AMPHIBIANS
AND
REPTILES

by

Robert Clarke
& Robert Boles

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I DIDN'T KNOW THAT!
AMPHIBIANS and REPTILES
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Robert Clarke & Robert Boles

Among the most-misunderstood groups of animals, surely the reptiles and amphibians rate highly, for everyone has heard snake tales that border on superstition; and who has not heard of warts caused by toads? Well, this issue of the Naturalist is intended to either put some of these stories to rest or provide more fodder. Actually, real-life accounts of these animals are sometimes stranger, and more interesting, than fiction. So, we are providing you with a potpourri of informational bits, which we hope will stimulate you to learn more — and be more tolerant — of the animals which compose these two classes.

Amphibians have a long geologic history of millions of years and were particularly abundant in the vast, humid swamps, the remains of which today constitute our fossil fuels: coal and oil. Today, this class of vertebrates is made up of a group of worm-like, legless caecilians, found around the world in the tropics, and the better-known frogs, toads, and salamanders.

Succeeding the amphibians geologically, the reptiles, once begun in the Pennsylvanian Period, flourished and expanded in numbers of species throughout the next Permian Period, and, finally, in the Mesozoic Era, dominated the earth, the seas, and the air in a myriad of grotesque forms, such as dinosaurs, mosasaurs, and pterodactyls. But with the ending of the era, the reptiles diminished in number and kind by huge extinctions, leaving us today only a modicum of species, hardly worthy of a group that once ruled the world. Today, the reptiles are represented by a few characteristic types: one rare, vanishing species on New Zealand, the crocodilians, turtles, snakes, and lizards.

How many of the following items do you already know? There are many more. Ask us where and how to look for information, we'll be glad to oblige.

--- I Didn't Know That! ---

In what is now the United States, the decline and end of the dinosaurs and the “Age of Reptiles” was marked by the formation of the Rocky Mountains.

The Spitting Cobra of Africa has the ability to eject a spray of venom droplets for a distance of several feet, and with astounding accuracy.

Under unusual stress conditions, Horned Lizards may squirt a spray of blood from the eye.

The United States has only one species of crocodile, which occurs in extreme southern Florida, where it is under strict protection.

There is a snake in the southwest desert that “swims” under the sand.
On Isla Santa Catalina, in the Sea of Cortez, Mexico, there is a population of rattle-less rattlesnakes. This isolated group lacks the gene necessary to produce the rattle shape which holds the segments together, so with each shedding of the skin, the rattle segment is lost.

Whereas all amphibians and most reptiles have a three-chambered heart, the crocodilians possess one that is essentially four-chambered.

In mating season, the roar of male alligators can be heard for miles in southern swamps.

Crocodiles are found in the tropics around the world, some even having been seen at sea, miles from land.

Although alligators have great strength for closing their jaws, the muscles that open the jaws are not so developed; thus a showman that "wrestles" alligators is able to hold the jaws together with his hands.

Many lizards will lie still when placed on their backs, as if mesmerized.

The prehistoric reptiles known as pterosaurs were capable of sustained flight, even though the wing membrane was supported by only one finger.

Some lizards use only their hind legs when running, much as the great carnivorous dinosaur, **Tyrannosaurus rex**, did millions of years ago.

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**Male anoles, American Chameleons, may be told from the females because they possess a large throat fan or "dewlap", which is used in display for territoriality or courtship.**

There are about 600 species of reptiles alive on Earth today.

Turtles and tortoises have no teeth, but instead have a horny bill somewhat comparable to that of a bird.

The rattles of a rattlesnake represent horny remnants of the skin that remain attached to the base of the tail and are not lost during shedding of the old skin.

The only known poisonous lizards are the Gila Monster and the Mexican Beaded Lizard of the southwestern United States and northern Mexico.

Fangs of poisonous snakes, like other teeth, are replaced if lost.

Some of the larger aquatic forms of salamanders were probably eaten by primitive tribes in both the Old and New Worlds; in fact, the "axolotl", the larval stage of one of the salamanders, is cooked and sold as a delicacy to the natives of Mexico City.
Some types of snake venom (Cobra or Coral Snake) attack the nervous system primarily; other types (Battlesnake) affect mainly the red blood corpuscles and blood vessels.

The body of a snake-bite victim builds up a protective antivenin that tends to counteract the snake's venom. The material used in most antivenin has been built up by a horse that has received numerous small injections of snake poison.

Taste buds are lacking from the tongue of snakes, but the tip of the forked tongue transfers molecules from the environment to two sensitive pits in the roof of the mouth where probably both scent and taste are interpreted.

