. This, indeed, includes most counties in Kansas.

One of the reasons porcupines are found around trees is that they eat them, or parts of them. Besides clover and other green plants, leaves and twigs make up the bulk of porcupine diet. In winter, they even eat the outer bark of trees.

Shelter is the other reason porcupine like trees. Hollow trees, logs and tree-tops are favorite resting areas. They will also rest and nest in burrows in the ground or in holes in rocky bluffs.

Although they are slow moving creatures, you probably wouldn't want to catch one. Porcupines, as everyone knows, are covered with sharp quills - about 30,000 of them - that protect them from predators. Each of these quills is

tipped with dozens of tiny barbs that swell when they enter the victim's flesh.

While humans can remove these quills by clipping them (to remove air pressure) and then pulling them out, animals are often stuck with them, so to speak.

When threatened, a porcupine will duck its head, bristle and rock back and forth on all four feet. If

lead to the predator's death by starvation. If stuck in the eye, quills can blind. Other wounds can fester and cause an infection.

For these reasons, dogs should always be kept away from porcupines.

Does this mean you should be afraid next time you wander into the woods or take a stroll down to your favorite stream? Not really. Although porcupines are widely distributed in Kansas, there aren't a lot of them. Porcupines are also primarily nocturnal - meaning they sleep in the day and come out at night to eat - so it's unlikely you will see one.

Also, porcupines are not as dangerous as some people think. Contrary to popular belief, they cannot throw or shoot their quills at people. In order to get stuck, you would have to brush against one or intentionally get too close. There are two reasons this shouldn't happen: 1) porcupines are slow-moving waddlers, easy to steer clear of, and 2) although

they usually don't have much fear of people, they seldom, if ever, look for a fight.

The porcupine's armor would seem to make it invincible, wouldn't it? However, there is one predator that regularly preys on porcupines - the fisher. A small mammal in the weasel family, the fisher can



this scare tactic doesn't work, it will slap the enemy with its tail, leaving spines embedded in the intruder's face. This can be particularly dangerous for predators such as coyotes or bobcats, which may leave the encounter with a mouth or nose full of quills. Not only is this painful, it can

flip the porcupine over and quickly attack its unprotected belly. Mountain lions, bobcats and coyotes have been known to eat, porcupines, too.

Because they are so slow, porcupines have been a ready natural resource for people, as well. For centuries, Native Americans used their quills for decoration and as needles for sewing buckskin. They also ate the prickly little critters. Surprisingly, people still eat them. In many states, they are protected, but people lost in the woods can kill them for food.

Porcupines can be destructive. They damage trees by stripping bark for food. Also, the porcupine appetite for salt can lead them to gnaw on ax handles, saddles, and other tools that have been soaked with sweat.

But in most cases porcupines are not a nuisance to man. They are fascinating mammals that have evolved one of the most unusual natural defense mechanism in nature - the quill.

Pine Cone Porcupine

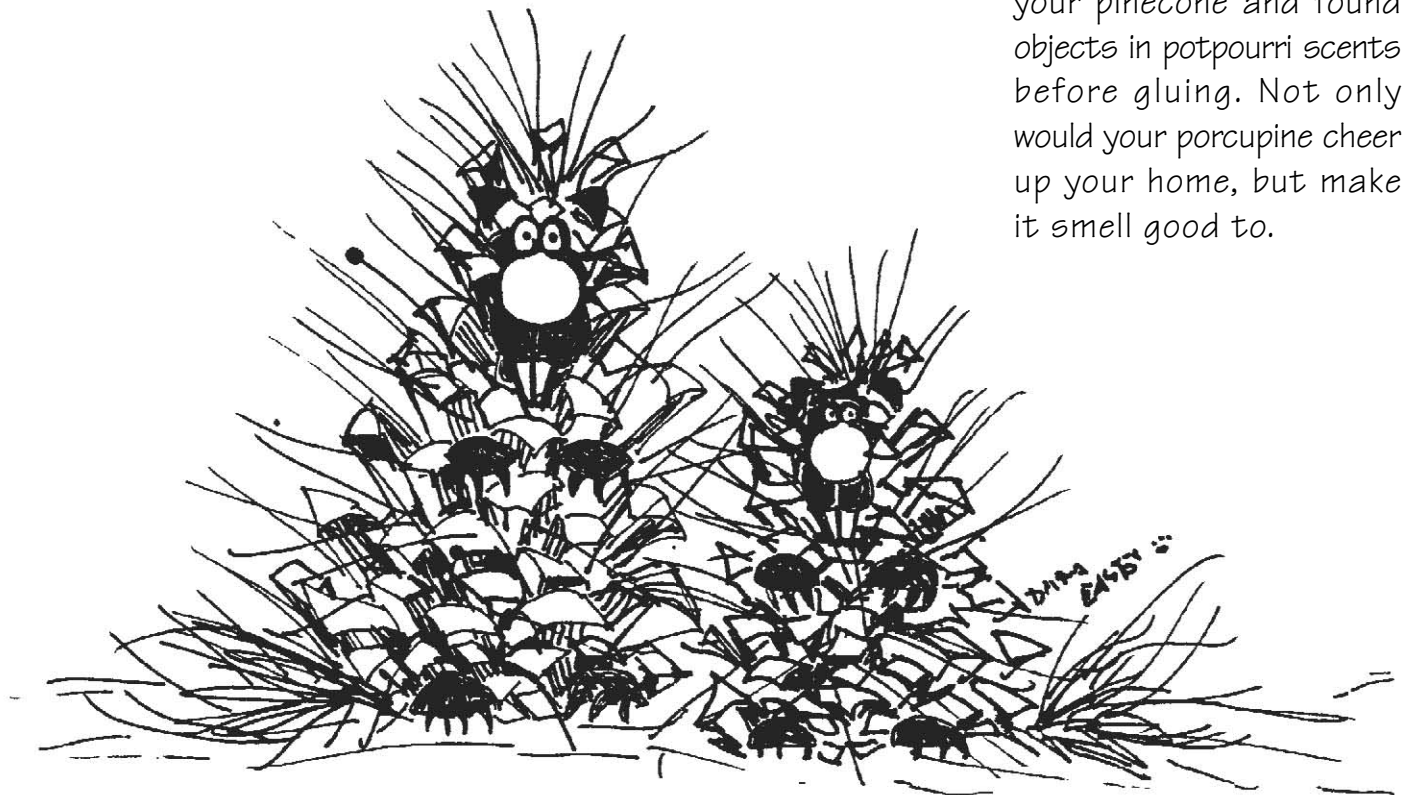
Materials: Fallen pinecones, pine needles, glue and found objects.

Instructions:

1. Gather several pinecones and pine needles, depending on the number of porcupines you want to make.
2. Next collect found objects from your house or outdoors that will serve as nose, ears, eyes and paws for your porcupine.

(Example: Pom poms - nose; felt - ears and paws; beads - eyes.)

3. Begin by pasting the nose, ears, eyes and paws to your pinecone.
4. Next paste the pine needles into your porcupine, making sure the needles stick out from the center of the cone.
5. An alternative to this project would be soaking your pinecone and found objects in potpourri scents before gluing. Not only would your porcupine cheer up your home, but make it smell good to.



PRONGHORNS on the prairie

by Dana Eastes

The only place you can see an antelope is on the plains of Wyoming. That's what I always thought, but I was wrong. You can see and hunt antelope right here in Kansas. They aren't as abundant as they are in Wyoming and other western states, but you still can catch a glimpse of their sleek beauty as they run across the Kansas prairie.

A couple of years ago on a brisk March morning, I was helping to trap turkeys in Comanche county. Riding along the back roads, we stopped abruptly. The wildlife biologist, Charlie Swank, pointed to a small herd of antelope in the distance. What looked like white specks to the naked eye turned into graceful antelope when looked at through a spotting scope. Seeing these antelope sparked my interest to learn more about them.

PRONGHORN PROFILE

You can call it a pronghorn; you can call it an antelope; you can even call it a prairie goat.

Actually prairie goat would be a closer description than antelope. Although antelope is what most people call them, they are not related to any antelope species. Like cheeseburgers and french fries, pronghorns are an American original. The scientific name is *Antilocapra americana*, the only member of the family *Antilocapridae*.

Males are known as bucks or billies and females are known as does. Unlike deer and elk, prong-



horns have horns, not antlers. Both bucks and does may have horns. A mature buck's horn can be more than a foot tall, but a female's horn is rarely more than six inches long. The sheaths of the horns are shed annually leaving only a spike.

The breeding season, or rut, begins in early October. Mature bucks defend their territory and begin to collect harems or groups of females. After the rut, both

bucks and does shed their horns, and small breeding groups join to form larger herds. Females break off from the herd when it is time to give birth, usually in late winter and early spring. Doe's usually give birth to a pair of fawns. The newborn fawns are scentless and spend their first week lying flat in the prairie vegetation, camouflaged from predators. The doe only visits at feeding time to avoid attracting predators to her

newborn. By the end of the week, it is able to follow its mother, and in three weeks it is feeding on vegetation. Pronghorns are not picky eaters; making use of all plant species on the prairie. They hunt out the richest, succulent grasses, and in doing so, can go without water. Water becomes more important in late summer and fall, when they drink as much as a gallon a day in hot, dry weather.

A mature buck weighs about 125 pounds and a doe .110. They stand 34 inches high. Bones are slender, but very porous. Hooves have pads that absorb the rough terrain. Large hollow hairs keep the pronghorns warm when the winter wind blows. They can erect the hairs at will on any part of the body, increasing the insulating effect. The large white rump patch is often erected when danger is sighted.

Their look is sleek and elegant, but don't let that mislead you, they are tough animals, surviving in severe weather and sparse country. They have incredible eyesight. It is said they can detect movement at four miles. They position themselves in areas where they can see great distances and are wary of any vegetation that may hide predators. Second to eyesight, speed is their best defense against danger. Pronghorns can reach speeds up to 60 M.P.H. in a short sprint. If confronted, they defend themselves

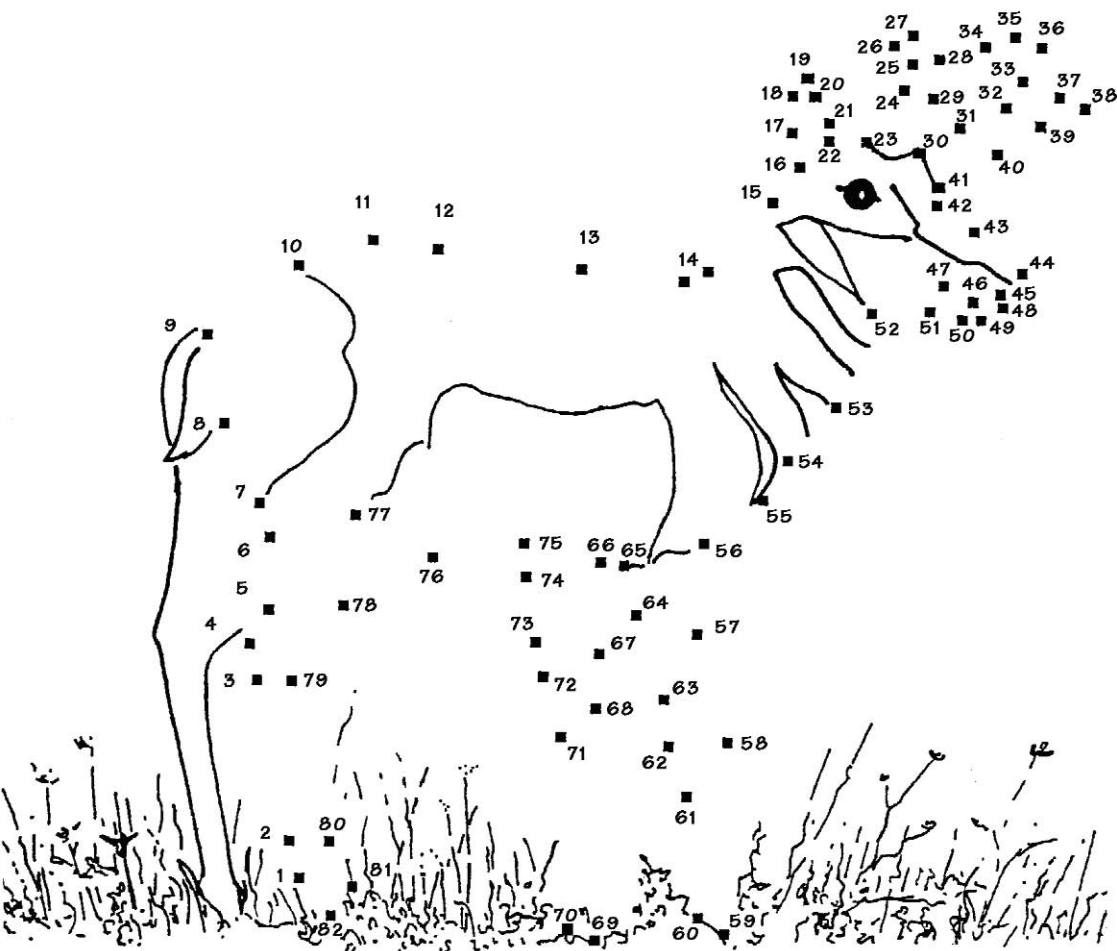
with their sharp, pointed hooves. Animals that prey on young pronghorns include coyotes, feral dogs, cougars, bobcats, and eagles. Besides man, these predators can rarely bring down a healthy adult.

Early travelers reported pronghorns as far east as Emporia. In 1867 Lt. George A. Custer recorded seeing antelope in abundance in what is now Ness county. The rush of civilization in the late 1800s pushed the pronghorns close to extirpation. Conservation efforts allowed only token herds to survive in the state. A 1962 aerial survey found only 56 antelope left in the state, all in Wallace county. Since then, wildlife biolo-

gists have transplanted animals from other states. Their numbers have gradually increased, allowing for a limited hunting season. This management technique controls herds, while providing an exciting challenge to hunters and delicious meat to those who are lucky enough to fill their game tag. The largest populations of pronghorns are in Wallace and Logan counties. Most recently, pronghorns have been transplanted from Colorado to the Flint Hills and Cimarron National Grasslands. Like the wind, the big blue sky, and the little blue-stem, pronghorns are a part of the Kansas prairie.

..... DOT - TO - DOT-ALOPE

Complete the picture by connecting the dots.



by Dana Eastes

In a wink, there goes a mink!

Mustela vison

Mink are truly a luxury that all Kansans can enjoy.

You might catch a brown glimpse of these finely furred critters if you happen to be fishing or exploring a riverbank. Don't blink though; they are quick, agile and shy. As soon as they appear, they're gone again.

The mink has shimmering, dark brown fur with a white spot under the chin. Mink are found throughout Kansas, but less common in the western part of the state. Mink like the habitat along stream and riverbanks, pond and lakeshores, wetlands and swampy areas, and places with lots of trees and brushy cover. At any rate, you'll rarely find a mink far from water.

Mink are more active at night than during the day.

Males and females make

separate dens, usually located under riverbanks, in hollow trees, under tree roots and abandoned beaver and muskrat dens.

MINK TRACKS



right front foot

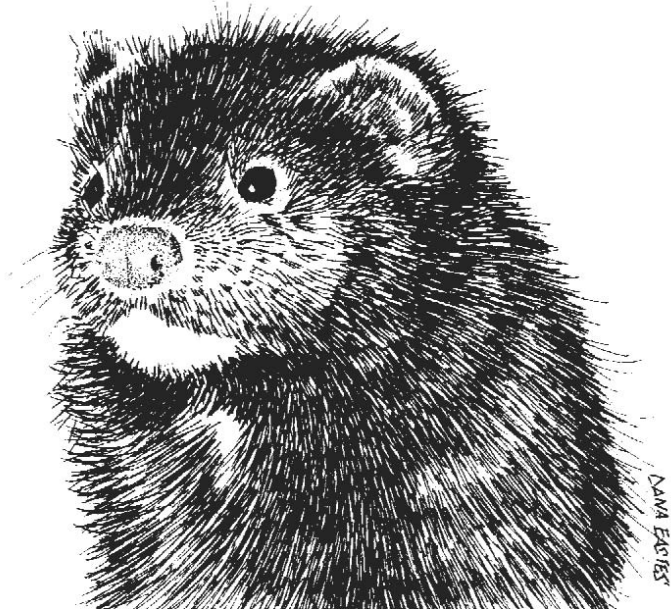


right hind foot

Like most kids, mink don't care for vegetables, but they do like meat and will eat

almost anything that moves, including muskrats (a mink favorite food), squirrels, rabbits, deer mice, voles, fish, crayfish, mollusks, grasshoppers, worms, birds, frogs and snakes. Mink are excellent predators when it comes to small or medium-sized mammals. The mink's predators include man, great horned owls, bobcats, bears, red foxes and coyotes.

Female mink will give birth to three to six young, called kits, in late April or early May. The kits are born blind and furless. By August,



DANA EASTES



the young kits are big enough to leave their parents. The female generally raises the kits alone.

It is thought that mink will become less common due to the lowering water tables in Kansas, which in turn will alter their habitat. Just one more little fine furry reason to conserve water.

How Many Mink?

Can you find and count all the mink in this picture? (Keep in mind, you'd never find this many mink together in the real Kansas wilds.) Look for the answer on the bottom of the page.



There are twelve mink in this picture. The critter in the lower left corner is a muskrat, notice the rat-like tail. Mink like to eat muskrats.

by Dana Eastes

Leave it to BEAVERS

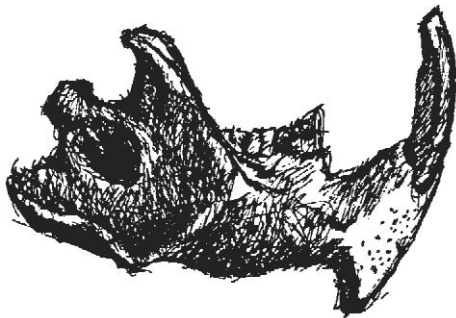
Beaver

(Family Castoridae)
Castor canadensis
missouriensis Baily

Beavers are silent creatures, content to go about their business of storing food, and building lodges and dams. They are also very playful in and out of the water. You know the ol' saying, "All work and no play makes for a boring beaver."

Typical lodges are rounded mounds made from branches and sealed with mud. Most lodges in Kansas are built into the side of a river or stream bank. Beavers can cut small trees in a minute. Large trees may take several days to cut.

Is there a busy beaver building in your backyard? If you consider the state of Kansas as your big backyard, then the answer is yes.



Jaw bone

You can spot a beaver by its heavy, humped backed body, bright orange incisor teeth, small ears and eyes, and a large paddle like tail. The tail is used for swimming and for balance when cutting down trees.

Viewing a beaver might be difficult. Working hours for beaver are early evening to early morning. Humans rarely visit but occasionally you might catch one out during the day if their territory is visited.

People in the 1800s wore hats made of beaver fur. The demand was so great that it damaged beaver populations across the country. Because of the demands of fashion and lack of game management practices, no more than 500 beaver remained in Kansas by the turn of the century. The first law to protect the beaver was passed in 1911. Today, the beaver population is secure.

The beaver is the largest living rodent in Kansas.



hind foot



front foot

Front feet are small for grasping limbs. Hind feet are large and webbed, great for swimming.

Beavers can remain underwater as long as fifteen minutes.

Beavers prefer small cottonwood and willows for food.

Sounds from the beaver are few, except for the loud slap of the tail hitting the water before diving (to signal danger) or the churring of young kits (beaver babies) in lodges.

"Enterprising" and "adaptable" are two good words

to describe beavers. I recently witnessed a beaver eating young wheat grass in a field and using a cement culvert as a lodge.

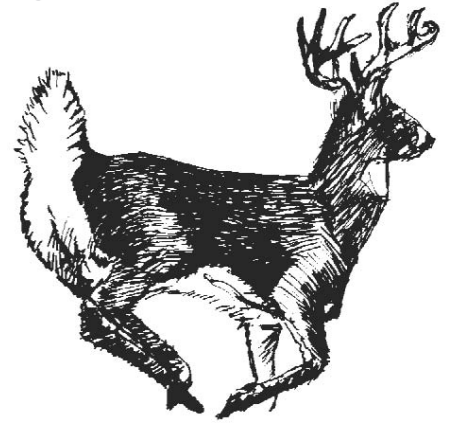
Remember:

Beavers have brown fur and a large paddle-like tail, the one on T.V. has freckles.

by Dana Eastes

Brown-tailed deer?