King Snakes feed on other snakes, even poisonous ones. Snakes are the prime food choice of the King Cobra of southern Asia.

Snakes are preyed upon by many animals, such as hawks, shrikes, and skunks and other members of the weasel family.

Snakes are totally deaf. They can, however, detect vibrations, such as that produced by the thump of a boot heel striking the ground.

Mudpuppies or "Water Dogs" are not poisonous. Their saliva will not hurt you, even if you are bitten.

Larval salamanders are valuable in laboratory transplantation experiments and studies of limb regeneration.

One kind of salamander in China is captured by herb collectors, killed, dried, and sold to the local "drug stores" as a cure for stomach trouble.

The largest of all living salamanders, which lives in Japan, grows to over five feet in length. Japanese catch it with hook and line, and its flesh it relished.

The largest American salamander, the Hellbender, Cryptobranchus alleganiensis, reaches a length of over twenty-nine inches.

The Tiger Salamander, Ambystoma tigrinum, may reach a length of over thirteen inches, making it the largest terrestrial salamander in the world.
Some toads may lay up to 35,000 eggs a year, though one species lays but a single egg.

A female European Common Toad lived under the steps of an English garden for 36 years. During this time it became so tame it would come out to take food from a person’s fingers, and even to have her back scratched.

The male of the European Midwife Toad assumes the responsibility for the eggs after they are laid by wrapping them around his waist and watching over them and keeping them moist until they hatch.

The African Chameleon has the ability to move each eye independently, to change color and pattern rapidly, to shoot its tongue out of its mouth almost a body length, to use its tail as a grasping organ, and has the toes of each foot separated into two groups (three on the outside and two on the inside) making an effective gripping device for branches, where it spends almost its entire time. Altogether, an unusual animal!

There are 90 different kinds of reptiles and amphibians in Kansas. Of these, only four (venomous snakes) can be considered dangerous to man.

Snakes differ from most other animals in that they do not stop growing when they become adults, but slow down considerably with increase in size.

The bite of a non-poisonous snake, such as a large Water Snake, may bleed rather profusely where the many tiny teeth have punctured the skin, apparently partly because the snake’s saliva retards coagulation or clotting. This may make the wound look much more dangerous than it really is.

Some snakes, such as the Garter Snake and Water Snakes, will defend themselves when handled with an offensive-smelling secretion produced by anal glands near the tail.

Many snakes, such as King Snakes and Rat Snakes, vibrate their tails rapidly when nervous or frightened, much as a rattlesnake does. In dry leaves this may produce a sound much like the buzz of a rattlesnake.

Snakes that are active by day usually have round pupils, while those that forage chiefly at night have pupils that are vertical, or catlike.

How long do snakes live? Records exist only from captive specimens. A Boa Constrictor in the London Zoo lived to be 23 years of age. An albino Prairie Rattlesnake lived in a cage for 20 years at the ESU Division of Biology. It died last year, not from old age, but when attacked by a young rat that had been placed in its cage for food.
Before much was known about fossils (early 1700's) a large fossil salamander was described as the skeleton of "the man witnessed the Deluge." An engraving was reproduced in one of the early Bibles as undeniable proof that the biblical story of the flood was true.

A surprising number of people over the world use snakes or their parts in medicine. Old-timers may still remember people using "snake oil" in an attempt to cure rheumatism. Today snake venom has several valuable uses in modern medicine.

A toad is a valuable animal, as it eats large numbers of insects that might damage crops. One estimate claimed that a single toad is worth from ten to twenty dollars to a North American gardener or farmer.

Papers sometimes print stories of people who claim to have found a live toad in the cornerstone of some old building that is being torn down. However, it has been shown that toads can live but a matter of weeks without food, even if plenty of water is available.

Some amphibians, the Caecilians of the tropics, are completely limbless, and look like large earthworms.

Salamanders are voiceless, though some may emit a small squeak when handled.

A Spadefoot Toad may stay burrowed for several months until the next good rain comes.

The type of locomotion called "sidewinding" is an adaptation for progressing over the soft, smooth sand of the desert. Sidewinder Rattlesnakes are found in the southwestern deserts of the United States.

Some salamanders become sexually mature while still in the larval stage, and some of these may never metamorphose to the adult form. The Tiger Salamander larvae often exhibit this, and are known as "axolotls."

Ancient Chinese physicians added toad skin to the medicine used in treating heart conditions. Modern chemical analysis now tells us that it really does contain a digitalis-like substance. Digitalis is prescribed for treatment of heart disorders by American doctors today.