Anyone who has seen a white-tailed deer for the first time probably wondered why it wasn't named a brown-tailed deer. The large rectangular-shaped tail is dark



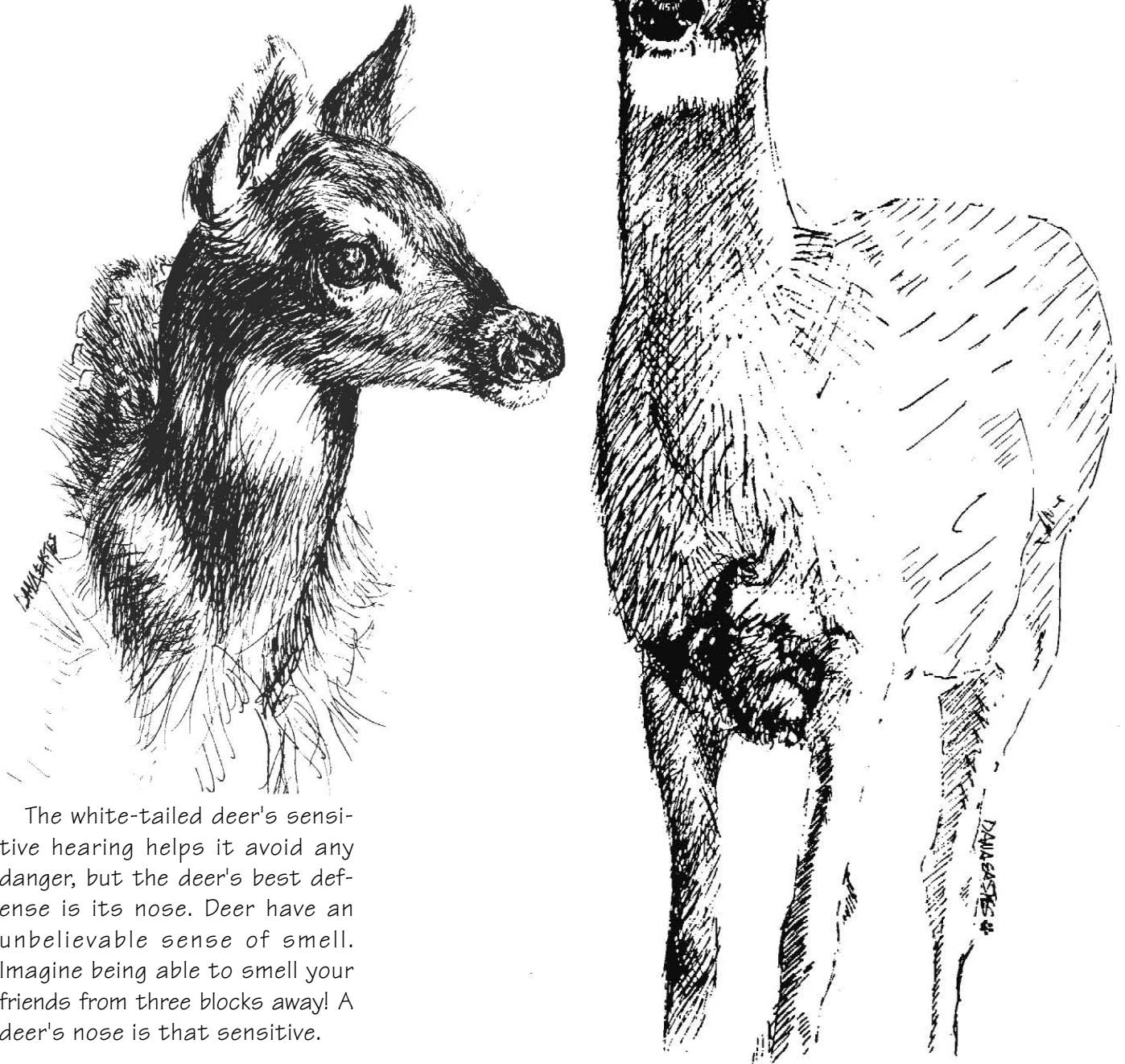
brown on the outside, but when the deer is alarmed, the tail is raised high in the air. The underside of the tail is white as snow and is kind of like a flag that warns other deer that danger is near.

A male deer is called a buck. Bucks have bony growths on their heads called antlers. Even though the antlers are hard as bone, they fall off each February or March, and the bucks grow them all over again every year. As a buck gets older, the antlers get larger.



White-tailed deer hoof print

A female deer is called a doe. Does don't have antlers. Sometime in May or June, young deer, called fawns, are born. Most of the time does have twin fawns, but it's not unusual for a doe to have triplets! After a fawn is born, the doe will leave it hidden while she feeds. The fawn will lie without moving to avoid any danger. If you ever find a fawn that looks alone, leave it there; the mother is nearby.



The white-tailed deer's sensitive hearing helps it avoid any danger, but the deer's best defense is its nose. Deer have an unbelievable sense of smell. Imagine being able to smell your friends from three blocks away! A deer's nose is that sensitive.

by Dana Eastes

WAPITI

You may have heard of this majestic four-legged creature. Most people call them elk, but another common name is "wapiti," a Shawnee Indian work meaning "pale rump." The word "elk" is actually an English word meaning "moose." If you ever visit the Maxwell game preserve or Cimarron National Grasslands and your Dad says, "Look kids, Elk!" You can say, "Yes dad, Wapiti!"

At any rate, a chance to see one of these animals in the Kansas wild will make your heart skip a beat. Here are some facts about wapiti that you can impress friends and family with.

Wapiti are thought to have lived in North America for 120,000 years. A land bridge nearly 1,000 miles wide allowed animals to migrate east from Asia to North America. These first animals formed four distinct groups that covered almost all of North America. Man showed up a few thousand years later. There is evi-

dence in Alaska that Paleo Indians were some of the first wapiti hunters. Remains found there are thought to be at least 11,000 years old. The Archaic Indians followed from 8,000 to 3,500 years ago; they hunted elk more

in sub-species are determined by antler formations, body size and coat color. Merrimen elk ranged far into Mexico and up into Texas and the southwest. Eastern elk ranged in the eastern U.S. and Canada. Both species were hit hard

by advancing civilizations and are considered extinct today. The four sub-species that remain today are Tule elk of the San Joaquin and Sacramento Valleys of California; Manitoban elk, once found throughout the Great Plains (including Kansas) and now found only in Manitoba and Saskatchewan; Roosevelt elk, plentiful throughout the Pacific Coast Range from California to Vancouver Island, B.C. (also called Olympic elk); and Rocky Mountain elk,

ranging from central Arizona north to British Columbia and Alberta and from central Washington east to South Dakota.

The Rocky Mountain elk are the



extensively using spears and atlatlas (a spear-throwing device).

By the time European man arrived, the wapiti had evolved into six sub-species. Differences

most plentiful, having the largest range. Although Manitoba or Great Plains elk were probably native in Kansas, the Rocky Mountain elk is the sub-species that have been transplanted back into the state.

Females, called cows, are somewhat darker with less contrast than bulls, or males. Both cows and bulls have straw-colored rumps and dark manes; and dark brown heads, sides, and under parts. Legs appear long and then compared to the heavy, thick body. After the molt, body color turns to the dark chestnut, but the rump remains yellow or straw-colored. Older bulls are lighter colored. Rocky Mountain elk can reach 5 feet at the shoulder and 7 ½ feet in length. Only bulls grow antlers. A mature bull can have five to seven points on each side. Antlers are shed in March or April. Elk are primarily grazing animals, making the Kansas prairie and woodland edges prime habitat for the wapiti to thrive. Elk chew their "cud" like cows and can consume 12 to 18 pounds of grass a day.

Kansas Wapiti still numbered in the thousands in the mid-1800s. Unregulated hunting, grazing and agriculture interests forced the elk herds to extinction in Kansas by 1900. The last elk were probably seen in southwestern Kansas. Today, there are a few captive herds at Cimaron National Grasslands in Morton County and Ft. Riley military reservation near Manhattan. Kansas now holds a limited hunting season on these two areas. Depending on the health of the herd, a limited number of game tags are drawn by lottery.

In autumn, a bugling elk signals the beginning of the rut or breeding season. Bugling begins on a low-pitch and swoops up high to clear bugle-like notes. This bugling is usually followed by a series of low grunts. Cows are attracted to the bull with the best bugling and aggressive displays. The neck and shoulders of bulls swell during the rut. Usually, the largest and strongest bulls dominate, maintaining the health of the herd. Dominant bulls gather from five to 15 cows and defend them against bachelor bulls. There are lots of threats and sparring, but actual fighting is rare. The gestation period is 247 to 270 days, the birthing in late May and early June. A newborn elk weighs from 23 to 45 pounds.

Elk were always a secondary meat source to most Indian tribes. Elk were harder to hunt than buffalo, deer, and fish, which were staples of Indian diet. There were various methods of hunting elk by the different tribes. The Plains Indians used dogs to chase the elk. According to some sources, most Indians preferred the bow to gun even when guns were available.

Indians used all of the elk. Antlers were used for decoration, tools and weapons but were never prized as "trophies" as they are today.

Today, people wanting to make big bucks legally and illegally have put the entire wild elk species at somewhat of a risk. Poaching and elk farms are two factors that threaten the purity and health of the North American elk herd. Poachers sell meat, antlers and body parts to willing buyers. There is a great demand for trophy antlers and especially velvet

antlers. Asian cultures use the antlers for teas, medicines, and as aphrodisiacs.

Build your own beast

Make a papier-mâché elk head. Begin by gathering pictures. Outdoor magazines are a great source for pictures of elk: Using the pictures as references, construct your papier-mâché head. Start by forming the head shape with wads of paper and masking tape. Complete the head with papier-mâché (paste and strips of newspaper). Next, search the woods for two fallen branches that resemble elk antlers. Shave the bark from your branches and shape and sand the points to the likeness of real antlers. Cut holes in the head above and between the ears and fit the antlers. (Make sure your branches or antlers don't outweigh your head.) Secure the antlers with glue, if needed. Finally paint with tempera paint and shellac entire head and antlers with acrylic medium or diluted glue.

Objective: Students will further their knowledge of the size, shape and color of wapiti through this hands-on project. It is also an opportunity to get outdoors and discover nature.

Materials: Pictures of elk, newspaper, vinyl wallpaper paste, tempera paint, branches, Elmer's glue, masking tape, sand paper, exacto knives.

For teachers: Another variation on this project. Give a short lesson on the American Indian and elk. Have students make papier-mâché elk masks similar to Indian ceremonial masks.

by Dana Eastes

Bob the shy cat



QUIET BOB

You'll never hear him coming. He appears out of nowhere. That's what most people who spend a lot of time in the outdoors will tell you. Bobcats have terrific senses of sight and hearing. Because of these extra special senses, they are seldom seen, even where they are common residents. They range across Kansas but more are found in the wooded eastern parts of the state.

THE BOBCAT BOOGIE OR BOBCAT'S BOUNCE BUT THEY DON'T FALL DOWN.

Bobcats sometimes bounce or pounce when hunting small rodents, always landing on their feet because, of course, they're cats. They are very curious and investigate almost everything when traveling their range, which

is usually a five square mile area. They walk, trot or take leaps from seven to ten feet at a time. They are also good climbers and take to trees for rest, observation or escape from pursuing dogs.

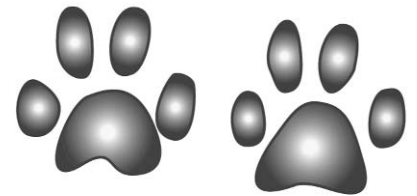
The bobcat is the only native member of the family Felidae still found in Kansas.

The bobcat walks on its toes. There are five toes on each front foot. The first is high and does not touch the ground.

COLOR: The upper parts of the body and sides are yellowish to reddish brown streaked and spotted with black. Older bobcats lose their spots.



Lynx Rufus



Right Front Foot

Right Hind Foot

GOODNIGHT BOB

Bobcats are mostly nocturnal, meaning they are most active at night.

The bobcat breeds from January to July, but the peak breeding months are February to May. Females may breed twice a year. Litters are born after 63 days, and range from two to seven (usually three) kittens.

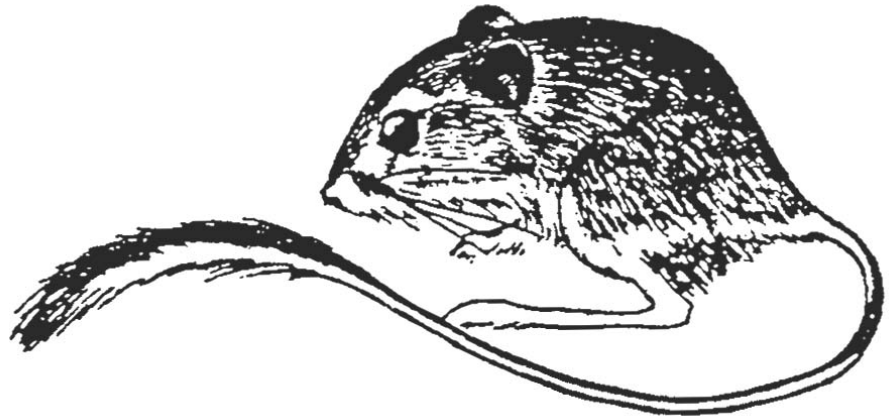
YOU BET YOUR BOBCAT

Even though you may not be lucky enough to see a bobcat in the wild, they are thriving in Kansas. They eat mostly rabbits, rodents, and birds. The abundance of these food sources, the bobcat's small size, and its secretive habits are probably why it is the only feline native thriving in Kansas. The presence of the bobcat in Kansas truly adds the "wild" to the Kansas landscape.

Amazing Kansas Mammals

Kansas has 82 species of mammals in eight different orders including:

- 15 species of bat
- 9 species of squirrel
- 3 species of deer
- 5 species of rabbit and hare
- 1 species of jumping mouse



Kangaroo Rat -

This amazing rodent needs very little drinkable water - a plus when living in a desert-like habitat. In fact, kangaroo rats in captivity have lived their entire lives without drinkable water!! The only water the Ord's kangaroo rat in Kansas receives is from dew. It can manufacture its own water, in most cases from dry food.

Armadillo -

This prehistoric-looking mammal takes the cake on multiple births. The armadillo gives birth to one or two sets of identical quadruplets every time she gives birth. Every time!!

Pronghorn Antelope -

The fastest land mammal over long distances is the pronghorn antelope. It has a top speed of 55 M.P.H. but can go 28-31 M.P.H. for about 14 minutes!! A well-developed set of lungs and a heart twice the size of comparable animals allows the pronghorn to accomplish this feat.

Prairie Voles -

They mature 30 days after birth and may have a litter of 4-9 young soon after. One female may

have a litter as often as 3-4 times a year!!

Elk -

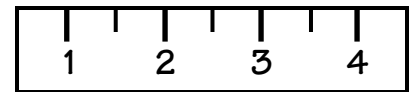
These mammals have the longest antlers of all mammals. They can reach 5.8 feet in length!! That is taller than most of you!! And they grow new antlers every year after the old ones fall off.

Opossum -

This animal has the most teeth of any North American mammal - wow!! Count 'em, 50 teeth to chomp, grind, and chew.

Activity — How Do I Compare

Have students research a mammal and compare its characteristics to theirs. Have them prepare graphs and other reports to present to the class or in written form. Actually perform the activity, i.e. jumping ability - use tape marks to show how far a student jumps in comparison to a mountain lion. Some of the items you may want to compare include: height, food consumption, speed (m.p.h.) - short distance and long distance, weight, life span, jumping (broad or high), heart rate, breathing rate, how many toes, teeth, etc.



Mountain lions can jump 18 feet high and broad jump 30 feet.

A shrew's heart beats 600 times a minute at rest and about 800 times when active.

Blue whales can weigh more than 150 tons and reach lengths of 100 feet.

by Mark Shoup

Prince of CLOWNS



Anyone who has ever been lucky enough to see a river otter — in the wild, in a zoo, or even on television shows like “Nature” — has been charmed by them. They’re playful nature and endearing looks capture our hearts as few wild creatures can.

But did you know that we have otters in Kansas? Actually, river otters are native to Kansas, but by the turn of the century they had been eliminated from the state because of habitat destruction and unregulated trapping. But they are coming back and, contrary to popular belief, are not endangered.

In 1983 and 1984, the Department of Wildlife and Parks released 19 river

otters in Crawford, Jackson, Jefferson, Linn, and Miami counties in eastern Kansas. The Kansas Trappers Association donated the money for this otter release. Also, from 1982 through 1992, the Missouri Department of Conservation released 845 river otters in their state.

Today, otters are showing up more frequently. Some are the offspring of those

19 that Kansas released, but biologists also believe that otters are migrating along streams from Missouri to Kansas. Within 10 years, they should be spotted occasionally anywhere in the eastern one-third of Kansas, especially during the mating season — mid-January to mid-March.

The river otter is built for life in the water. Its entire body is covered with a soft, oily underfur protected by



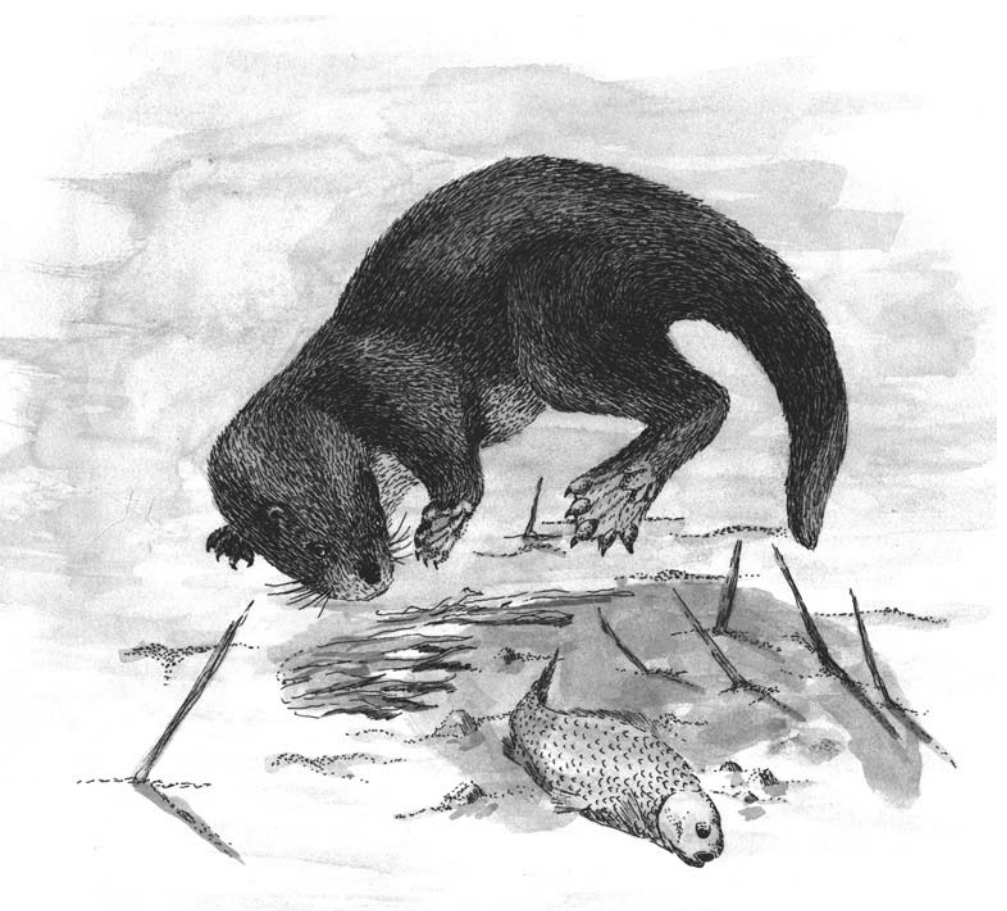
another layer of smooth guard hairs. Its toes are webbed, and it has valves in its ears and nostrils that keep water out. It's thick, heavily muscled tail doubles as the perfect rudder and propeller.

The otter's gestation period — the time between when the parents mate and the young are born — may be one reason their numbers have grown slowly. The otter's gestation period is 288 to 380 days, longer than a human's. Usually, they have two young in an abandoned burrow or a den of their own making near water. The female must teach the young to hunt and swim, but the male helps with this care as the little ones grow.

About 60 percent of the otter's diet is fish, but they will also eat rodents, insects, crayfish, and about anything else they can catch.

In the wild, an otter may live six or seven years.

If you're looking for otters, the best times are early in the morning and late in the day along the banks of ponds, lakes, streams, marshes, and drainage ditches. A good telltale otter sign is



their footprints, which, unlike most other mammals, will show five toes instead of four.

Of course, play is the one otter habit that makes people love them more than anything else. In summer mud or winter snow, otters

create their own slippery slides on the banks of rivers. Family groups will often take turns on the slide, making a good running start on the bank and ending with a big splash. In the water, they will roll, dive, float lazily on their backs, and even body surf in rapid currents. Occasionally, they can be heard whistling back and forth to one another.

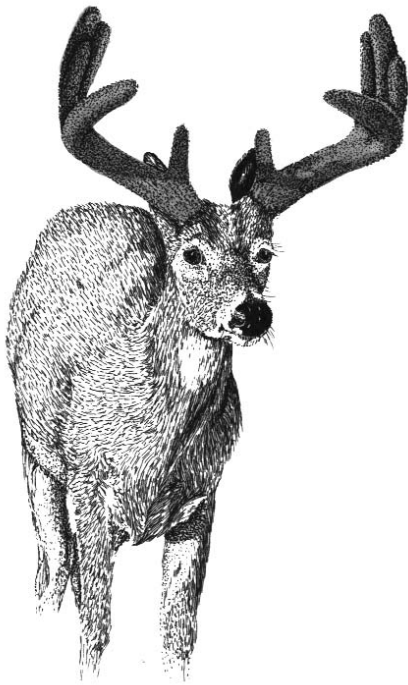
If you live in eastern Kansas and have seen an otter, count yourself lucky. It's one of nature's most lovable critters, the clown prince of the wild.



by Mark Shoup

BAFFLING BONES

Unlike animals with horns - such as bison, sheep, and pronghorns — deer have antlers. Horns are made of keratin, the same stuff that makes hair and fingernails. Horns are retained throughout the life of the animal. Antlers, on the other hand, are pure bone. Amazingly, these bones grow,



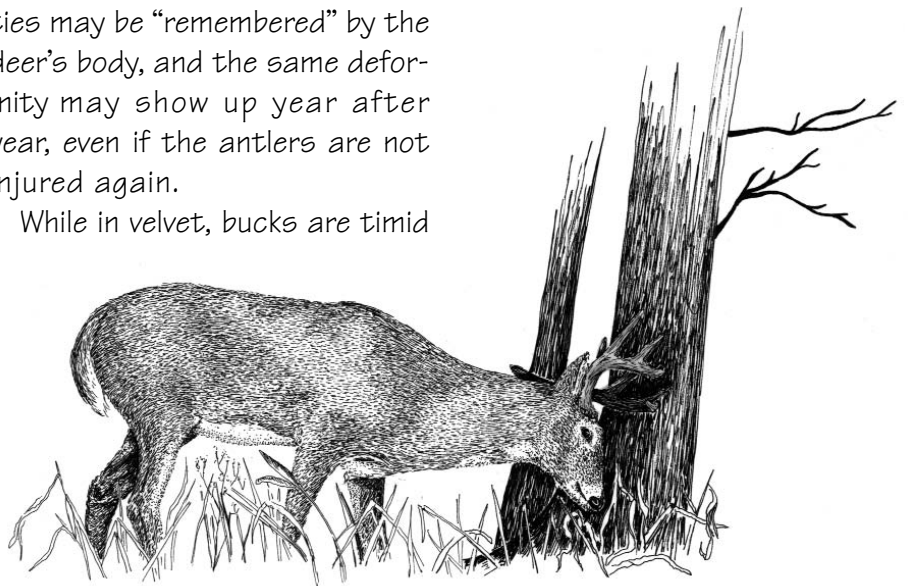
fall off, and grow again every year. They look the same each year, except that they grow bigger until the animal gets old. No bone on earth grows so rapidly.

It all starts with pedicels, bumps on the top of the male deer's head. The pedicel is living

bone tissue that will connect the antler to the skull. Sometime in early May, antlers begin to press up from the pedicels. Scientists think this new antler growth is triggered by longer days.

The new antlers are covered with a soft mass of blood vessels and nerve endings called the "velvet." The rapidly growing antlers receive blood through the velvet, and through the core of the antler as it grows. During summer, while the velvet is intact, the antlers are very delicate. They bruise or bleed easily if injured. Sometimes, injuries to antlers in velvet will cause a deformity in the fully developed antler. Strangely, such deformities may be "remembered" by the deer's body, and the same deformity may show up year after year, even if the antlers are not injured again.

While in velvet, bucks are timid



and careful to avoid conflict. If they can't avoid a scuffle, they will use their front feet rather than their antlers, much like a doe does.

As the days shorten in late summer, the velvet dies and the antlers harden. The velvet will bleed slightly as it peels away. During this time, bucks get much more aggressive. As they ready themselves for fall combat, they rub their antlers on tree trunks to strengthen their neck muscles. As the rut -- or breeding

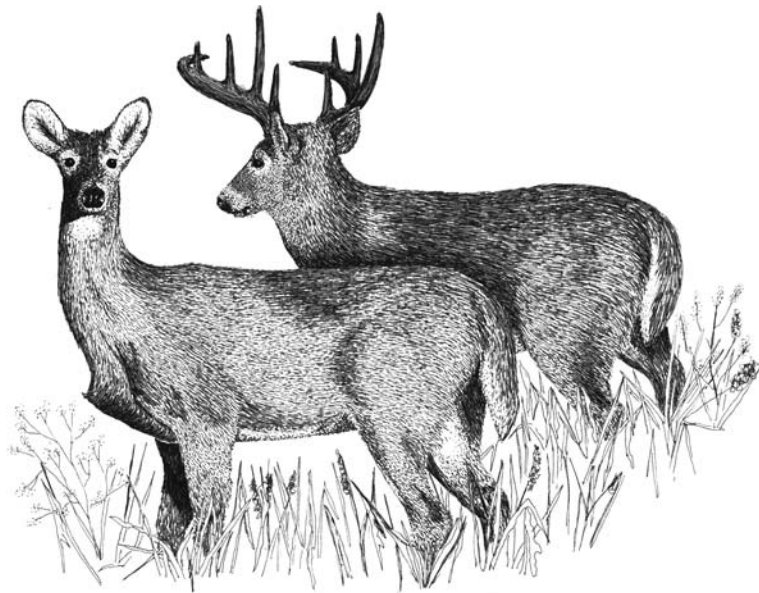
season -- approaches, the buck deer's neck muscles swell. Now they are ready to compete for breeding does.

The most aggressive bucks — usually but not always the ones with the biggest antlers — breed most often. Dominating other bucks, then, would seem to be the reason deer have antlers. But there are other possible reasons. One suggestion is that does are the ones that make the breeding decisions, and they may be attracted to bucks with larger antlers. Another suggestion is that bucks actually use antlers to avoid fights. It is known that once two deer fight and one establishes dominance, the two will seldom if ever fight again. During each breeding season, bucks will recognize and avoid those sets of antlers that have beaten them in the past.

Contrary to popular belief, deer seldom use their antlers to defend themselves against predators. The best defense seems to be their powerful legs and sharp hooves.

In Kansas, the rut peaks in November and is, for the most part, over by mid- or late December. From January to late March, pedicels lose their grip on these amazing bones, and the antlers fall off. For a short time, bloody dents remain on the deer's head, but this soon heals. Within a month or two, new antlers begin to grow.

Late winter and early spring are great times to hunt for fallen antlers, called "shed" or

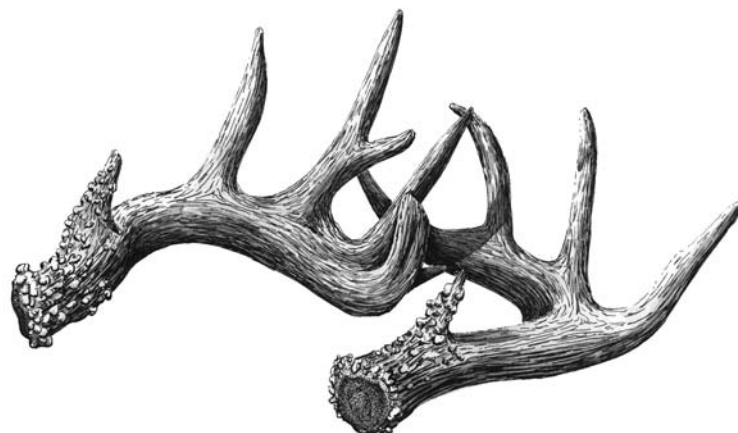


"drop" antlers. But don't wait too long to look. The reason we don't see deer antlers everywhere is that, like everything else in nature, they are not wasted. These magic bones are rich in calcium, and squirrels, rabbits, mice, rats, and other animals devour them quickly. It is not uncommon to find a shed antler that has been gnawed by some small critter.

Look for shed antlers in shelterbelts or woodlands wherever deer trails can be found. When driving through the country, make note of places where you have

seen deer. Look in the places. If you know a landowner, ask where to look for sheds. If you think you know a good spot but don't know the landowner, be sure to get permission before looking.

Finding an antler lying in the woods is one of Nature's rare gifts. It's a magical moment when you look past a tree trunk and see an ivory point sticking up through fallen leaves. Imagine, where has it been? Where is the deer that dropped it? What does the deer look like now? How much bigger will the antlers be next year?



Prairie Pups

by Mark Shoup

Most people who have spent time in the western half of Kansas have been lucky enough to see the little rodent we call the prairie dog. Although there aren't a lot of prairie dogs left in Kansas, many native pastures in the west still provide homes for this social animal.

The first signs of a prairie dog colony (called a town) are the tell-tale mounds of bare dirt in short grass. If you stop and watch quietly, the little animals, which are about the size of a squirrel, will soon appear from their burrows and scurry from one mound to the next. They'll stop and nibble grass, sit on their back legs and search for enemies, or bark a warning as a hawk flies over.

If this happens, they will scamper into their burrows or bark together on top of the mound. When the danger has passed, they emerge from the burrows and give a "jump-yip" call to sound the all clear.

In Kansas, the black-tailed prairie dog is the only species found. Its scientific name, *Cynomys ludovicianus*, is Latin for "dog mouse." It grows to about 16 inches and may weigh 2-3 pounds.

Black-tailed prairie dogs love the company of other prairie dogs. They greet each other with "kisses" — actually touching each other's mouthparts in order to smell glands that identify one individual from another. Young do this frequently. Dogs are also fond of grooming one



another. This is not to say that prairie dogs can't get ornery. They will bare teeth and fight ferociously when an intruding prairie dog comes into the wrong territory.

The prairie dog's main diet is grass. It is estimated that 250 dogs can eat as much as a 1,000-pound cow. It will also eat insects, especially grasshoppers.

A prairie dog town is an underground wonder. The burrow opening is about 6 inches wide and leads to a tunnel that goes from 3 to 16 feet deep before branching

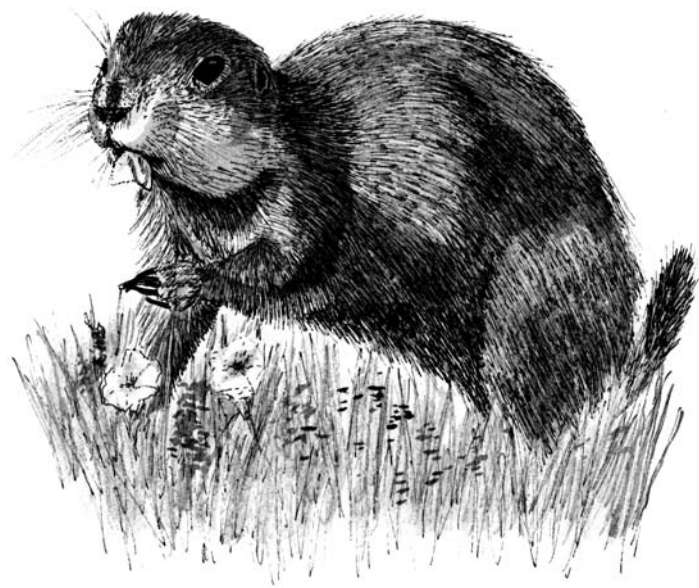


out. A guardroom is located off this tunnel a few feet down. From here, wary prairie dogs can listen for danger before going out. Many loops and branches are dug off the main tunnel, as well, including 10-inch bedroom chambers and toilet rooms. Each burrow also has an exit mound in addition to the entrance.

Other animals, including burrowing owls, snakes, rabbits, and insects use old prairie dog holes as homes.

Many creatures eat prairie dogs. Hawks, badgers, and coyotes all prey on them and can usually be found near a town. Bobcats and foxes prey on them, too. Rattlesnakes and bull snakes will take the young. The prairie dog's worst predator, however, is the black-footed ferret. Or at least it used to be. This small weasel is now gone from Kansas and can only be found in Wyoming, so the remaining dogs in Kansas just contend with more commonplace predators.

Although prairie dogs are not rare, they are not nearly as common as they once were. In 1903, prairie dog towns covered about 2 1/2 million acres in Kansas. Today, only about 50,000-75,000 acres of prairie dog towns remain. Most of this is on private land, but dogs can be viewed on public land, as well. The Cimarron National Grasslands, in Morton County, has prairie dog towns, and



Quivira National Wildlife Refuge, west of Hutchinson, has a thriving native population.

A prairie dog town is being re-established at Kanopolis State Park. This town only has about 12 dogs, but the nearby wildlife area has a good town. And of course, there's Prairie Dog State Park. This park is on Sebelius Reservoir in Norton County. It boasts a prairie dog town

of 500-1,000 animals. State parks might be the best bet to watch dogs close up because they become somewhat used to people.

Prairie dogs are as much a part of Kansas's natural history as the buffalo. Next time you visit a place where dogs are found, take time to sit and watch quietly. Imagine the town stretching as far as the eye can see.



by Mark Shoup

WHAT'S UP, DOC?



Everybody loves a rabbit, especially that wascally one that frustrated Elmer Fudd and slam-dunked with Michael Jordan. But did you know that Bugs Bunny isn't really a rabbit? He's a hare.

Note the long ears, the big front teeth, and the large back legs. (Okay, Bugs doesn't have any front legs, but you know what I mean.) A rabbit's ears are much shorter, the front teeth not so big, and the back legs, while also well-suited for hopping, not nearly as big as the hare's.

A hare is bigger, too. The most common Kansas hare, known as a black-tailed jackrabbit (*Lepus californicus melanotis*) weighs from 3 to 6 pounds, while the cottontail rabbit weighs 2 to 3 pounds.

So besides those things, what's the difference between a rabbit and a hare? Which would win a race? Would the cottontail win while the over-confident jack took a nap during the race? Would the jackrabbit win by a hare?

Actually, the jackrabbit would leave the cottontail in the dust. While the cottontail can run as fast as 18 miles per hour, the jack smokes the track at up to 35

miles per hour. Add to this its ability to zig-zag at nearly full speed, and you have a critter well adapted to the open plains of western Kansas, where most are found. Its sharp eyesight, large ears, and speed help the jack avoid predators on the high plains.

The black-tailed jackrabbit is the only common hare in Kansas. Like all hares, young jackrabbits are covered with fur, and their eyes are wide open at birth. Jackrabbit young are born in a bowl-shaped depression in the earth, called a "form," lined with fur from the

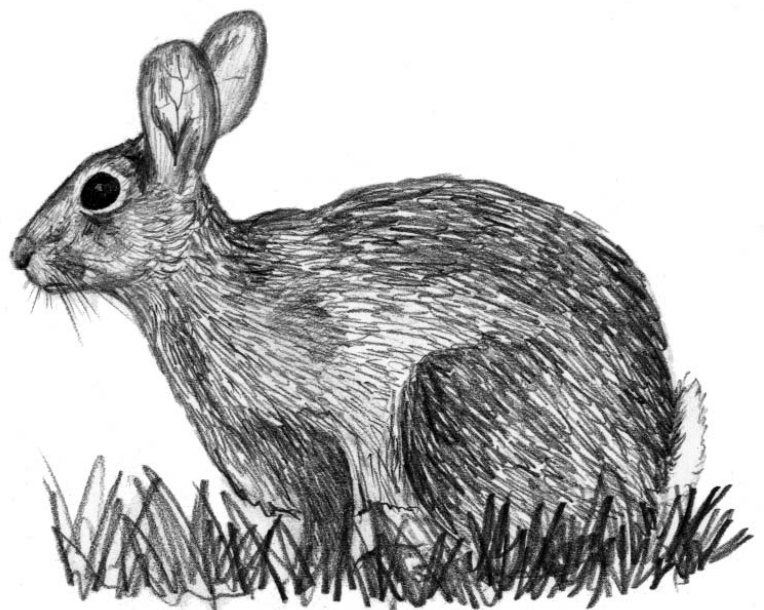
mother's chest. Jackrabbits can produce four litters of eight "kits" each year. To avoid attracting predators, the mother leaves the kits in the form during the day and comes back several times to feed them at night.

Young jackrabbits can leave the nest after they are only one month old.

The jackrabbit's long ears aren't just for better hearing. On hot days, these ears help reduce the hare's body heat.

Although they are larger than cottontails, jackrabbits have hind tracks that may appear smaller because they run on the toes of the hind feet. The long heels do not leave marks when the animal is running. Jackrabbits would rather hop than walk. They hop 5 to 10 feet at a time. When running full tilt, a jack can hop 20 feet or more in a single bound.

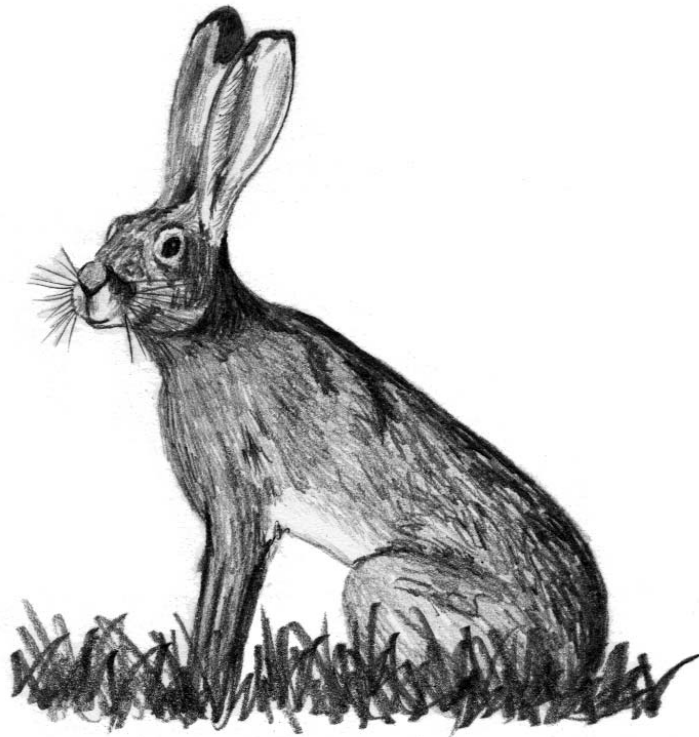
When they bolt across the



prairie at that amazing 30 to 35 miles per hour, jacks occasionally jump into the air to get a look around and flash the white underside of the tail if being chased by a predator. Jackrabbits will also thump the ground with their big hind feet to signal danger (kind of like another famous thumper).

The small-eared cousin of the jackrabbit, the cottontail (*Sylvilagus floridanus*) can be found anywhere in Kansas. However, this cute little fellow -- which looks more like Peter Cottontail than Bugs Bunny -- prefers wooded areas to the plains and pastures occupied by the jackrabbit. And much like Joel Chandler Harris' Brer Rabbit in the Uncle Remus tales, the cottontail loves the safety of a briar patch.

In fact, any old weedy field or junkpile can attract cottontails. This is why they are often seen in towns, usually in early morning or late evening.



Both jackrabbit and cottontail eat grasses and leafy vegetation in the summer and woody or dried vegetation in winter. Cottontails also enjoy a meal of fallen fruit, berries, and (like Peter Cottontail) garden vegetables.

Also like the jackrabbit, the cottontail has sharp hearing and a keen sense of smell. Its eyes are set well back on the sides of its head, providing a wide field of vision. Cottontails are quick, though not as fast as the jackrabbit. And they will swim if they have to. (I once saw one swim the Arkansas River to avoid a dog.)

The cottontail nest is much like a jackrabbit's but is usually located within the cover of brushpiles or thickets. The average litter is five young, and an average of four litters are born per year, from March through September. Unlike jackrabbit young, cottontail kits are born blind and naked. However, they are fully furred and on their own within 16 days!

Both cottontails and jackrabbits are major food sources for predators such as hawks, owls, foxes, coyotes, and bobcats. Primarily because of predation, wild rabbits seldom live more than one year. Young usually comprise about 80 percent of the population, but the production of large and numerous litters keep their populations, especially those of the cottontail, strong and healthy.

Three rabbit species that are rare in Kansas are the desert cottontail, the white-tailed jackrabbit, and the swamp rabbit. No joke, Kansas has a swamp rabbit. The swamp rabbit lurks about the marshy areas of far southeastern Kansas. It looks very much like the cottontail except that it is bigger, weighing from 3 to 5 pounds.

Whether it's cartoons, folk tales, or real-life natural history, everyone loves a hare-raising story about one of these charming creatures. Everyone, that is, except Farmer Brown.



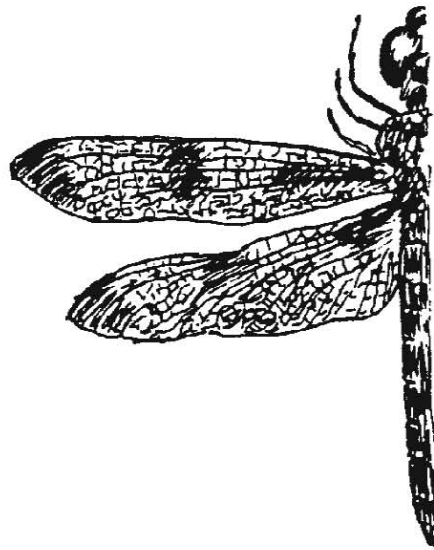
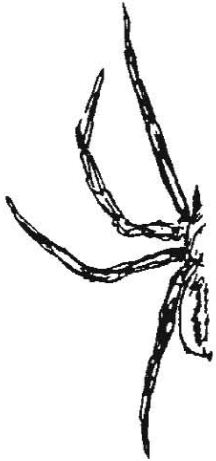
CHAPTER TWELVE

TAXONOMY

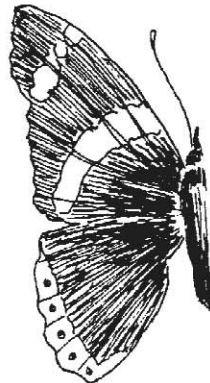
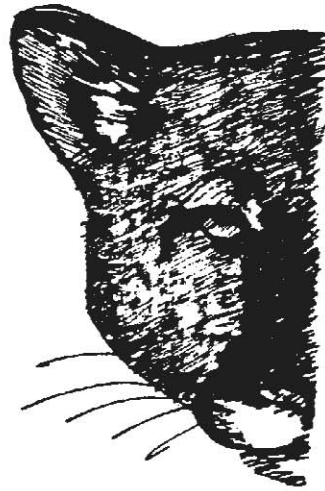
TWO HALVES MAKE A WHOLE

by Joyce Harmon

Symmetry is a characteristic of some living and nonliving things where half of the body is a mirror image of the other half. A line of symmetry cuts something exactly in half. Look at the half drawings of animals below and complete the drawings as carefully as possible.



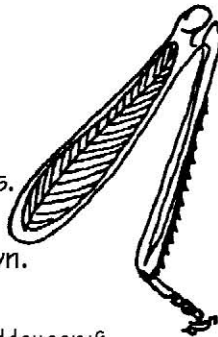
$$\frac{1}{2} + \frac{1}{2} = 1$$



ANIMAL RIDDLES

Can you guess which animal these riddles are talking about?
(There may be more than one correct answer.)

I eat plants.
I can jump high.
I live in grassy fields.
I have 6 legs.
I am green and brown.
I am an insect.



grasshopper

I eat insects, crayfish, and fish.
I live in the water.
I have barbels that look like whiskers.
I am brown and have fins.
I find my food by smelling and tasting.
I am a fish.



catfish

I eat insects.
I can fly.
My tail looks like something
you use to cut paper.
I have 2 legs.
I am white and black.
I am a bird.



scissor-tail flycatcher

I eat worms, insects, and berries.
I move slowly over the land.
I carry my home with me.
I am brown, yellow, and black.
I have 4 legs.
I am a reptile.



box turtle

I eat grasshoppers, scorpions, and lizards.
I live in the prairie.
I have 2 legs.
I am brown and gold.
I live in holes in the ground.
I am a bird.



burrowing owl

I eat plants like sagebrush and grass.
I live in the prairie.
I have horns.
I am brown and white.
I have 4 legs.
I am a mammal.



antelope

I eat ants and beetle larvae.
I live near trees.
I can fly.
I am red, black, and white.
I have a long, sharp bill.
I am a bird.



woodpecker

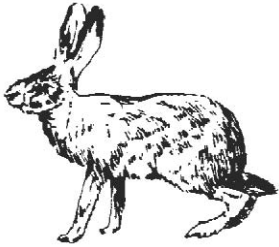
I eat rabbits, mice, and watermelons.
I can live all over Kansas.
I have 4 legs.
I am brown.
I am related to the dog.
I am a mammal.



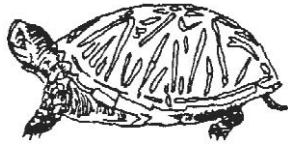
coyote

MIX 'N' MATCH

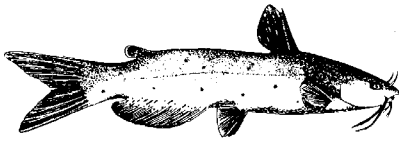
Match the animal with the sentence that describes it. Print the animal's name in the blank below its picture. One has been done for you.