Since amphibian skin does not grow with the growing body, as ours does, it becomes necessary frequently for the amphibian to shed its tight old skin. Some toads push the old skin off with their "hands", roll it up into a ball — and swallow it!

The "warty" skin of a toad cannot give warts to anyone who handles it.

"My skin? I was handled by a boy with warts!"
The Hog nose Snake, or "Puffing Adder", is actually harmless, and does not have a poisonous breath, as is sometimes supposed.

![Image]

Imagine ---- They say I have bad breath!

If a human tried to consume a food item in proportion to that eaten by a snake, it would be like trying to swallow a basketball with your hands tied behind your back. Actually, a snake doesn't swallow its food as we do, but slowly draws itself forward over the prey.

The Hedgehog in Europe and the Mongoose in the tropics of Asia and Africa are famous as snake eaters.

No snake has legs, but some snakes have vestiges of hind limbs, an example being the "spurs" of a male Boa Constrictor.

A snake drinks like a horse, thrusting its nose in and sucking up water by means of rhythmic contractions of its throat.

Many lizards have the ability to break off (autotomize) part of the tail. The broken portion twitches and contorts for a little while, attracting the attention of the predator, giving the rest of the lizard a chance to escape. A new tail portion later grows from the stub, but it is structurally different from the original.

Sometimes a lizard's tail is not completely detached when broken and a new tail grows out at the site of the break, resulting in a "two-tailed" lizard.

The Basilisk Lizard of southern Mexico and Central America lives in and around trees along streams. It has very large hind legs and feet and, when frightened, will run on the hind legs. On coming to water, the speed and large feet skitter it across the surface, sometimes actually crossing small streams in this manner. A colloquial name given to this lizard is Jesus Christo Lizard, because it "walks on water."

The eyes of Blind Snakes are visible only as pigmented spots, and unlike other snakes, the scales around the body are all the same.

The tail of a snake usually makes up about one-fourth of the snake's total length.

The tail of the true Sea Snakes is flattened and oarlike, and is used to propel them rapidly through the water.
More and more people are now keeping salamanders as pets.

The call of the Barking Frog sounds like the yapping of a fox terrier dog, the Carpenter Frog sounds like someone hammering, and the Green Frog sounds like a banjo being plucked.

Because of its great appetite for beetles, the Marine Toad of tropical America has been introduced to nearly all sugar-producing areas to help fight the sugar beetle.

South American Indians use the secretion of Arrow-poison Frogs for poisoning the tips of their arrows.

Zetek's frog, the Panama, is so poisonous that it may kill other animals that try to eat it.

There is a belief in Argentina that if a Horned Frog (Ceratophrys ornata) bites the lip of a grazing horse, the horse will die from the bite. Actually, there is no poison in the frog's mouth.

The wart-like parotoid glands, located behind the toad's eyes, secrete an irritating poison when the toad is frightened or injured.

A Kansas lizard that occasionally runs on its hind legs is the large, colorful Collared Lizard, that uses its long tail as a balance.

Box Turtles (Terrapene) are so-called because the plastron (lower shell) is hinged to the carapace (upper shell) and allows the head and legs to be withdrawn and the shell closed like a "box" against predators. Box turtles are terrestrial, but the aquatic turtles have had to sacrifice this kind of protection in order to increase buoyancy and swimming ability, thus the shell size has been diminished.

Box Turtles, because of their high-domed carapaces, have a difficult time mating, for the undersides of the tails must come together. This has been accomplished by the male mounting the female's shell from the rear, hooking his innermost rear claws under her carapace edge, and then falling backward. It is quite an awkward arrangement, but effective.

A snake is almost completely helpless on a very smooth surface, such as a piece of glass, and can make very little forward progress.

Mating of snakes usually takes place in the spring, before the recently emerged snakes scatter for the summer.

When the substrate gets hot for a lizard, its body and tail are elevated, it raises its front feet up on its claws, then raises the large hind toes up in the air, resting on the heel of the foot.
Poisonous Water Moccasins ("Cottonmouths") seldom occur in Kansas. Many reports of such are caused by mistaken identification of harmless water snakes.

One family of salamanders, the Plethodontidae, common in eastern United States, has no lungs, so all "breathing" must be accomplished through the skin and mouth lining.

The largest of all lizards is the Komodo Dragon, a monitor lizard, that live in the Dutch East Indies. These lizards grow to over 12 feet in length and may weigh over 250 pounds. Pigs and small deer form the mainstay of their diet, but they will eat carrion, also.