1. _____



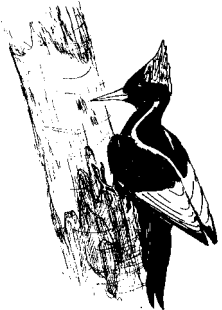
2. _____



3. _____



4. _____



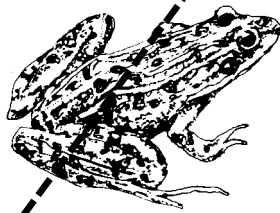
5. _____



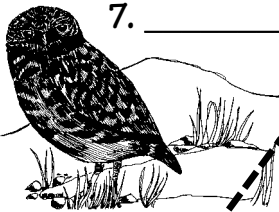
6. _____



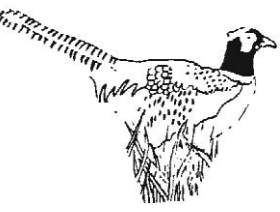
7. _____



8. _____



9. burrowing owl



10. _____

A. It uses its beak and tongue to get its food.

B. A plant-eating insect.

C. An amphibian that eats insects, worms, and snails.

D. A mammal that eats rabbits, mice, and watermelon.

E. This bird eats grain, caterpillars, ants, crickets, and weed seeds.

F. Hunts for meals of scorpions, lizards, and snakes.

G. A plant-eater that browses on sagebrush, grasses, and other prairie plants.

H. A small plant-eater that likes clover and grass.

I. A reptile that eats worms, snails, insects, and berries.

J. It feeds on insects and fish by using its sense of smell and taste.

KEY: 1. jack rabbit (H) 2. ornate box turtle (I) 3. channel catfish (J) 4. pronghorn antelope (G) 5. pileated woodpecker (A) 6. grasshopper (B) 7. coyote (D) 8. plains leopard frog (C) 9. burrowing owl (F) 10. pheasant (E)

by Joyce Harmon

A HORSE IS A HORSE* *(Of course, of course)

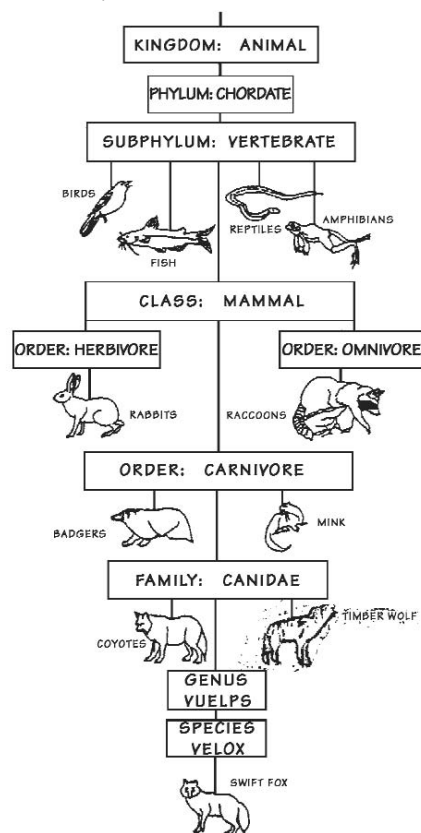
ANIMALS: There are all kinds of them. There are meat eaters and plant eaters, furbearers and feather wearers, tall ones and small ones. Some are noisy; some are quiet, some like daylight, and others night. Many run and many fly and some with scales just slither by. There are horses, mosquitoes, frogs, coyotes, hawks, bluegills and lizards. The list is endless. How does anyone begin to organize all these critters? Through TAXONOMY.

TAXONOMY is a system of classification that groups ani-

mals according to their similarities. For instance, all animals that have backbones are grouped as VERTEBRATES. Vertebrates with feathers are grouped as birds while those with hair or fur are recognized as mammals. These broad groups are further separated. Mammals that grow antlers are deer; those that gnaw with large, curved incisors (like beavers and mice) are rodents. The more physical characteristics animals have in common, the more closely they are related.

The standard ranking system classifies creatures from broad similarities to specific similarities in these categories: Kingdom, phylum, class, order, family, genus, and species. Here is what the classification of a horse looks like:

KINGDOM: Animal
 PHYLUM: Chordate
 SUBPHYLUM: Vertebrate
 CLASS: Mammal
 ORDER: Perissodactyl
 FAMILY: Equidae
 GENUS: Equus
 SPECIES: Caballus



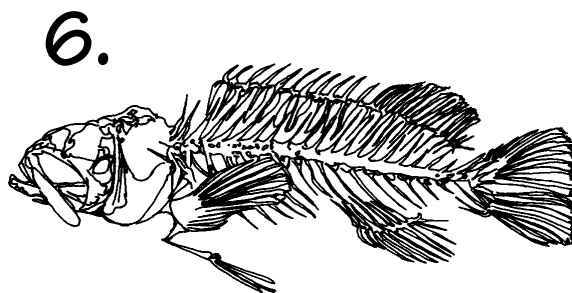
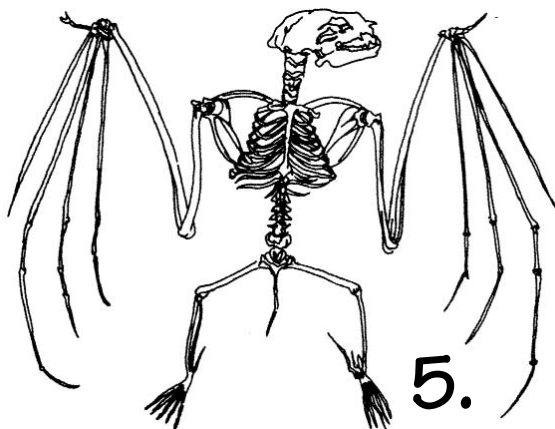
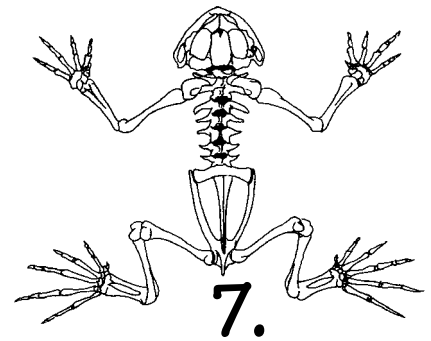
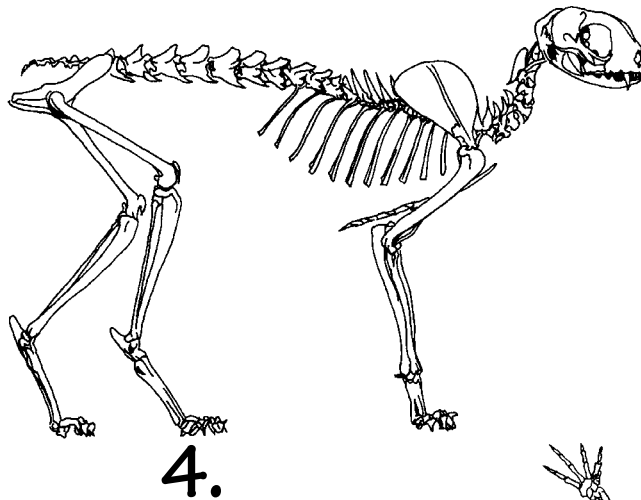
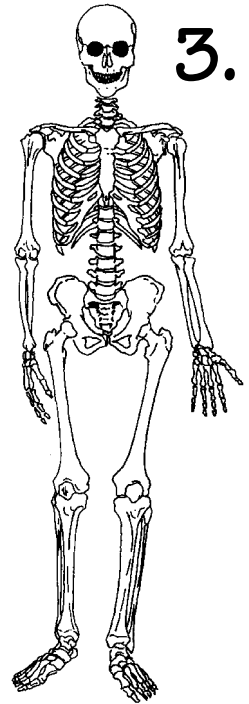
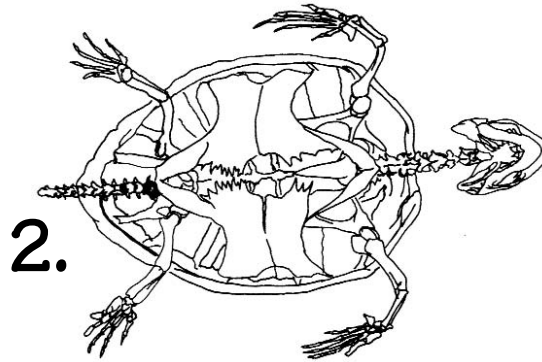
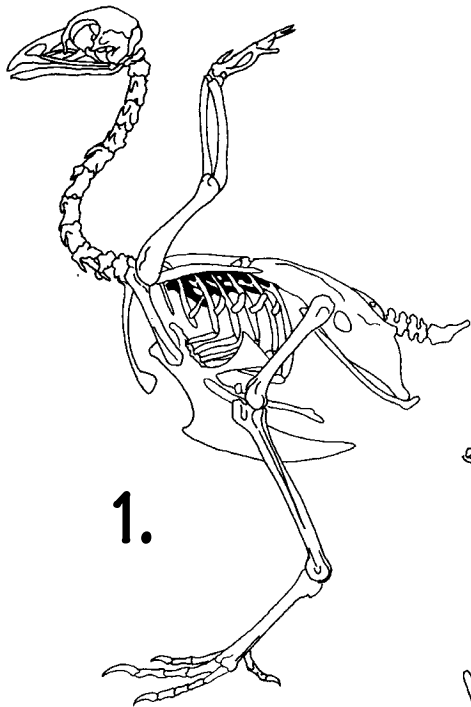
Illustrations by Alan Baccarella

As you can see, most of these taxonomic titles are Latin words. After a little study, you should be able to place living things in their proper Kingdom through Class, but because there are so many Orders through Species, you'll need to look them up in a text or identification book.

Try your hand at classifying an animal by building a mobile. Attach pictures and names to a cardboard backing and hang them beneath one another in the appropriate order. This mobile classifies *Vulpes velox*, the Swift Fox.

make no bones about it...

X-rays have been made of several vertebrates (animals with backbones). See if you can name the animal by looking its bones.



- 1. bird
- 2. turtle
- 3. human being
- 4. bobcat
- 5. bat
- 6. fish
- 7. frog

Illustrations by Alan Baccarella

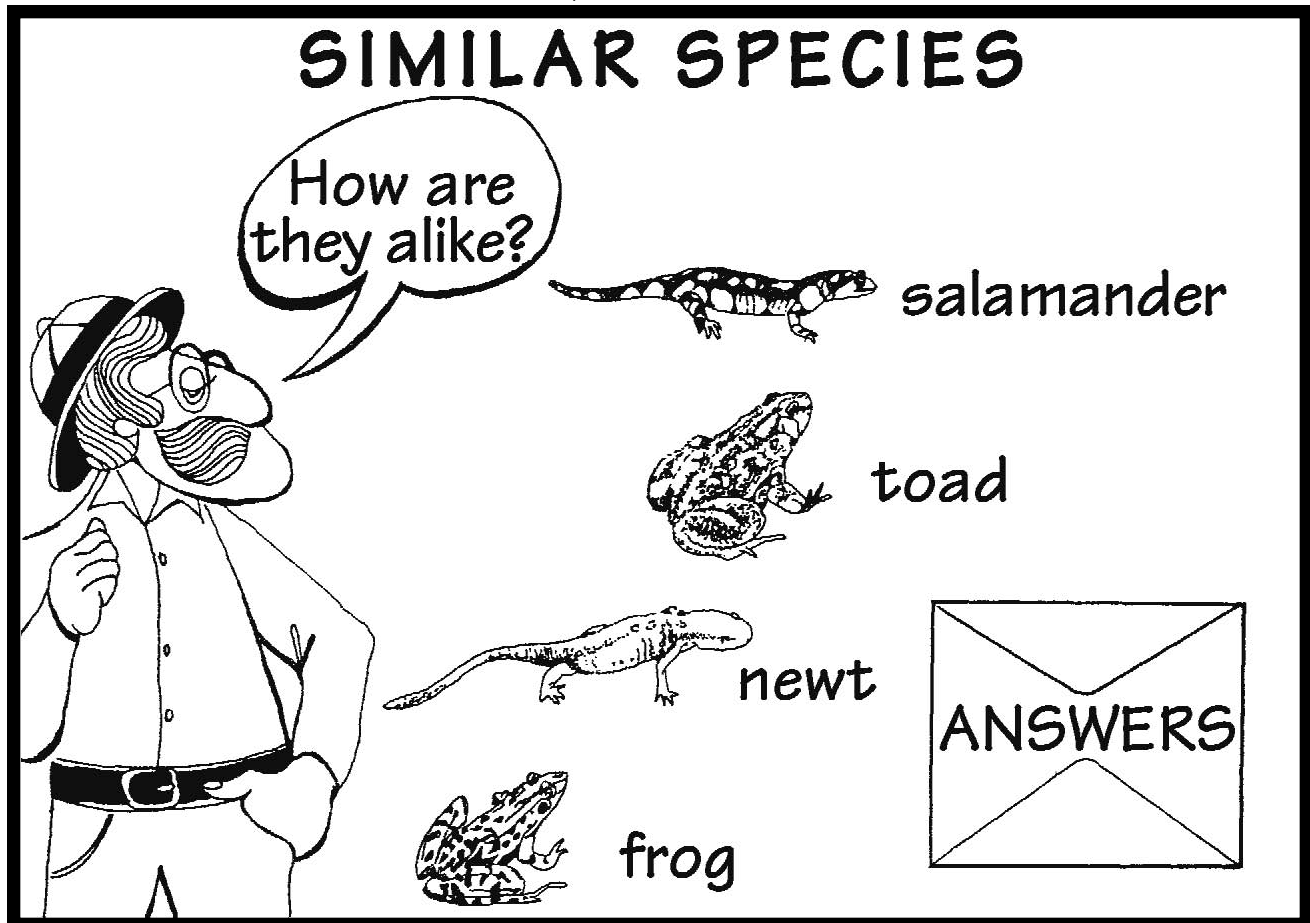
by Joyce Harmon

BULLETIN BOARD IDEAS

Empty bulletin board or wall space can be put to practical use with the following idea. Children review classification

skills by deciding how the following groups of animals are alike. Answers can be placed in an envelope and discussed at

the end of the week. Start over with a new group of animals the next week. Below are a few suggestions; add your own ideas.



channel catfish
bluegill
walleye
paddlefish
(FISH)

rattlesnake
turtle
alligator
chameleon
(REPTILES)

mouse
coyote
whale
antelope
(EACH END IN SILENT E)

Illustrations by Alan Baccarella

whale
otter
elk
bat
(MAMMALS)

brown recluse
owl
skunk
firefly
(NOCTURNAL)

passenger pigeon
Labrador duck
Stellar's sea cow
Audubon's bighorn
(EXTINCT)

deer
grasshopper
beaver
antelope
(HERBIVORES)

western kingbird
largemouth bass
plains leopard frog
red-sided garter snake
(VERTEBRATE)

bobcat
eagle
hawk
scavenger beetle
(CARNIVORES)

black-footed ferret
whooping crane
gray bat
peregrine falcon
(ENDANGERED SPECIES)

scissortail flycatcher
Mississippi kite
winter wren
osprey
(BIRDS)

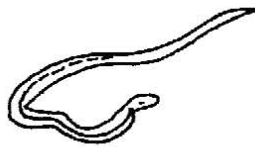
Taxonomic Terms

Taxonomy is the study of animal and plant classification. See, which questions you, can answer right away. Complete the remaining questions with further study.

1. Putting animals into groups to make study easier is called?
 - a. phylum.
 - b. cold-blooded.
 - c. classification.
 - d. herbivore.



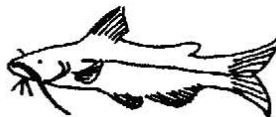
2. Animals with backbones are?
 - a. invertebrates.
 - b. vertebrates.
 - c. characteristics.
 - d. mammals.



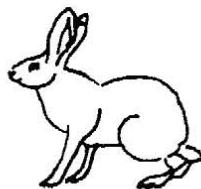
3. The five main groups of vertebrates are?
 - a. mammals, birds, reptiles, amphibians, and fishes.
 - b. mammals, insects, birds, amphibians, and fishes.
 - c. mollusks, mammals, reptiles, fishes, and insects.
 - d. reptiles, spiders, fishes, mammals, and birds.



4. Animals that maintain a constant body temperature are?
 - a. amphibians.
 - b. cold-blooded.
 - c. reptiles.
 - d. warm-blooded.



5. Herbivores are?
 - a. hungry.
 - b. plant-eaters.
 - c. meat-eaters.
 - d. eat both plants and meat.



6. Animals that change body temperature to match their surroundings are?
 - a. cold-blooded.
 - b. mammals.
 - c. vertebrates.
 - d. warm-blooded.

7. Reptiles breathe with?
 - a. air pockets.
 - b. gills.
 - c. lungs.
 - d. both gills and lungs.

8. Omnivores eat?
 - a. plants.
 - b. animals.
 - c. both plants and animals.
 - d. fish.

9. Animals that are active during the day are.
 - a. hibernators.
 - b. nocturnal.
 - c. tired.
 - d. diurnal.

10. Amphibians are covered with?
 - a. hair.
 - b. scales.
 - c. moist skin.
 - d. feathers.

BONUS:

Why are animals classified? _____

List at least three ways that animals are classified. _____

KEY: 1. c; 2. b; 3. a; 4. d; 5. b; 6. a; 7. c; 8. c; 9. d; 10. c.

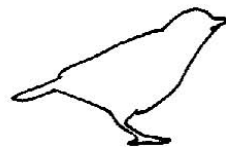
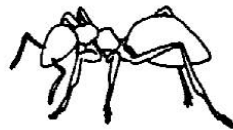
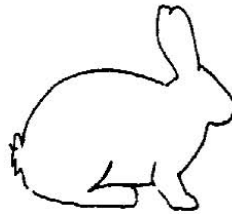
WHERE DO THEY BELONG?

by Joyce Harmon

TEST YOUR SKILLS:

Classify the following animals by class, **M** = mammals, **B** = birds, **R** = reptiles, **A** = amphibians **F** = fish, **I** = insects, and **O** = other.

1. ___ antelope
2. ___ silver fish
3. ___ cardinal
4. ___ monarch butterfly
5. ___ great-horned owl
6. ___ egret
7. ___ whitetail deer
8. ___ rattlesnake
9. ___ leopard frog
10. ___ eel
11. ___ bat
12. ___ turtle
13. ___ crocodile
14. ___ catfish
15. ___ osprey
16. ___ mallard
17. ___ trout
18. ___ great blue heron
19. ___ alligator
20. ___ hornet
21. ___ salamander
22. ___ toad



23. ___ turkey
24. ___ elk
25. ___ bluegill
26. ___ pheasant
27. ___ bass
28. ___ seal
29. ___ otter
30. ___ monkey
31. ___ anteater
32. ___ kangaroo
33. ___ armadillo
34. ___ mosquito
35. ___ cow
36. ___ dog
37. ___ pigeon
38. ___ ant
39. ___ whale
40. ___ frog
41. ___ seahorse
42. ___ shark
43. ___ starfish
44. ___ clam

KEY:
1.-M, 2.-I, 3.-B, 4.-I, 5.-B, 6.-B, 7.-M, 8.-R, 9.-A, 10.-F, 11.-M, 12.-R, 13.-R, 14.-F, 15.-B, 16.-B, 17.-F, 18.-B, 19.-R, 20.-I, 21.-A, 22.-A, 23.-B, 24.-M, 25.-F, 26.-B, 27.-F, 28.-M, 29.-M, 30.-M, 31.-M, 32.-M, 33.-M, 34.-I, 35.-M, 36.-M, 37.-B, 38.-I, 39.-M, 40.-A, 41.-F, 42.-F, 43.-O, 44.-O.

SOMEBODY DOESN'T FIT



Directions: In each of the groups below, one animal does not belong. Put a line through the animal that doesn't belong and replace it with an animal that does. Choose from the categories below to name the entire category. The first one has been done for you.

Categories

mammals
reptiles
birds

amphibians
insects
fish

herbivores
carnivores
water-dwelling mammals

have wings
extinct
endangered

prairie rattlesnake
red-eared turtle
alligator
chameleon
~~tiger salamander~~

crow
bat
woodpecker
coot
penguin

cow
cardinal
horse
bobcat
grasshopper

Five-lined skink

Reptiles

grasshopper
crane
flying squirrel
bat
butterfly

bat
whale
camel
bluegill
coyote

channel catfish
shark
white bass
trout
drum

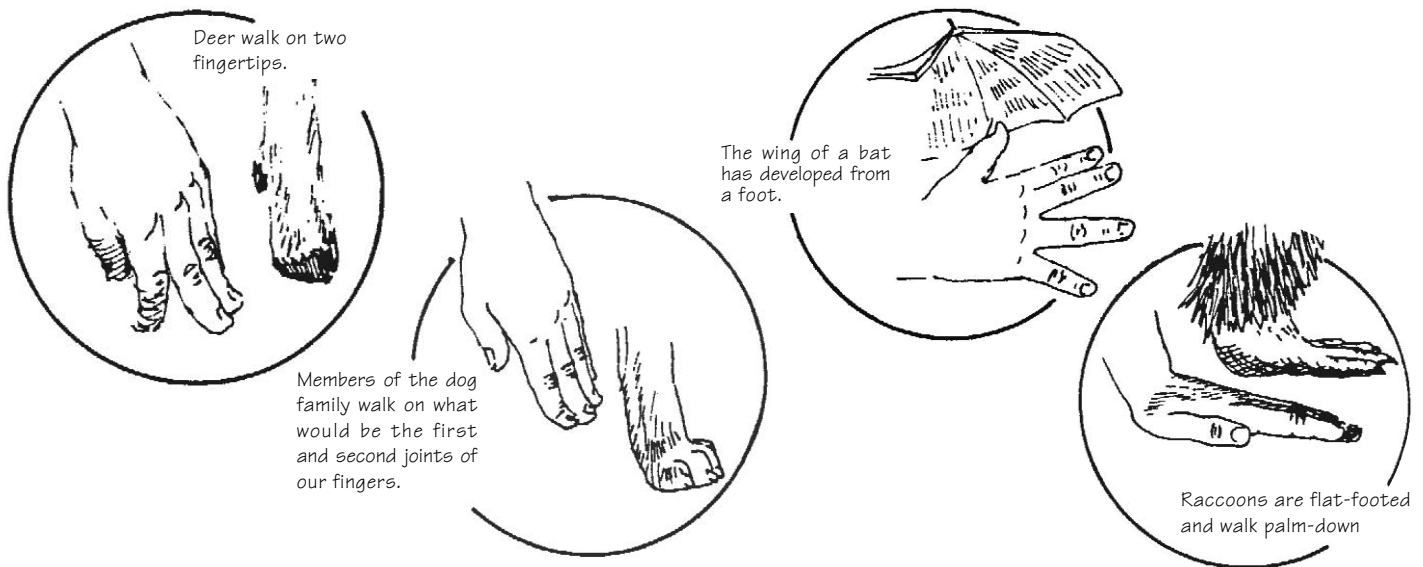
mosquito
passenger pigeon
sea mink
great auk
Carolina parakeet

whale
manatee
dolphin
elk
porpoise

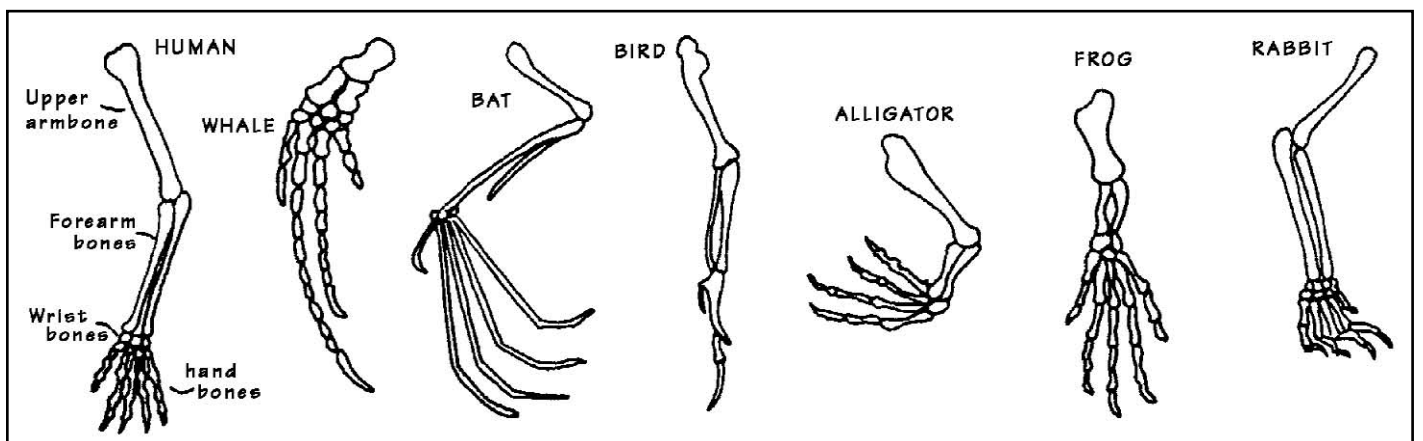
whooping crane
Arkansas darter
Topeka shiner
black-footed ferret
white-tailed deer

THE KNEE BONE'S CONNECTED TO THE...

By comparing human bones to those of other animals we can see how they are alike in structure and purpose. Examine the illustrations below.



Label the upper arm bone, forearm bones, wrist bones, and hand bones on each of the forelimb below.



by Joyce Harmon

E is for ecological expressions



Directions: Given the following words, complete the exercise below. You may use a separate sheet of paper for your answers.

estivate	exotic	emu	echidna	eel
eagle	entomology	ermine	eider	environment
egret	echolocation	ecology	extinct	experiment
eddy	earth	elk	eaglet	ecosystem
edentate	endangered	egg	estuary	eland
echinoderm	earth science	edge effect	extirpated	erosion

- Place the words in alphabetical order. Divide the words into syllables. Double check your work.
- Look up each word in your dictionary. Write the word, its pronunciation, part of speech, meaning(s), and the quick words found on the dictionary page. Use the word in a sentence. The first one has been done for you. (Note: Dictionaries will vary in pronunciation keys.)

estivate (es' tə vāt'), verb 1. to spend the summer, as at a specific place or in a certain activity. 2. to pass the summer in a torpid condition. (also spelled aestivate.)

guide words: essentialist Estremadura

Some desert animals estivate in the summer to save energy.

- Write at least five sentences using two or more of these words in each sentence.

The bald eagle is endangered because poisons in the environment caused the egg shells to be weakened.

- Complete: the following sentences using the words above.

Bats use special radar called _____.

An arm of the sea at the lower end of a river is a/an _____.

An _____ species no longer exists.

_____ and _____ are adult birds that live in Kansas.

- List all the words that name an animal or group of animals.

- Write the correct word for each respelling.

ē-lənd

ē-myū

eg'

ēl'

er'-mən

ent'-ə-māl'-jē

es'-chə-wer'-ē

in-vī-rən-mənt

i-kol'-ə-jē

ik-sper'-ə-mənt

- Unscramble these words.

gtalee

yeoolgc

gdneeeanr

ysrutea

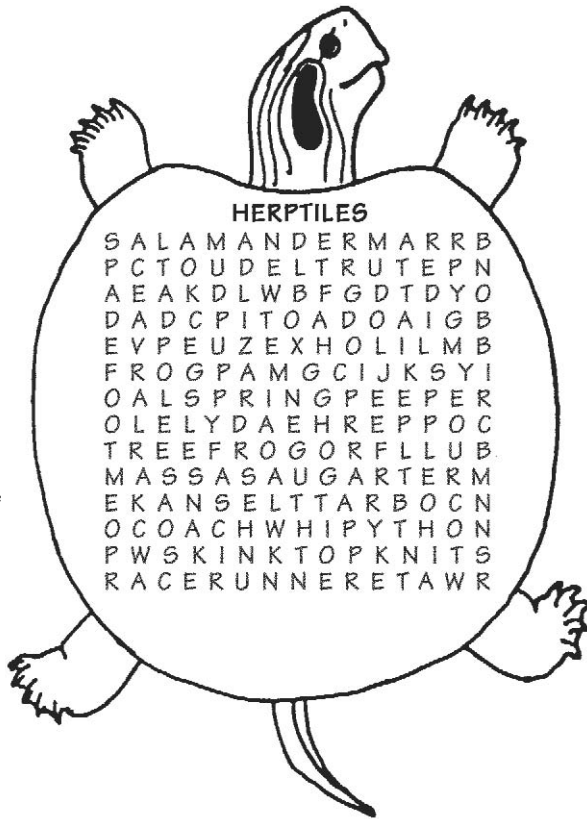
mycssoet

oooyetlmng

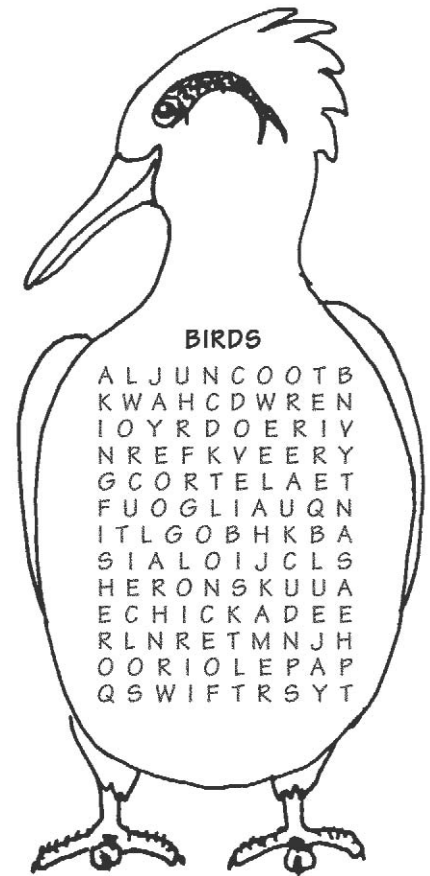
HIDE N' SEEK

Directions: Circle the names of wildlife that belong in each animal class represented below. Answers run forwards, backwards, diagonally, up, and down. Try making your own word search puzzle.

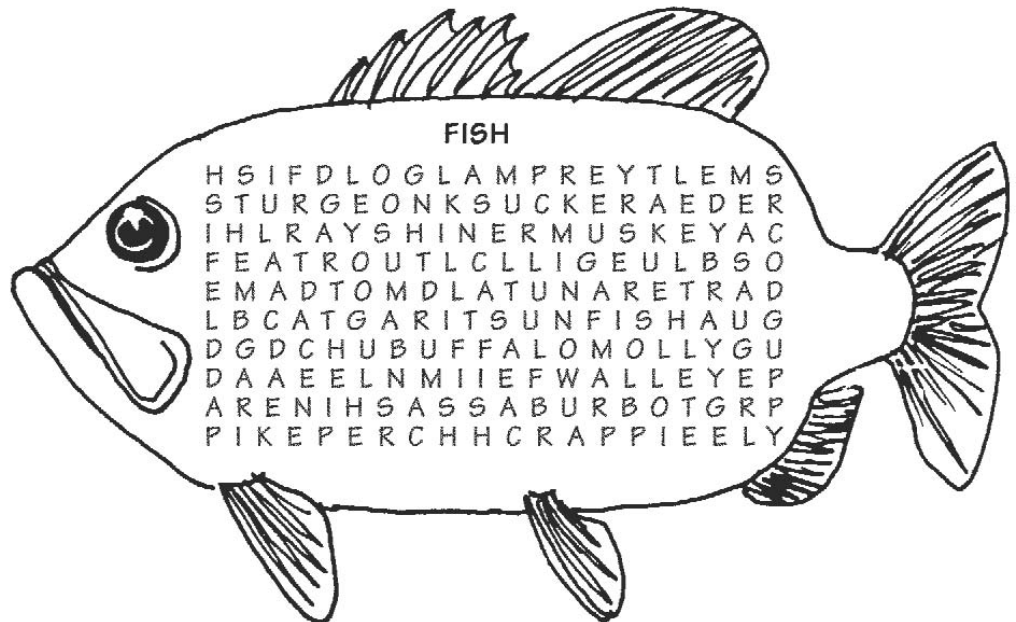
- larva
- skink
- salamander
- newt
- mudpuppy
- toad
- spadefoot
- tree frog
- spring peeper
- bullfrog
- tadpole
- turtle
- slider
- lizard
- massasauga
- garter (snake)
- box (turtle)
- copperhead rattlesnake
- gila (monster)
- gecko
- mud (turtle)
- racerunner
- coachwhip
- stinkpot
- python
- pygmy (rattlesnake)
- cobra
- water (snake)
- ribbon (snake)
- map (turtle)
- egg
- frog



- ibis
- swift
- stork
- loon
- wren
- veery
- vireo
- oriole
- tern
- teal
- pheasant
- bluejay
- coot
- duck
- quail
- chickadee
- dove
- eagle
- finch
- gull
- heron
- kingfisher
- jay
- owl
- hawk
- crow
- lark
- junco



- sucker
- darter
- crappie
- burbot
- perch
- walleye
- sturgeon
- paddlefish
- gar (3 times)
- eel (3 times)
- shad
- trout
- pike
- carp
- shiner (2 times)
- chub
- dace
- buffalo
- minnow
- killifish
- catfish
- madtom
- bass
- sunfish
- bluegill
- drum
- sauger
- redeer
- molly
- goldfish
- guppy
- cod
- tuna (2 times)
- muskey
- ray (2 times)
- smelt
- lamprey



by Joyce Harmon

ANIMAL QUIZ



Circle the correct answer.

1. Wild animals eat different kinds of foods. They eat
A. plants and animals. B. candy. C. soil.
2. The scissortail flycatcher eats
A. grass. B. insects. C. berries.
3. The channel catfish finds its food by
A. digging. B. touching. C. smelling and tasting.
4. Which animal eats both plants and animals?
A. burrowing owl. B. prairie chicken. C. pronghorn antelope.
5. What does the pileated woodpecker use to get insects from trees?
A. its beak and tongue. B. its wings. C. its red feathers.
6. The Topeka shiner eats
A. bluegills. B. tiny plants and animals. C. radishes.
7. The ornate box turtle
A. stores its food in its shell. B. runs to catch its food.
C. eats plants and animals.
8. The plains leopard frog is an amphibian that eats
A. crickets and worms. B. grass and watermelon. C. coyotes.
9. Coyotes eat almost anything and can live in a lot of places. They are
A. reptiles. B. mammals. C. amphibians.
10. Cottontails, jackrabbits, and swamp rabbits are
A. meat eaters. B. eat both plants and animals. C. plant eaters.

Key: 1.-A; 2.-B; 3.-C; 4.-B; 5.-A; 6.-B; 7.-C; 8.-A; 9.-A; 10.-C.

HIDE 'N' SEEK



Find the names of the Kansas animals listed at the bottom. Long names may be found on separate lines.

K	A	N	S	A	S	F	I	S	H	A	N	D	S	B	A	S	G	C
J	P	G	S	O	O	F	I	S	H	G	E	R	W	U	B	D	A	E
H	I	R	C	R	A	N	D	C	O	D	A	B	I	R	C	F	M	G
P	L	A	I	N	S	L	E	O	P	A	R	D	F	R	O	G	E	K
H	E	S	S	A	T	G	R	Y	R	E	H	I	T	O	D	R	J	L
E	A	S	S	T	I	C	D	O	O	A	M	N	F	W	O	E	T	C
A	T	H	O	E	B	A	E	T	N	O	P	Q	O	I	R	A	O	O
S	E	O	R	B	B	L	U	E	G	I	L	L	X	N	S	T	P	M
A	D	P	T	O	A	G	N	I	H	O	T	U	V	G	T	E	E	M
N	W	P	A	X	R	A	O	R	O	T	O	W	H	O	X	R	K	I
T	O	E	I	T	K	M	Y	I	R	Y	Z	S	N	W	L	A	A	S
J	O	R	L	U	C	E	D	A	N	O	L	T	E	L	E	N	S	S
R	D	A	C	R	A	N	H	R	H	F	A	E	F	G	H	D	H	I
M	P	E	F	T	J	J	S	P	T	I	J	K	L	M	N	L	I	O
H	E	A	G	L	A	I	M	A	L	O	P	R	S	E	A	E	N	N
R	C	B	Q	E	F	R	C	H	I	C	K	E	N	S	A	S	E	A
Y	K	R	T	C	O	M	M	I	S	S	I	O	N	S	E	S	R	E
E	E	R	K	A	N	S	A	S	F	I	S	H	A	N	D	E	D	C
S	R	G	A	M	E	C	O	M	M	I	S	S	I	O	N	R	N	D

coyote
burrowing owl
swift fox
pronghorn (antelope)

jack rabbit
cottontail (rabbit)
plains leopard frog
grasshopper

ornate box turtle
catfish
Topeka shiner
pileated woodpecker

pheasant
goose
greater and lesser prairie chickens
scissortail (flycatcher)
bluegill



nature's notebook

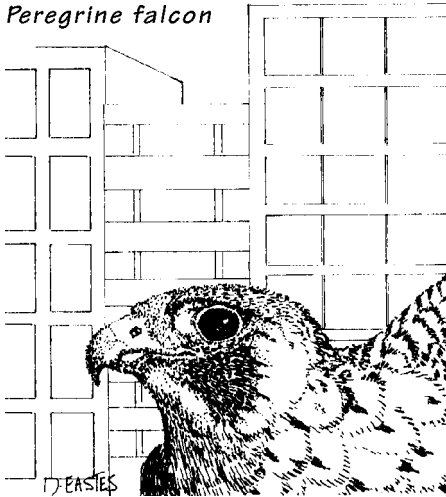
CHAPTER THIRTEEN

THREATENED & ENDANGERED SPECIES

ENDANGERED SPECIES

by Mark Shoup

Peregrine falcon



The peregrine falcon is one of several Kansas birds of prey on the Kansas and U.S. Government "Lists of Endangered and Threatened Species." There are also numerous other animal species and plants. Animals and plants on these lists are protected. It is illegal to kill them or to destroy the places where they live, called their habitats.

Species are placed on the list because there are so few of them on Earth that they are either in danger or becoming extinct or because they are close to becoming endangered.

Throughout Earth's history, species have become extinct naturally. This is rare and usually occurs over a period of thousands of years. However, because of dramatic changes in our environment made by man, hundreds of species have become extinct in recent years.

Some scientists estimate that a new species becomes extinct each day because of man's activities, such as destruction of tropical rain forests in South America and Asia. Three of the more well known extinct birds in this country are the Carolina parakeet, the Labrador duck and the passenger pigeon.

Market hunting was the cause of a few extinctions, but the most common cause of extinctions have been destructions of wild-life habitat. The expansion of cities, industries, and farm are the primary causes of habitat destruction.

Contrary to some popular misconceptions, no species currently hunted by man is endangered or threatened. In fact, no species has even become endangered or threatened by modern, regulated hunting.

The peregrine falcon is different from some endangered species. It has been endangered by the use of the pesticide DDT. DDT caused the eggshells of peregrines and some other birds to become so weak that the eggs could not develop. It is now illegal to use DDT in the U.S., but we still make it and sell it to South American countries to use. Since the

banning of DDT, the peregrine has been making a slight comeback although it remains endangered.

Also called the "duck hawk," the peregrine is the swiftest of all birds of prey. It can dive at speeds up to 180 miles per hour. Its speed and agility allows it to prey on other birds. Because of this, peregrine falcons were prized by falconry hunter for generations. The peregrine is also the mascot for the U.S. Air Force Academy.

The peregrine has displayed a most remarkable ability to adapt in recent years. Its natural habitat is high cliffs in open country. However, peregrines have recently made homes in cities across the country. They make their nests on ledges high atop skyscrapers. From here, they have a ready supply of prey pigeons. Pigeons have become pests in many cities, so city dwellers are usually happy to see these beautiful swift birds of prey.



Black-footed ferret

QUIZ

1. What is the primary reason most species become extinct?
a. pesticides b. old age c. hunting d. habitat destruction
2. Species never become extinct naturally. True or False
3. Modern, regulated hunting has caused some species to be placed on the Endangered and Threatened Species List. True or False
4. Which of the following is not an extinct species that once lived in the U.S.?
a. Labrador duck b. Carolina parakeet c. dodo bird d. passenger pigeon
5. What caused the peregrine falcon to become endangered?
a. DDT b. lack of pigeons to eat c. air pollution d. habitat destruction
6. The peregrine is the fastest bird of prey. How fast can it fly?
a. 60 mph b. 120 mph c. 180 mph d. 240 mph
7. DDT is no longer used as a pesticide. True or False
8. In recent years, the peregrine has found a place to call home. Where is this?
a. grain elevators
b. McDonald's
c. City skyscrapers
d. Cheyenne Bottoms

Answers

1. - d. habitat destruction 2. - False
3. - False 4. - c. dodo bird
5. - a. DDT 6. - c. 180 mph
7. - False 8. - c. City skyscrapers

KANSAS THREATENED (T) & ENDANGERED (E) SPECIES

REVISED - JUNE 2003

Mammals

Black-footed ferret	E
Grey Myotis (bat)	E
Eastern spotted skunk	T

Birds

Bald eagle	E
Whooping crane	E
Peregrine falcon	E
Least tern	E
Black-capped vireo	E
Eskimo curlew	E
Piping plover	T
Snowy plover	T
White-faced ibis	T

Reptiles

Broadhead skink (lizard)	T
--------------------------	---

Checkered garter snake	T
Common map turtle	T
New Mexico blind snake	T
Northern redbelly snake	T
Texas longnose snake	T
Texas night snake	T
Western earth snake	T

Amphibians

Cave salamander	E
Graybelly salamander	E
Grotto salamander	E
Central newt	T
Dark-sided salamander	T
Eastern narrowmouth toad	T
Green toad	T
Northern spring peeper (frog)	T

Strecker's chorus frog	T
Western green toad	T

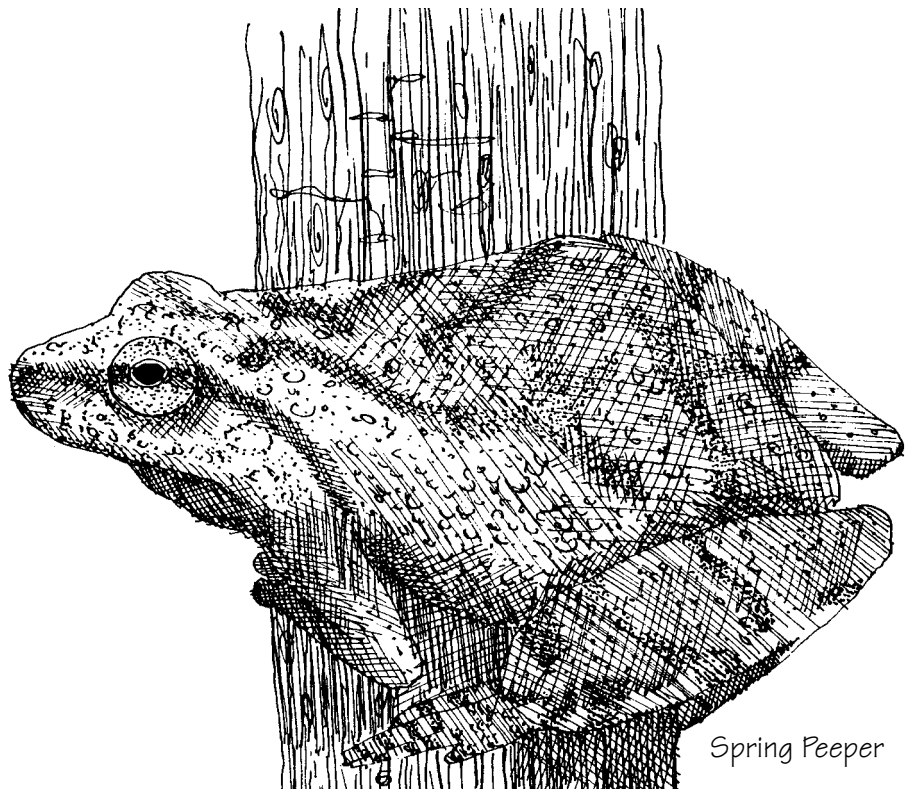
Fish

Arkansas River shiner	E
Pallid sturgeon	E
Sicklefin chub	E
Speckled chub	E
Arkansas darter	T
Chestnut lamprey	T
Flathead chub	T
Hornyhead chub	T
Neosho madlom	T
Redspot chub	T
Silverband shiner	T
Blackside darter	T
Sturgeon chub	T

Western silvery minnow	T
------------------------	---

Invertebrates

Flat floater mussel	E
Rabbit's foot mussel	E
Western fanshell mussel	E
Neosho mucket mussel	E
Elktoe mussel	E
Bleedingtooth mussel	E
Slender walker snail	E
Scott riffle beetle	E
American burying beetle	E
Rock pocketbook mussel	T
Fluted-shell musse	T
Butterfly mussel	T
Ouachita kidneyshell mussel	T



Spring Peeper

SOMETHING WILD by Joyce Harmond Depenbusch IN KANSAS

Introduction:

Many different species of wildlife live in Kansas. Some are abundant everywhere in the state. Others have adapted only to the eastern forests or to the arid High Plains. Where these two different environments come together in central Kansas, a number of eastern and western species can be found. Several bird species do not stay in our state for long periods of time,

but can be seen only when they migrate through Kansas.

Wildlife belongs to everyone of us. The Kansas Department of Wildlife and Parks is responsible for taking care of, or conserving, our wildlife for us. They do this by protecting and providing good homes for wildlife. Limiting the number that is taken by hunting, trapping or fishing protects some wildlife species. This allows many people

to enjoy these wildlife related sports and also keeps the wildlife populations healthy by reducing the surplus that could result in disease. There aren't any surplus animals of threatened and endangered species for us to take even one.

Besides hunting, trapping, and fishing, many Kansans also enjoy photography, watching, attracting, feeding and studying wildlife.

KANSAS THREATENED (T) & ENDANGERED (E) SPECIES STATUS - 2003

Birds

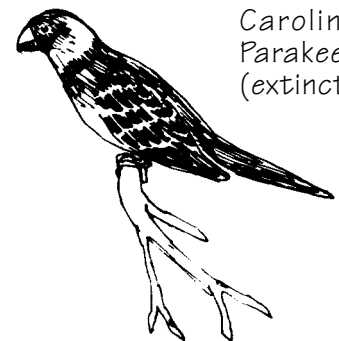
Endangered.....	5
Threatened.....	4
In Need of Conservation .	16
Total Species	415

Kansas birds include 243 terrestrial or land birds, 111 water birds, and 61 that only rarely occur in our state. The most obvious features that separate birds from other wildlife groups are their feathers and a hard beak. Feathers are

used for flying but also protect the skin and conserve body heat. Waterbirds have special feathers that help them float by trapping pockets of air. All birds lay eggs and some young leave the nest soon after hatching while others are less developed and stay for several weeks.

Birds are found in all habitat types. They eat many kinds of plants and animals and, they are a food source for predators.

Birds such as pheasants, quail, and ducks are hunted. Many people enjoy watching, feeding, and photographing these highly visible animals.



Carolina Parakeet (extinct)

Mammals

Endangered.....	4
Threatened.....	10
In Need of Conservation .	23
Total Species	124

Kansas mammals include 23 rats and mice, 15 bats, 9 squirrels, 8 weasels, 5 hares and rabbits, 3 deer, 3 foxes, 3 shrews, 2 cats, 2 pocket gophers, and one each opossum, mole, arm-

adillo, beaver, ringtail, raccoon, coyote, porcupine, and pronghorn. All mammals have hair that protects the skin in many ways and also helps to conserve body heat. Animals in this group also

give birth to live young that are fed milk produced from the mother's mammary glands. Mammals can hear and smell very well and they have whiskers that help their sense of touch in dark environments.

Finding mammals can be difficult because many are active only at night. Choice of food

varies with mammal species. Mammals may be carnivores (meat-eaters), herbivores (plant-eaters), or omnivores (eat both plants and animals). Some animals, such as deer and rabbits, are shot and eaten by hunters. Others, such as beaver and fox, are trapped for the value of their fur that is made into

coats and other items.



Fish

Endangered..... 4
 Threatened..... 11
 In Need of Conservation . 22
 Total Species 124

Kansas fish include 41 minnows, 17 darters, 14 suckers, 6 madtoms, 4 catfish, 4 sunfish, 4 top minnows, 3 gar, 2 each of crappie, buffalo, silver-sides, shad, and sturgeons, and 1 each live bearers, sculpin, lamprey, paddlefish, bowfin, eel, mooneye, burbot, walleye, carp, amur, pike, trout, and drum. External body scales, the lack of arms and legs, the presence of fins, and gills

are the most noticeable characteristics of fish. Fish use oxygen from the water that passes into their mouths, across their gills, and out their gill openings on the sides of their head. Like amphibians, reptiles, and invertebrates, fish are cold-blooded. In other words their body temperature is approximately the same as that of the surrounding environment.

About two-dozen fish species provide many hours of fishing fun for anglers. The smaller fish provide important food for the larger fish. Many fish are placed in aquaria in schools

and homes. And several species of minnows are used for bait by anglers.



Invertebrates

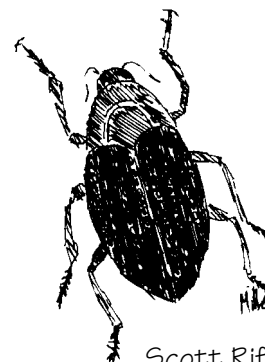
Endangered..... 11
 Threatened..... 4
 In Need of Conservation . 16
 Total Species 22,000+

Kansas invertebrates include 18,000+ insects, and 4,000+ aquatic invertebrates, crustaceans, and mollusks. Invertebrates are animals that do not have backbones. Insects and crustaceans (crabs and crayfish) have skeletons on the outside of their

bodies. Mollusks (clams and snails) are protected by shells.

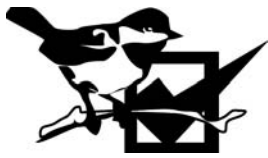
Invertebrates affect just about every type of living thing. A variety of animals eat them and many invertebrates feed on other animals and plants. We like honeybees mostly for their honey. But they as well as other insects are important pollinators of many plants. Several species of fresh water mussels are sold at grocery stores. Other invertebrates

such as crayfish, leeches, grasshoppers, and crickets are used for bait by anglers.



Scott Riffle Beetle

by Joyce Harmond Depenbusch



KANSAS

WILDLIFE

KANSAS THREATENED (T) & ENDANGERED (E) SPECIES STATUS - 2003

Amphibians

Endangered.....	3
Threatened.....	7
In Need of Conservation .	2
Total Species	28

Amphibians include salamanders, frogs and toads. In Kansas, there are 8 salamander, 14 frog, and 6 toad species. Wildlife in this group have no claws on

their feet and depend on water for their existence. They must keep their skin moist and cannot survive away from water or damp areas. Amphibians also must lay their jelly-like eggs in moist areas or the eggs will dry up and die. The eggs of all amphibians hatch into aquatic larvae (for salamanders) or tadpoles (for frogs and toads),

which after at least a few weeks metamorphose into adults.



Cave Salamander

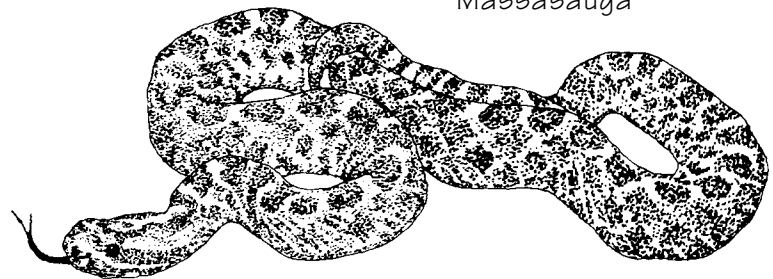
Reptiles

Endangered.....	0
Threatened.....	8
In Need of Conservation .	6
Total Species	63

Reptiles are turtles, lizards, and snakes. In Kansas, there are 14 turtle, 12 lizard, and 37 snake species. Wildlife in this group have dry, scaled skin and claws on their toes and fingers (except snakes). Unlike amphibians, reptiles can stray far from water without drying out. All Kansas turtles and lizards plus most snakes bury their leathery-shelled eggs on land. A few snakes give birth to live young. Young reptiles do not go through a larval or tadpole state but instead look like their parents.

Turtles are the only reptiles with shells covering most of the back and underneath body parts. Turtles and lizards have eyelids

and small rodents. People eat some, such as snapping turtles. Many reptiles are also used as pets.



Massasauga

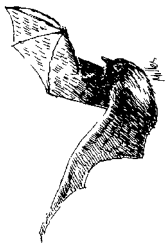

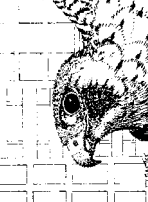
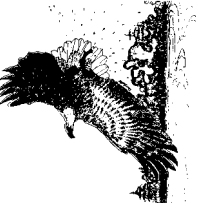




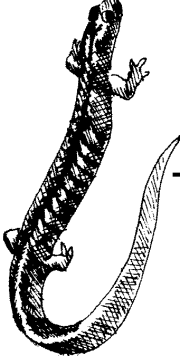




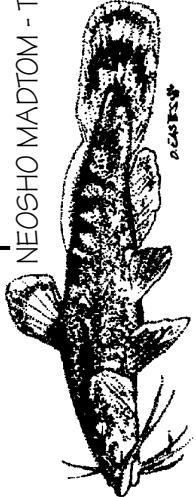



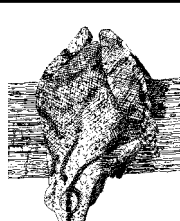

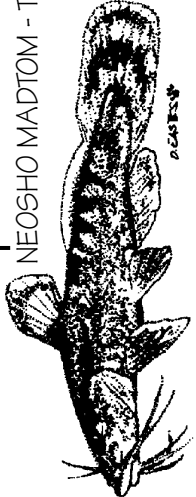
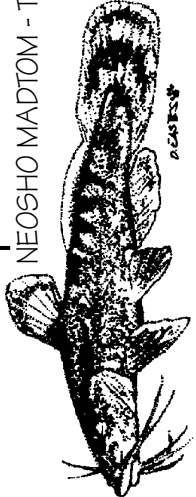



that shut, and front and hind limbs (except the western glass lizard). Snakes have no limbs and their eyelids cannot move.

Reptiles are found at various levels in food chains. They not only are eaten by other animals, but they also feed on insects



This month is dedicated to the threatened and endangered wildlife of Kansas. Learn as much about each species as possible. Discover why they are threatened or endangered. What is being done to improve the status of these species?

MAY

	<p>May 1900, President McKinley signed the Lacey Act, which prohibits interstate shipment or illegally killed wildlife and restricts importation of foreign wildlife.</p>	<p>E - ENDANGERED</p> 	<p>GRAY MYOTIS - E</p> 	<p>BLACK - FOOTED FERRET - E</p> 	<p>BALD EAGLE - E</p> 
<p>ESKIMO CURLEW - E</p> 	<p>LEAST TERN - E</p> 	<p>WHOOPING CRAIN - E</p> 	<p>CAVE SALAMANDER - E</p> 	<p>GRAYBELLEY SALAMANDER - E</p> 	<p>CENTRAL NEWT - T</p> 
<p>GROTTO SALAMANDER - E</p> 	<p>RIFFLE BEETLE - E</p> 	<p>PALLID STURGEON - E</p> 	<p>T - THREATENED</p> 	<p>WHITE-FACED IBIS - T</p> 	<p>BROADHEAD SKINK - T</p> 
<p>COMMON MAP TURTLE - T</p> 	<p>NORTHERN SPRING PEEPER - T</p> 	<p>WESTERN GREEN TOAD - T</p> 	<p>NEOSHO MADTOM - T</p> 	<p>NEOSHO MADTOM - T</p> 	<p>WESTERN NIGHT SNAKE - T</p> 
<p>EASTERN NARROW-MOUTH TOAD - T</p> 	<p>TEXAS NIGHT SNAKE - T</p> 	<p></p>	<p></p>	<p></p>	<p>"Before many years, the Buffalo, like the Great Auk, will have disappeared; surely this should not be permitted." - John James Audubon. 1843</p>



nature's notebook

CHAPTER FOURTEEN

VEGETATION

Joyce Harmond Depenbusch

POISON IVY

The old saying "Leaves of three, let them be," describes poison ivy, Toxicodendron radican, Rhus radicans, or Rhus toxicodendron. This plant is a good one to be aware of and to be able to recognize easily.



Poison Ivy is a perennial (having a life cycle of more than two years), and grows as a vine or shrub. The vines can be found on the ground, climbing trees or any available object. The vine is brown covered with rootlets, and looks like a fuzzy rope. The shrub form of this plant can be a few inches to several feet tall. The leaves vary in size, shape, color, and shininess (or luster). The leaf edges may be smooth or jagged. The leaves are red or purple in early spring; shades of green in the summer; and yellow, red and orange in the fall. From May to July,

the poison ivy plant has clusters of small greenish yellow flowers. The flowers form small green berries, which ripen to white.

Some bird species eat the berries. In the early 1900's, the milky juice from inside the plant was used as indelible ink and in shoe polishes.

Urushiol is the oil in poison ivy that can irritate humans. The substance is found in all parts of the plant and remains potentially dangerous even when the plant is dead. Studies have shown that leaves stored for over five years were nearly as toxic as fresh leaves.

Touching clothing or pets that have contacted poison ivy, and breathing smoke from the burning plant can cause irritation. Some people are not sensitive to the plant, while others need to be hospitalized after contact.

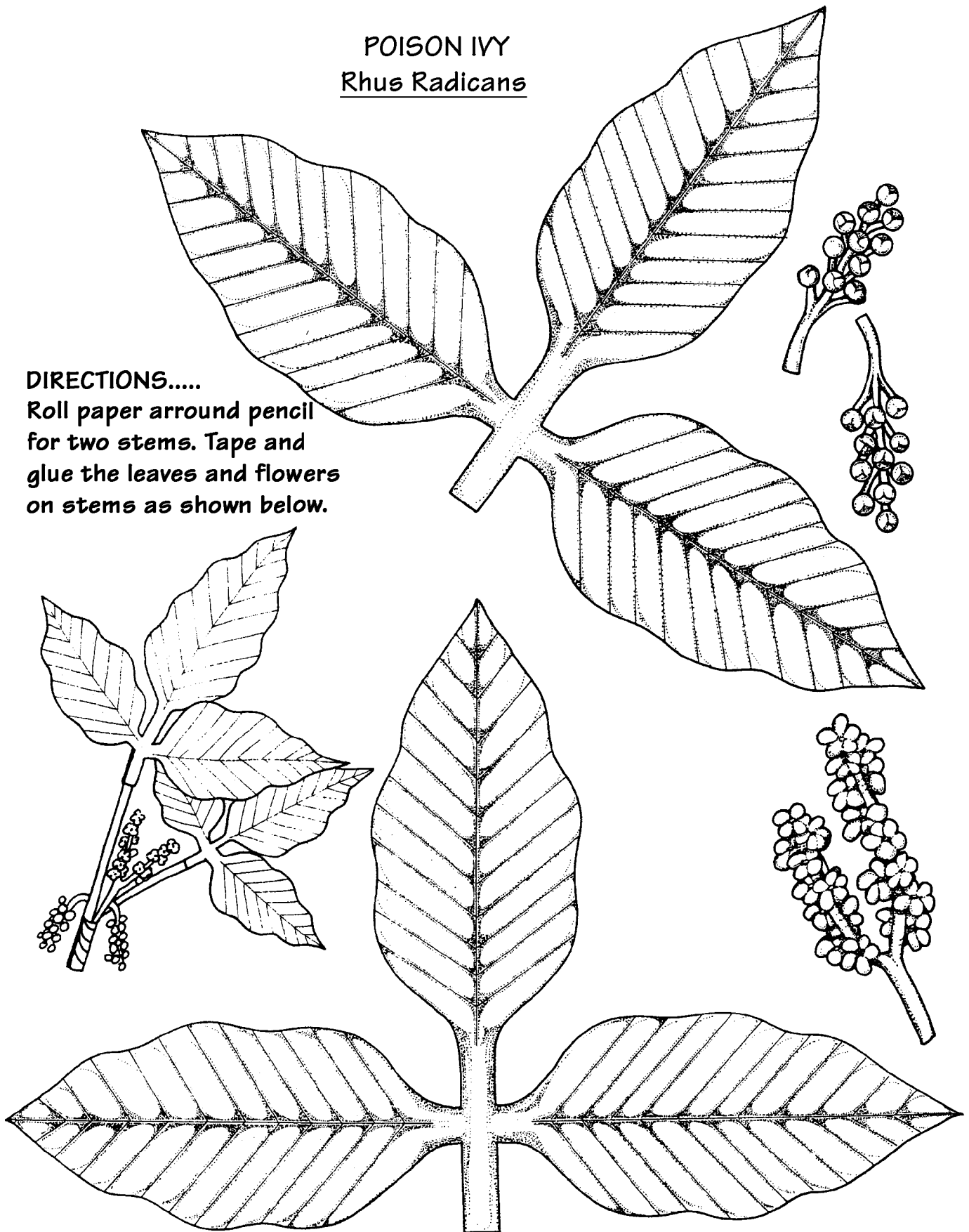
Avoiding the plant is the best method of preventing skin irritation. If contact is made, wash the area and any clothes involved thoroughly and frequently in strong soap with cool water. Caladryl lotion can help ease itching. Contact a doctor for medicine needed to treat severe cases.

You can make a model of poison ivy by following a few simple directions:

- 1) trace or make duplicate copies of the models.
- 2) color the models with crayon or marker.
- 3) reinforce the back of the model with construction paper if necessary.
- 4) fold on an dotted lines, cut on solid lines.
- 5) use glue to assemble.

POISON IVY
Rhus Radicans

DIRECTIONS.....
Roll paper arround pencil
for two stems. Tape and
glue the leaves and flowers
on stems as shown below.



by Joyce Harmond Depenbusch

Wildflowers

One of the first and most attractive signs of spring is the color that wildflowers add to the landscape. Kansas has a variety of wildflowers that bloom from spring through fall. Below are a few of the wildflowers found in our prairie state and some information about them.

Use the descriptions to color the pictures.

One of the first wildflowers to bloom in pastures and meadows is called pussy toes, or Indian tobacco. It blooms from March through April, producing a white flower that looks like a cottonball. The pussy toe was named after the female flower, which is shaped like five toes. The leaves are silvery gray. This plant grows in rocky soil.

(*Antennaria plantaginifolia*)



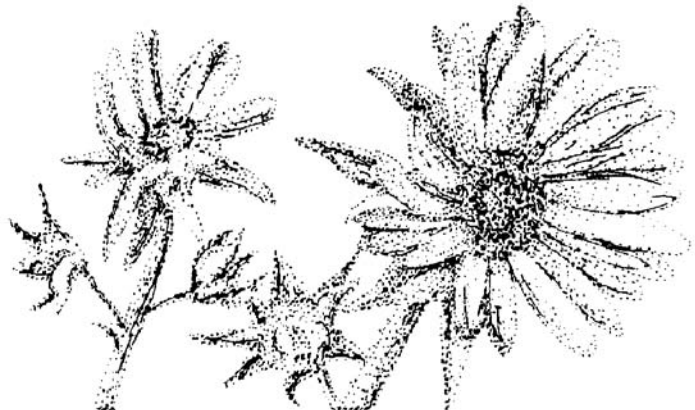
The cardinal flower, or scarlet lobelia, begins blooming in July and continues through October. It is found near streams and other damp places. This plant is named after its brilliant red blossom. Butterflies, moths and hummingbirds pollinate the cardinal flower.

(*Lobelia cardinalis*)



The compass plant, or rosin weed, is a common summer flower on the Kansas prairie. Blooming from July to September, this tall (5 to 9 feet) plant produces many yellow and orange flowers. It's called a compass plant because the leaf edges usually face to the north and south.

(*Silphium laciniatum*)



The gayfeather, also called the blazing star, is a beautiful blue and purple prairie flower that blooms during July and August. The narrow leaves have small bristles, and the blossoms consist of threadlike plumes. Plains Indians made medicine out of the gayfeather and used the creation on both themselves and their horses.

(*Liatris sp.*)



The poppy mallow, or ground mallow, grows close to the ground. It blooms from late April through mid-October. Depending on the mallow species, the flowers may be white, pink, red or purple. The poppy mallow is drought resistant and can be found throughout Kansas. Indians used parts of the plant for medicine.

(*Callirhoe sp.*)



The common sunflower, our state flower, is just one of many species of sunflowers common in Kansas. The familiar yellow and orange flower can be seen from July through September. It grows well in wide, open fields. This tall plant has dark green leaves. The sunflower is a composite, which means each flower is actually made up of many small flowers. Each petal attached to the brown center is a separate flower.

(*Helianthus annuus*)



To learn more about wildflowers contact:

Kansas Wildflower Society
Mulvane Art Center
17th and Jewell
Washburn University
Topeka, KS 66621

You might also find out about wildflowers at the local library.

by Joyce Harmond Depenbusch

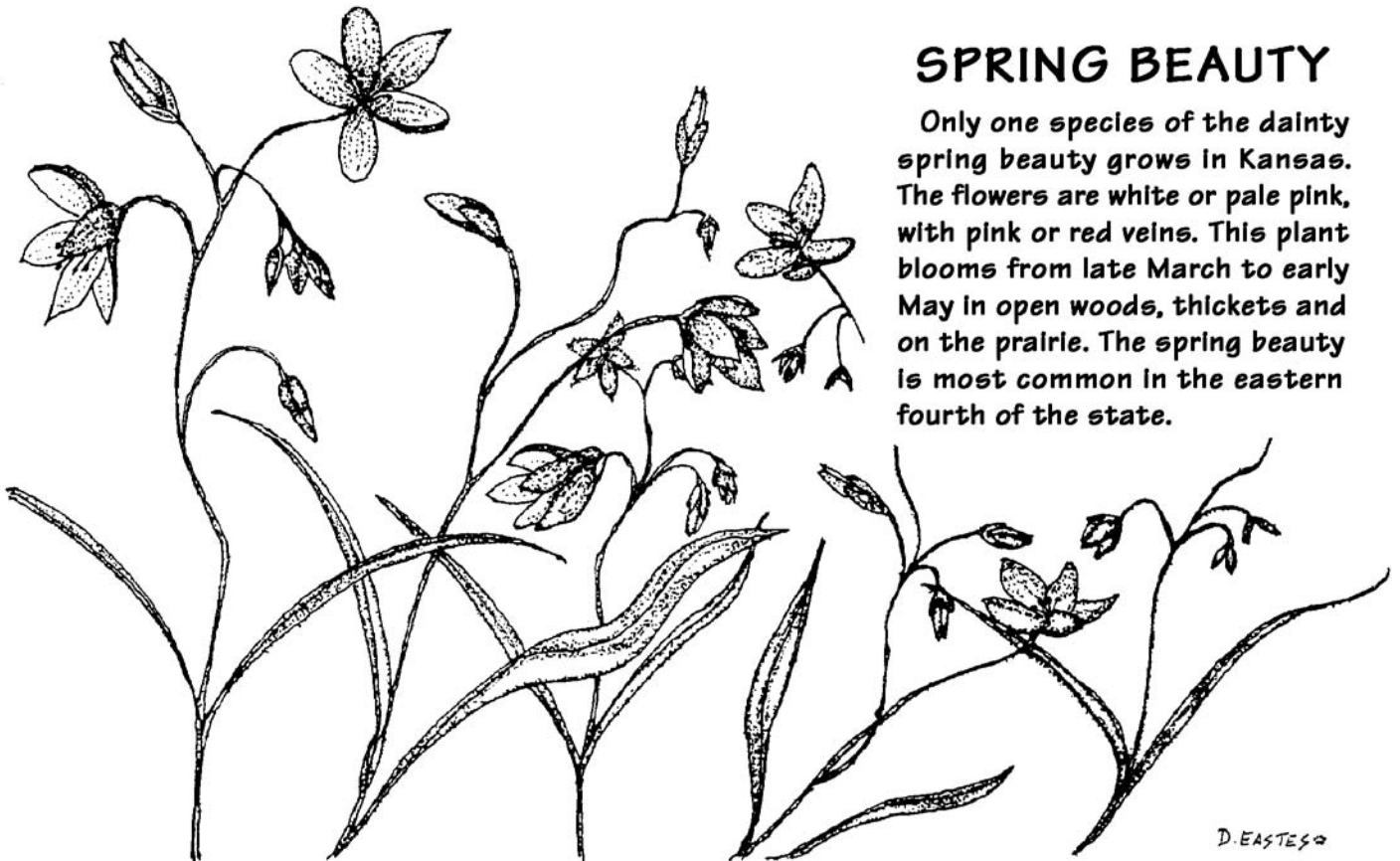
3-D

WILDFLOWERS

In the March/April "Nature's Notebook" (*Wildflowers*) you learned about several Kansas wildflowers. Now you have a chance to make your own three-dimensional model of the spring beauty, *Claytonia virginica*.

Directions:

1. Trace or make duplicate copies of the model.
2. Color the model with crayon or marker.
3. Reinforce the back of the model with construction paper if necessary.
4. Fold on all dotted lines, cut on solid lines.
5. Use glue to assemble.



by Mark Shoup



Every kid likes to dig in the dirt, so why not double your fun and plant a garden this spring. Few things make you feel better than watching the things you have planted grow. If you plant vegetables or melons, you even get a tasty bonus when you pick your crop. Flowers are just as much fun, and the harvest is a feast for the eyes.

The opportunity is, well, as close as your own back yard. Seed, soil, and sunlight are the essential elements. Add a few tools and some help from Mom or Dad, and you're set.

Of course, the first thing you'll need is a few tools -- a shovel, a hoe, and a rake. You

don't need kid-sized tools, but if you get them, make sure they're well made -- metal and wood, not plastic. Most hardware and gardening supply stores can help you with this.

The next thing you'll need is a plot of land. The size just depends on how much you want to plant. Where you put it depends on what you plant. A vegetable garden usually needs plenty of sunshine, but some flowers, such as impatiens, need a little shade.

Chances are, your parents already have a garden area. If so, ask them to divide a portion of it just for your project. If not, maybe they'll set aside a small corner of the yard.

If you're digging up a lawn for a new garden plot, try to remove as much grass as possible and turn the soil at least twice afterwards. Then mix in sheep manure or, if your parents have a compost heap, mulch for fertilizer.

Next, it's time to pick your plants. Whether it's flowers or vegetables, plant what you like. Snapdragons and impatiens are cool to play with, and they're pretty as well. Marigolds planted around your vegetable garden can help keep harmful insects away. (Perhaps the simplest and safest way to control garden pests is to pick them off, but be sure to leave critters like ladybugs, praying

mantises, ground beetles, and spiders alone. They eat the bugs that eat your plants.) Many flowers are perennial, meaning that once you plant them, they'll come up next year on their own. Wildflowers, such as Indian blanket, are great additions to any yard.

In the vegetable department, you can grow beans, carrots, cucumbers, peas, potatoes, tomatoes, watermelons, and many others in Kansas.

I know what you're thinking. Beans? Peas? Carrots? But forget what you may think about these veggies, as you have known them before. When you have grown them yourself, they are among the tastiest treats on earth.

Okay, so you've decided on what to plant, but when and how do you do it?

At this point, it's a good idea to take a trip to your local County Extension Office. (Look up the number and address up in the phone book under the name of the county you live in. For example, in Reno County, look up "Reno -- County Of," and under that you should find "Extension Agent" or "Office.") You'll find tips on growing just about everything a Kansas garden can grow. If you plan it right, you can harvest your own crops as early as May and as late as October.

Gardening is a creative activity, but you can make it even more fun by making your garden grow into a playground. Here's one great idea.

Push 10 or 12 poles or 1-inch dowels in the ground in a circle about 5 feet in diameter. Tie the poles together at the top in tepee fashion then circle the whole thing with twine. Leave space for a "doorway" at the bottom. Plant pole beans at the base of each pole. As the beans grow, they will enclose the

area, creating a hide-away and playhouse.

For an all-living version of this tepee, plant giant sunflowers instead of poles. When the sunflowers are about 8 feet tall, carefully bend them over and tie them together just below the flowers. Then plant morning glory seeds at the base of each sunflower. The morning glories will entwine the larger plants, making a beautiful hideout that will also be a great refuge and winter bird feeding station.



by Mark Shoup

Cornucopia



The cornucopia, or horn of plenty, is a symbol of abundance. In Greek mythology, the infant Zeus broke off a goat-nymph's horn and gave it to the daughters of King Melisseus. Zeus promised that the horn would always be full of food and drink.

Since the days of the ancient Greeks, the horn of plenty has come to symbolize Mother Nature's bounty. However, in these days of giant supermarkets and fast food rest-

aurants, we seldom associate the food we eat with nature. Few people realize that the natural world bears all the food a person needs, if only we knew what to look for.

When I was a boy, I could stand for hours in the shade of a mulberry tree, munching the dark purple berries as I escaped the summer heat. Sandhill plums were another summer treat, as were wild currents. Occasionally, I'd munch a wild onion. As I got older, I learned to dig the root of purple poppy mallow, or Indian bread, and eat it. It tasted kind of like rope, but it was neat

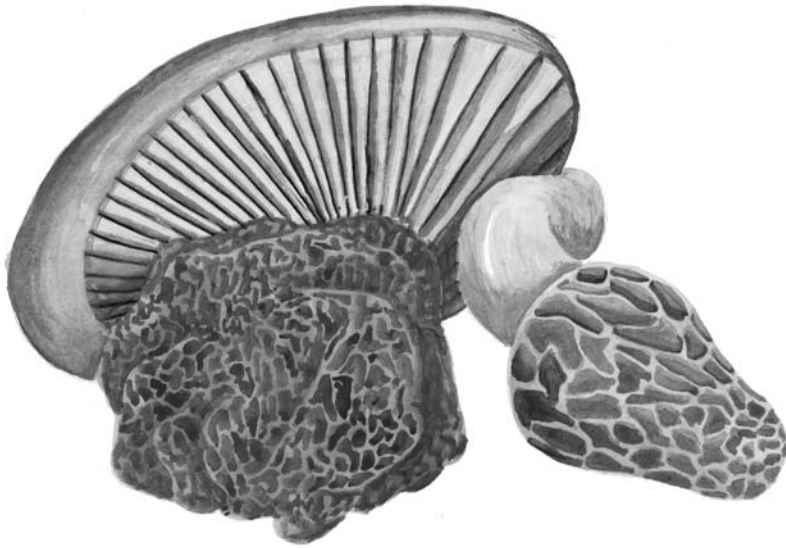
to think you could eat it. I also learned to boil wild rose hips for tea.

Of course, these were only a few small summer snacks — hardly enough to keep a person alive, especially year-round. How did Native Americans survive? They hunted, of course, and fished some. But it takes more than meat to live.

Most people would probably be surprised to learn that one favorite Indian food was cattails. In early spring, the cattail's crisp white tuber -- a swollen underground stem much like a potato -- was ground into meal. As the plant grew, the tender shoots were eaten like asparagus.

The cattail had other uses





for Native Americans. The leaves made fine basket- and roof-making material. And the downy cotton was stuffed into moccasins for extra warmth in winter. Other plants yielded dyes, medicines, tinder, and cord. Birch bark was used to make canoes.

Today, foraging for edible wild plants is a hobby for many nature lovers. Modern-day foragers sometimes get even more creative than our forebears. Cattail pollen, for instance, has been used as a spice to replace the rare and expensive saffron. Elderberry jam, sandhill plum butter, persimmon preserves, and black-walnut pie are other natural treats we get from Mother Nature.

Less well-know food sources, such as wild rice, fescue, and curled and narrow dock yield seeds that can be cooked

like rice or ground for flour. In early spring, pokeweed, Jerusalem artichokes, and morels are favorites. Throughout the summer, watercress, various berries, and plums provide a sweet heat-retreat. In autumn, nuts of all kinds are ready for the taking, especially in eastern Kansas.

Becoming an outdoor gourmet can be an exciting, fulfilling (and filling) hobby. Of course, you don't want eat plants without knowing for sure that they aren't poisonous. **(Be especially cautious with mushrooms!)** The best way to learn about wild edible plants is from someone who knows about them.

Many older people know about these plants and would love to share their knowledge with young people. Scout troops and university biology departments often have access to such experts, as well.

One excellent book on the subject is *Edible Wild Plants of the Prairie*, written by Kelly Kindscher and published by the University Press of Kansas in Lawrence. Another good source is *Tom Brown's Guide to Wild Edible and Medicinal Plants*. With a little study and caution, gathering wild plants can be some of the best fun you have this summer.



Home-Grown or Wild, They're all Showoffs



For most people, the first hint of spring can be seen when touches of color suddenly burst onto the gray landscape. It's flower time. In fact, these showy hints of spring are so popular that many people grow them in their yards.

One of the first home-grown flowers to show the face of spring is the crocus.



Crocuses can splash the landscape with white, yellow, or purple anytime from mid- or late February through mid-March.

They grow from a type of bulb called a **corm**. Bulbs are a kind of like a cross between a root and a seed. They stay a part of the plant year after year. When the plant goes **dormant** (goes to "sleep") in summer or fall, all the energy from the plant is stored in the bulb.

The dormant bulb needs cold period -- winter -- before it can sprout and bloom again. But once the first good thaw comes, crocuses, like other bulb plants, come shooting up from the ground quicker than other plants. This is because they grow from their ready-made source of energy, the bulb.

Although most crocuses are only 4 to 6 inches tall with a 1- to 2-inch flower, they are favorites among flower gardeners because of their early bloom and bright color.

Two other favorites are the daffodil and the tulip. The daffodil (sometimes mistakenly called a buttercup) is known to most people for its flattened petals, called the **corona**, and cup-like inner flower, called the **trumpet**. The most common daffodils are

yellow although they come in many colors. Most grow 12 to 18 inches tall with a 2- to 3-inch flower.

Everyone has drawn pictures of tulips or cut them out of construction paper in school. They are well known, hearty, and can be grown just about anywhere. They also come in just about every color -- and color combination -- in the rainbow. Among early blooming home-grown flowers, this is probably the favorite.

This spring, look for cro-





cuses, daffodils, and tulips in your neighborhood. They are called **perennial** flowers, meaning they sprout again each year without re-planting. You might even want to go the library and get a book on planting your own bulb garden.

If you like your springtime more on the wild side, take a stroll in the nearest pasture or vacant field. A number of early-blooming wildflowers come out in March. These plants are not only colorful,



they often have colorful names. Lambert crazyweed, ground-plum, spiderwort, and Buckley's beardtongue are just a few.

Lambert crazyweed has a pea-like flower that grows on an 8- to 12-inch stem. The flowers range from bluish-purple to white. This plant is found in drier areas of the state, even in gravelly or rocky soil. As you might guess, crazyweed gets its name from the fact that it is poisonous to livestock.

Horses, cattle, and sheep that eat this plant lose weight and muscle control, become weak, and can act downright crazy. Sick animals have to be removed from pastures with this plant because they become crazyweed addicts!

As its name suggests, ground plum grows close to the ground throughout Kansas. It has tiny green leaflets and small purple flowers that resemble snapdragons. Its fruit is edible and tastes like pea pods.

Note: Unless you are with an expert, never eat wild plants. Many of them are highly poisonous.

Spiderwort is another purple flower. This one, however, grows on a long, smooth stem that may be more than 3 feet tall. The leaves are long and smooth, too, growing 4 to 14 inches. At the top of the stem, a cluster of purple flowers grows, each with three petals. This plant has an even more colorful name -- "cowslobbers," for mucous-like strings of sap that may hang from its leaves.

Buckley's beardtongue may grow 3 feet tall, as well. However, the last foot or so of this plant may all be purple flowers growing opposite one another on the stem. This flower may not come out until April.

Whether you like to grow them yourself or go on a flower "treasure hunt" with ID book in hand, make this spring an adventure with flowers. Take time to learn more about these spring-time beauties.



by Jim Mason



Cool Cottonwood



When the pioneers crossed the Great Plains on the Santa Fe or the Oregon Trail, they often went for a long time without seeing any trees. The prairie was frequently seen as a very foreign and hostile environment to people from the Ohio valley, the Appalachian Mountains, or New England because they were used to forested surroundings. No trees meant no wood for cooking. Dried bison dung was used for cooking fuel instead. No trees also meant no shade, which can be very precious on a hot day in summer. This and other factors led explorer Zebulon Pike to misname the area as the "Great American Desert."

There is a tree that is well-adapted to life on the prairie, however. You can recognize it from afar during the growing

season by the shiny leaves that shimmer and shake in the wind. The pioneers were always glad to spot one of these trees in the distance because it offered the possibility of wood

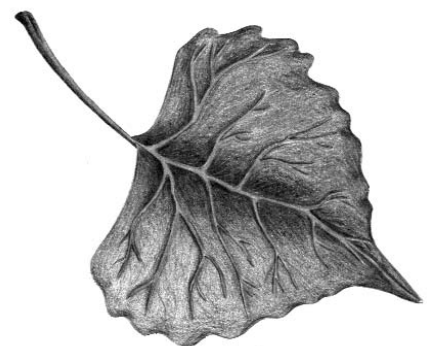


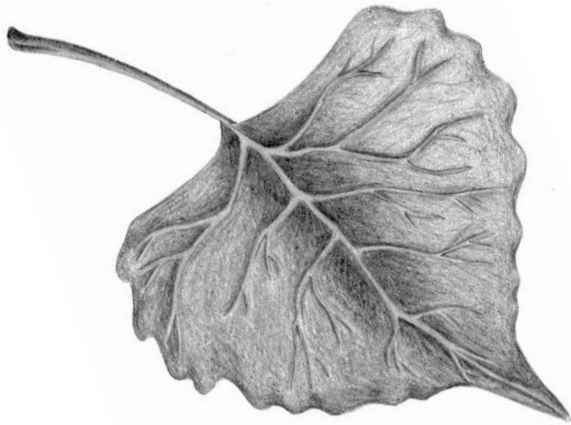
and shade. It also represented the chance of finding water because this species likes to keep its feet wet, so to speak. This species is the cottonwood tree.

Cottonwoods are either male or female. It is the fluffy white seeds produced

by the females during early summer that give the tree its name. The seeds are very small -- 1 millimeter wide by 4 millimeters long -- which is quite remarkable considering that they can become one of the largest trees in North America, more than 100 feet high with massive trunks more than 5 feet in diameter.

Trees had to survive prairie fires in order to live on the Great Plains. Cottonwoods did this by typically growing on the





edges of rivers and streams and by developing a very thick, corky bark upon maturity. As their seeds are dispersed by the wind, many end up landing on the surface of water and are then stranded along the waterline on sandbars, islands, and riverbanks.

If the river level does not fluctuate too much, allowing the seed to establish itself, a new monarch of the plains will begin its life. As the water level drops with late summer droughts, one can often walk along a sandbar and see a row of these newly-sprouted cottonwoods at the former waterline.

Cottonwoods can live to be more than 100 years old. There are cottonwoods on the Great Plains today that were living when the great herds of bison still roamed the prairie.

Cottonwoods are related to poplars and aspens, with which they share the same

shaking, shimmering leaves.

The heartwood typically rots from the larger limbs and trunk of a cottonwood. If a windstorm breaks one of these hollow branches off, providing access to the interior, they can provide homes for

squirrels, raccoons, and opossums or even a hive of honeybees.

After pioneer settlement, other kinds of trees became established across the Great Plains due to the control of wildfires and intentional planting of shelterbelts and woodlots. Ribbons of forest followed the water courses across the prairie where formerly only a few solitary cottonwoods could be seen. These so-called "gallery forests" are a significant part of the habitat mix on the Great Plains today, giving forest-adapted animals places to live they never had before.

As summer changes to fall, the leaves of the cottonwood turn a bright yellow, a vivid contrast to the clear blue skies of autumn. At this time, they stand out from the

other trees that share their habitat nowadays, allowing one to easily pick out the cottonwoods -- true pioneers among the latecomers on the modern prairie.

In cottonwoods, this change in leaf color and dropping of leaves is triggered by cooling soil temperatures. As soil temperature drops below 50 degrees, the bacteria that "fix" nitrogen and other nutrients die. This causes the cottonwood to lose much of the water (in the form of sap) in its trunk and branches, causing the tree to go dormant through the winter. Without this dormant period, winter temperatures could freeze sap in the tree and kill it.





nature's notebook

CHAPTER FIFTEEN

WEATHER

by Mark Shoup

Space & Weather

Ever wonder why summers are hot and winters are cold or why days are longer in summer? The answer is simpler than you might think: Earth is tilted on its axis as it orbits (moves around) the Sun. The axis is an imaginary line that the sun rotates (spins) on, just like a wheel rotates around an axle. A simple experiment will help you understand how Earth's tilt and orbit cause seasons.

Here's what you'll need:

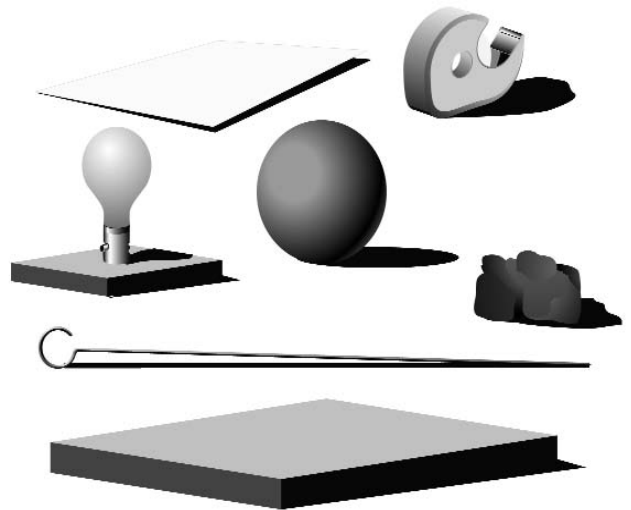
- White construction paper and a roll of Scotch tape
- A Styrofoam ball or small Nerf ball about the size of an orange
- A knitting needle or a cooking skewer
- A flat board about 6 inches square and some modeling clay (A thick Styrofoam

block about 12 inches square may also work.)

- A small lamp (Just a light bulb socket on 4-inch by 4-inch block is perfect.)

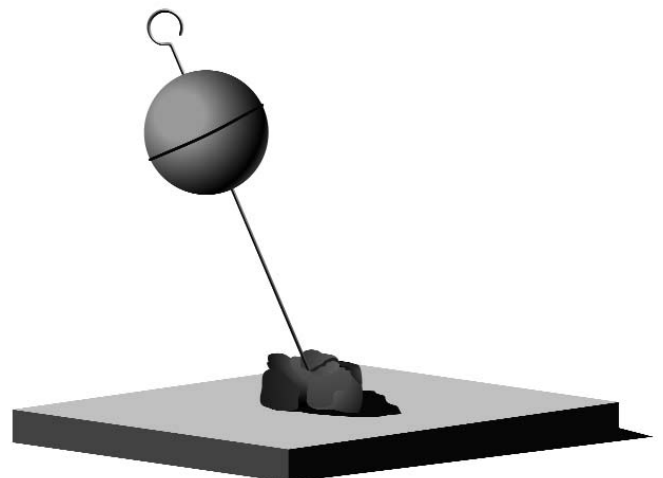
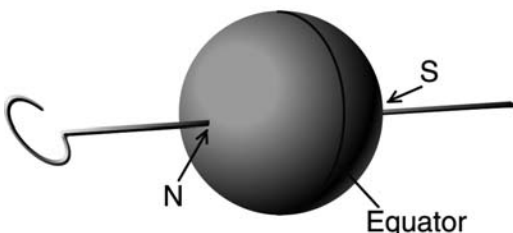
First, you need to make Earth. Push the needle or skewer through the middle of the ball. With a black marker, mark one end "North" and the other end "South." This is your Earth's axis. Then draw a circle all the way around the middle of the ball, perpendicular to the axis. This is the equator.

Next, press enough clay on the board to stick the axis in and hold the Earth firmly. (Or stick the axis in a thick Styrofoam block.) Be sure the Earth



is tilted and that the end marked "north" is up. The real Earth is tilted about 23 degrees.

Now find a clear space on the floor. You need an area about 6 feet by 6 feet. Cut a star out of the construction paper and tape it on one wall, about 3 feet off the floor and centered above one side of



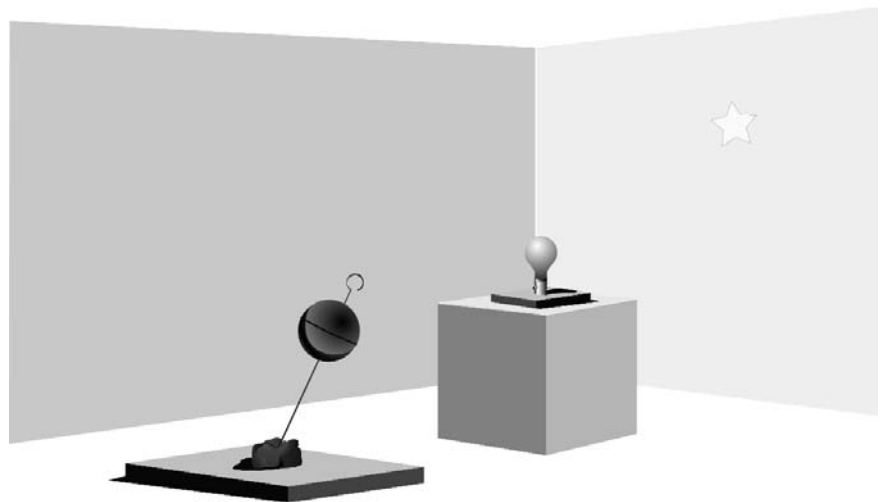
your area. Put the lamp (your Sun) on the floor in the center of this area and turn it on. With the north end pointed toward the Sun -- **and toward the star** -- put Earth on the floor about two feet from the lamp. Be sure that the north end of the axis points toward the Sun. On the first day of summer, June 21, the Earth is always in this position. This is called the summer solstice.

Everything on the north side of the equator is called the Northern Hemisphere. The United States is in the Northern Hemisphere. Rotate your Earth on its axis, just as the real Earth spins. Notice that the Northern Hemisphere receives the most direct sunlight. In fact, it is light here more than it is dark, making days longer than nights.

Can you see why the sun feels hotter in summer? This is because that part of the Earth in summer gets more sunlight and, especially, more direct sunlight. In the Southern Hemisphere, the sunlight hits Earth at an angle, so much of the light bounces off the atmosphere, like skipping a rock across water.

Everything is opposite in the Southern Hemisphere -- that part of Earth south of the equator -- where it is winter.

Okay, let's make it winter in the Northern Hemisphere. **Making sure to keep the axis pointed toward your star,**



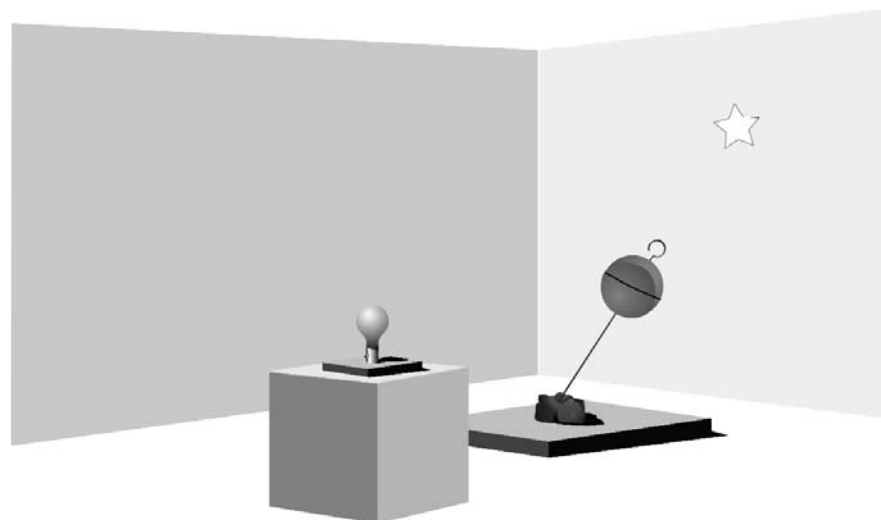
move the Earth halfway around the Sun. The Northern Hemisphere's axis will now be pointed away from the Sun. This move represents six months for your Earth. It is now Dec. 21, the winter solstice.

Have you ever found the North Star (called Polaris) in the night sky? Earth's northern axis always points toward this star. You have just moved your Earth just as the real Earth moves, with the northern axis pointed at the star on your wall -- your Polaris.

Now "spin" your Earth. Notice

that more light now hits the Southern Hemisphere. Days are longer there, and this part of Earth gets more direct sunlight. It is summer "down" there and winter "up" here. The summer solstice there is Dec. 21. Do you know anyone who lives in the Southern Hemisphere? What would it be like to celebrate Christmas in summer?

Okay, you understand seasons now. Ask yourself this question: what would seasons be like if Earth was not tilted?



by Mark Shoup



The most common word we use to describe something cool is “awe-SOME.” However, few probably realize that the real meaning of the word is something that makes you feel both respect and fear. Few things in nature fit this definition of “awesome” as do thunderstorms.

Thunderstorms are the most familiar and exciting events of spring and summer in Kansas. These giant black clouds contain some of the most powerful forces in nature. They also put on some great light shows.

Of course, there are many different types of clouds. From highest to lowest, they include the following:

Cirrus clouds are wispy streaks high in the sky. **Cirrostratus** are similar but spread into milky sheets.

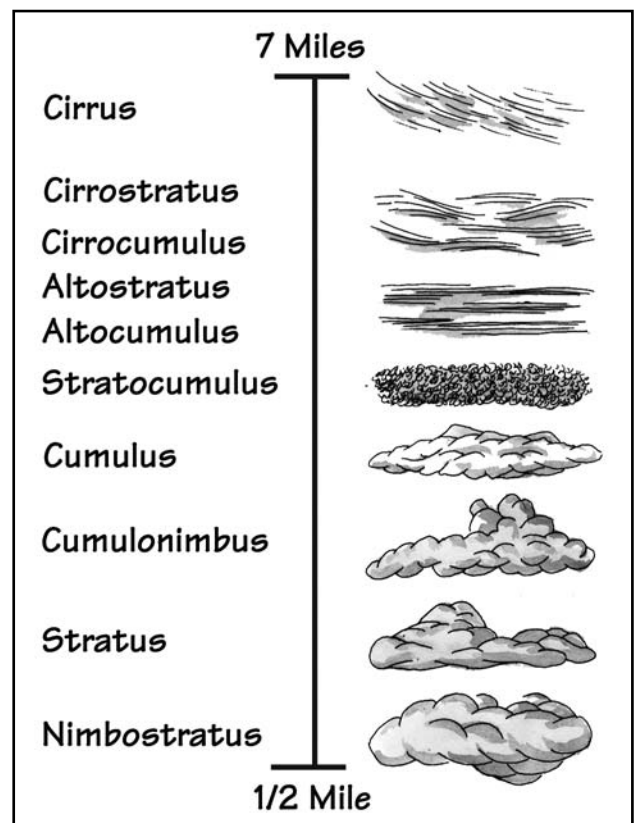
Cirrocumulus are also high and thin, but they are bunched up into a lumpy sheet, like dried white mud cracking.

Altostratus and **altocumulus** are like puffy dinner rolls at medium height.

Stratocumulus rise and spread out sideways from the tops of **cumulus** clouds, which billow upward and have a solid, mountainous look. If a cumulus cloud grows big enough, it becomes a **cumulonimbus**, the boiling, mountainous clouds that sometimes look like atomic explosions. **Stratus** and then **nimbostratus** are the dull gray clouds

that hang low and often contain drizzle.

It is the **cumulonimbus** clouds that put on the great





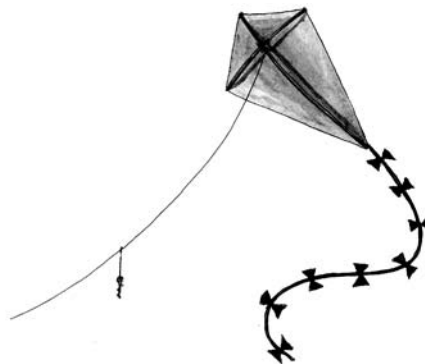
summertime shows that we both love and fear. As warm, moist air rises, it gets cooler the higher it goes. As the water vapor in the air cools, it forms tiny droplets that create the cloud we see. Rising warm air also creates an updraft that, if strong enough, can reach some 18 miles high to the layer of our atmosphere called the **stratosphere**. Air in the stratosphere is warmer, and here the cloud spreads out across the sky.

Large or small, these clouds almost always create thunder, lightning, and rain. If moving masses of cold and warm air come together around a thunderstorm, a supercell storm occurs. These are the scariest of all. Not only do they create thunder and lightning but hail, high winds, and sometimes tornadoes. Kansans know these devastating "twisters." Several have hit Kansas towns, causing widespread damage.

Most storms, however, are just exciting to watch. The electricity they generate

almost seems to charge you up, and the air always feels freshest after a storm.

Lightning is the most common and interesting element of thunderstorms. A single thunderstorm cloud can generate enough energy to light a small town for a year. Some people argue whether lightning bolts move from the clouds to the ground or the other way around. The answer is "both." Lightning bolts begin when a small "leader stroke" charges the air from the cloud to the ground. An instant later, a huge lightning bolt shoots up the path created by the leader.



The air around a lightning bolt is five times hotter than the surface of the sun.

Everyone is familiar with the story of Benjamin Franklin flying a kite with a key tied to the string during a thunderstorm. While old Ben proved that lightning was electricity when sparks jumped from the key, he was very lucky he wasn't killed. NEVER try this experiment.

Hail is one product of thunderstorms that nobody likes. Hail is formed when rain freezes in the cold upper air. If hailstones are caught in the updraft, they may collect



more water, rise, and grow bigger. Hailstones may range from the size of a pea to as big as a softball. The largest hailstone ever recorded fell in Coffeyville, Kan., in 1970. It weighed 1.7 pounds.

This summer enjoy the thunderstorms that come your way. Just be careful. Stay out of the open, and avoid becoming a human lightning rod by fishing or playing golf if a storm is anywhere near. And stay out of the water.

by Mark Shoup

Let it Snow!

In Kansas, some winters go by without a flake of falling snow. When snow does fall, everyone gets excited. Snow is more fun than a sand pile. You can sled on it, slide on it, make snowmen out of it, and best of all, you can have snowball fights with it.

Of course, snow isn't fun for everyone. People have to shovel walks and plow streets to remove it. Driving a car on it can be dangerous, especially when it melts and refreezes, making slippery ice. If too much snow falls, ranchers may have trouble feeding cattle. Just getting around can be nearly impossible.

The greatest record snowfalls have occurred right here in North America. The record for one year happened on Mt. Rainier, Washington, from February 1971 to February 1972 when 1,224 inches of snow fell. That's more than 100 feet of snow in one year. The single-day record came

to Silver Lake, Colorado, in 1974. They received 74 inches -- more than 6 feet -- of snow in one day.

Of course, most snow in the United States melts in spring or summer. In the polar regions of Earth, snow hardly ever melts. Each year, layer after layer of snow falls and packs tightly. This old, well-packed snow is called "firn." Over the years, firn forms what we know as the polar ice caps. The ice caps still contain snow that fell thousands of years ago and never melted.

Over hundreds of years, firn snow forms a glacier, or long sheet of ice. Glaciers create valleys and rivers, and in the Polar Regions, icebergs. The world's largest glacier is the Lambert Glacier, in Antarctica. It is 40 miles wide and 250 miles long. When glaciers such as this meet the ocean, they break off, forming icebergs. Icebergs are very dan-



gerous to ships. The worst accident caused by an iceberg happened in 1912. The Titanic, the world's largest passenger ship -- considered "unsinkable" by its builders -- sunk when it crashed into an iceberg in the Atlantic Ocean. More than 1,500 of the 2,200 aboard were killed.

Although dangerous, snow is a blessing to the earth. It makes our rivers flow and provides moisture for our winter crops. It helps fill our lakes and provide the water we drink. For the playful, it provides a surface to ski. Snowdrifts transform invisible wind patterns into solid sculptures -- beautiful subjects for the photographer.



But what happens before the snow piles up may be the most fascinating part of snowfall.

Snowflakes begin as crystals that develop about 6 miles above the earth. The temperature at this height is more than 30 degrees below zero. Snowflakes begin to form when water molecules collect on tiny particles in the air, such as dust or bits of salt from sea spray. These first flakes are simple six-sided crystals. (Six-sided objects are called hexagons.) Although no two snowflakes are identical, they all have six sides. Some snowflakes have six points; others have six flat sides.

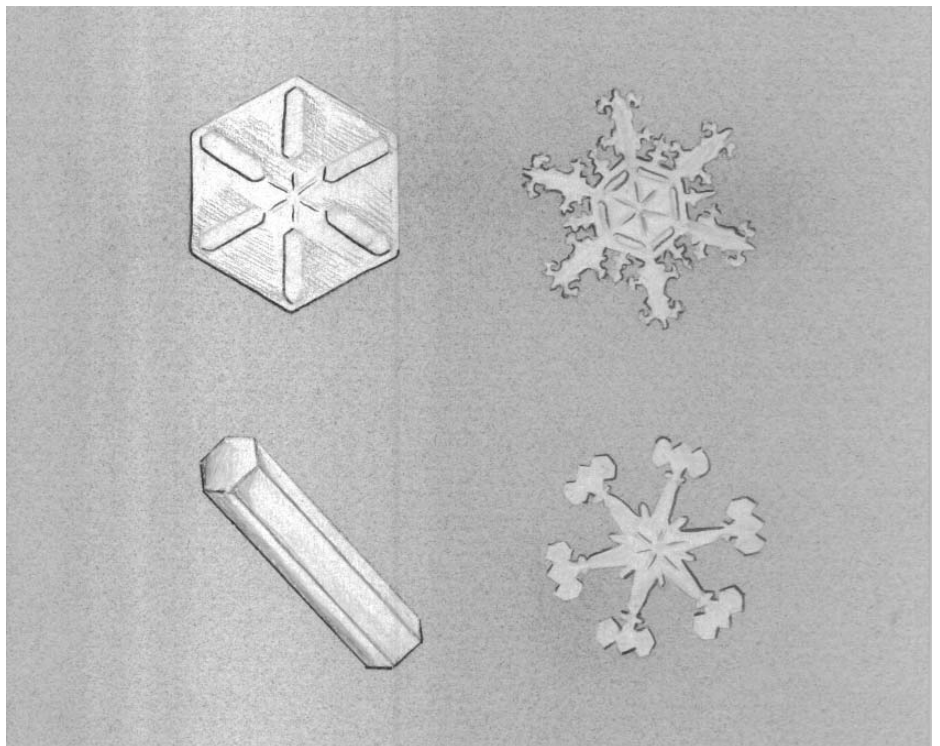
As the crystals fall, water molecules stick to them, forming larger flakes. The warmer the air, the better the molecules stick and the bigger the flakes. Although most flakes are about one-half inch wide, they can be much bigger. In 1971, snowflakes 12 inches wide and 8 inches thick fell in Siberia.

Although every snowflake is different, they do come in several basic shapes, including six-pointed stars, six-sided flat plates, and something that looks like a six-sided needle. Others have many offshoot points that make the snowflake look like it has more than six basic sides.

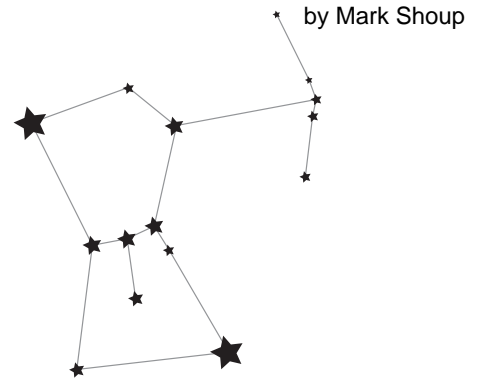
If we have snow this winter in

your part of Kansas, you can check the shape of the flakes. Place a black cloth outside to catch a few flakes. (If you cool the cloth in the freezer first, snow won't melt on it as it lands.) Use a magnifying glass to study the different shapes. Draw them. Write down the date and outside temperature with each drawing. Do this several times throughout the winter. Compare snowflake shape with outside weather conditions. What are the similarities? Differences?

There is something magical about waking up on a winter morning to find it has snowed, especially when it's a wet snow and tree limbs, fences, and shrubs are all blanketed in white. But when it snows this winter, take a closer look. The shapes inside the white blanket may be even more magical than the "winter wonderland" they create.



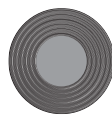
Star Light Star Bright



If you have read the article on star gazing in this issue (Seize the Night), you may be more curious about astronomy. Almost everyone has enjoyed looking up at the night sky and wondered about all those stars. When star gazing, one simple question usually comes to mind: How far away are they?

Most stars are trillions of miles from Earth. (A trillion is a thousand billion, if that helps.) Because trillions of miles are difficult to understand, distances in space are usually measured in "light years" -- the distance that light will travel in one year. (Let's see. Light travels 186,000 miles per second. Now multiply 186,000 times the number of seconds in a year . . . Never mind. We'll just call the answer one light year.)

Some stars appear brighter than others, but does that mean the brighter stars are closer? Not necessarily. Distance, size, and temperature all help determine how bright a star appears in the sky. Naturally, the closer you are to a light, the brighter it seems. Bigger and hotter stars also shine more brightly.



Blue Supergiant
Hottest, Biggest



Red Supergiant
Coolest, Biggest



Blue Giant
Hottest, Big



Red Giant
Coolest, Big



Yellow Star
Warm, Medium Sized



Red Dwarf
Coolest, Smallest



White Dwarf
Hottest, Smallest

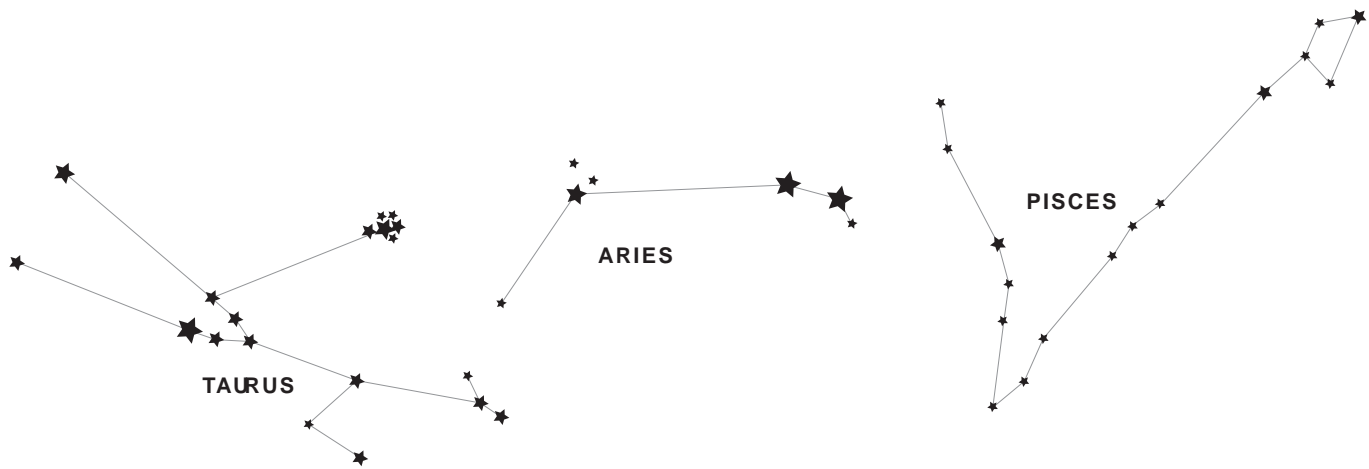
How bright a star appears to be from Earth is called its "apparent magnitude." But if we could collect all the stars in the sky and arrange them the same distance from Earth, we could see how bright each one really is compared to the others. Scientists call this "absolute magnitude."

Absolute magnitude is determined by the star's size and temperature. The star's distance only determines only how bright it appears to be.

There are several types of stars, such as blue supergiant, red supergiant, blue giant, red giant, yellow star, red dwarf, and white dwarf. The hottest stars are blue or white, followed by the yellow star and then the cooler orange and red. Of two equal-sized blue and red stars, the blue one would be hottest -- and brightest. But size matters. A blue supergiant would be the brightest, but a red supergiant might be brighter than a blue giant.

It's not easy to tell from Earth which stars are closer, and not all stars in the same





constellation are the same distance away. Consider the three stars in the handle of the Big Dipper. Alioth, which is closest to the Dipper's "bowl," is about 81 light years away. Mizar, the middle star in the handle, is about 88 light years away, and Alkaid, the star at the end of the handle, is 100 light years away. All three are white stars.

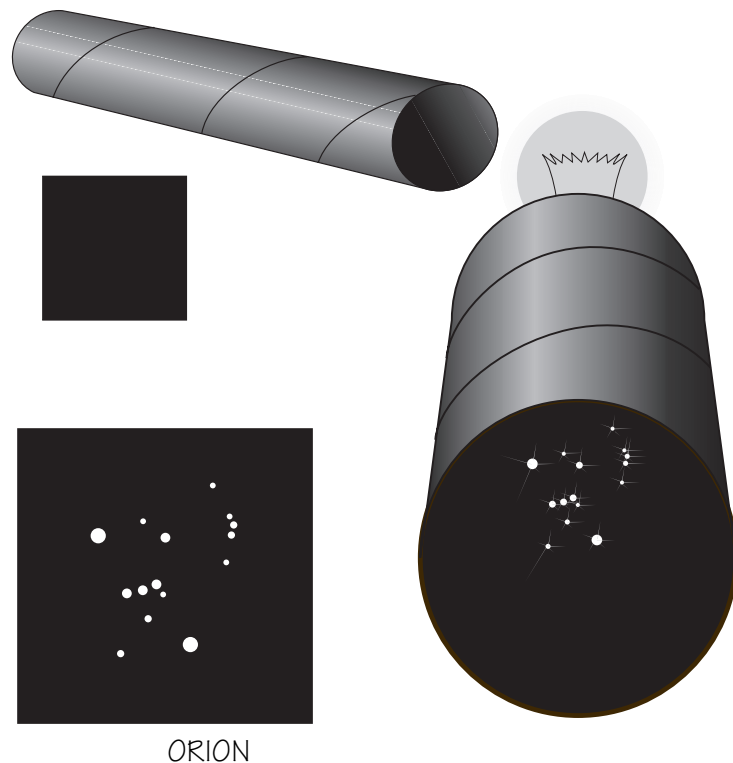
Alioth is the brightest of the three stars. It is also the biggest, about four times the size of the sun, and brightest. Mizar and Alkaid are about equal in size, twice as big as our sun. Mizar is about twelve light years closer, so you might think that it would appear brighter than Alkaid. Not so. While Mizar is about 63 times brighter than our sun, Alkaid is much hotter. It is 4,300 times brighter than our sun!

Like the Big Dipper, most visible stars are grouped into patterns called constellations. For ancient peoples, these patterns represented gods or animals, each with its own story. There are about 90 officially recognized constellations.

You can make your own constellation viewer to demonstrate the patterns of constellations. First, you need an oatmeal canister or a paper towel tube. Next, cut pieces of black construction paper about two inches wider than the hole in the canister or tube. Now, using

the constellations in this article or constellation books from the library, poke holes in the paper in patterns of the constellations.

Turn the paper upside down, place it over one end of the tube or canister, and hold it up to the light. Instant constellation!



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Wildlife Education Service
KS Dept. of Wildlife & Parks
512 SE 25th Ave.
Pratt, KS 67124

Phone:
(620) 672-5911

Website:
www.kdwp.state.ks.us



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