Only one lizard today regularly enters salt water — the Marine Iguana of the Galapagos Islands. They feed on algae on rocks underwater and are at home in the sea. Kansas once had a population of huge marine lizards, the Mosasaurs, which lived in the sea that covered what is now western Kansas during the Cretaceous Period of the Mesozoic Era (the "Age of Reptiles"). Good exhibits of these monsters may be seen in the museums at Fort Hays State University and the University of Kansas.

A captive garter snake gave birth to 78 young.

Female snakes probably will never be considered to be ideal mothers, as they normally take no interest in their young after they are born.

A snake is most brightly colored just after shedding its old skin.

Snakes locate prey by both sight and smell. A Swiss zookeeper told of a European water snake that tried to swallow a part of its own body that was scented with fish. A pet Hognose Snake at ESU ate the toad offered to it as food, then tried to swallow the thumb of the professor's hand that had been helping to hold the toad. "Old timers" may recall finding snakes that had swallowed the china "nest egg" from a hen's nest. A hungry DeKay's Snake was seen to follow the trail made by rubbing earthworm "extract" along the floor of its cage.

Snakes can live for months without eating. However, when food is available they may engorge until they can hardly move.

There is a small toad in the semiarid regions of Africa and Australia that lives inside of termite mounds, where it not only finds sufficient moisture, but also is extremely well-fed on the myriad of its host.

All snakes are carnivorous and predatory.
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The Alligator Snapping Turtle, largest of our fresh water turtles, has an amazing fish lure — a worm-like appendage on its tongue which it wiggles, coaxing unwary fish into the gaping jaws.

You cannot tell the age of a rat-tlesnake by the number of rattles it has. Actually, a new rattle is formed each time the snake sheds its old skin, and it may shed its skin several times a year. An albino Prairie Rattlesnake, captured as a baby, was kept in the Biology Department at ESU for some 20 years, during which it shed its skin over 50 times. This means it formed more than 50 rattles. If each rattle averaged about one-fourth of an inch in length, and none was lost, the snake would have had a string of rattles over a foot long. Because rattles are easily broken or worn off, a rattlesnake seldom has more than six or eight rattles, at most, regardless of its age.

Some snakes, such as Racers and Rattlesnakes, tend to raise their heads when they sense someone or something approaching. Such behavior makes a mowing machine a literal "guillotine."

Lizards conduct themselves during their active day in such a way that a "preferred body temperature" is reached and maintained. This PBT varies with different species and lizards from different habitats, but it is maintained in a species between very close limits, varying only a few degrees. All of the major functions: feeding, mating, excreting, take place while this PBT is in effect. Lizards are not "cold-blooded," for the PBT may be higher than yours. Unlike mammals, that have built-in thermostats, lizards control their body temperature by behavioral thermoregulation.

The largest USA lizard, the Chuckwalla, of the southwestern desert, although fierce in appearance, is primarily a vegetarian, that relishes flowers.

“Sand” lizards, such as the Earless Lizard and Gridiron-tailed Lizard, bury each night (or escape) into the soft soil or sand by folding the front legs back along the body and then "shimmying" the body from side to side, while pushing with the hind legs, quickly disappearing beneath the surface.

Newts can be readily "tamed", learning to expect food from the person who tends them.

A frog uses its eyes to help "push" food down its throat.

Snakes cannot close their eyes, as they do not have movable eyelids.
In spite of a generation of effort on the part of biologists and naturalists to educate the public as to the usefulness of snakes, there is still a widespread fear and horror of even the most harmless forms in the people's minds.

Some people still believe that there are "Hoop Snakes" that form themselves into a circle, and "roll" downhill in pursuit of any hapless person who may get in their way.

A mother snake does not protect her young by swallowing them.

The so-called "Glass Snake" isn't a snake at all, but a legless lizard. It is also not true that the parts will grow back together, or that each piece will continue to "wiggle" until it thunders.

Snakes are not "slimy", nor do they "sting", with their tongues.

The mate of a snake does not go around trying to "avenge" the killing of one of the pair, as some people believe.

The constrictors, such as the Rat Snakes, do not crush their prey, as many people think. Instead, the heart action is stopped by the powerful squeezing action, so that the animal dies quickly.

Snakes are very important in the control of field mice and cotton rats that live in the farmer's hay and grain fields.

Snakes have only one lung.

Horned Rattlesnakes are found only in deserts. The Sidewinder of the Southwest has an almost identical counterpart in the Sahara, but it is a member of a different family. The two even use the same sidewinding locomotion.

A snake's backbone may have 200 or more vertebrae.

Snakes cannot outrun a human. Their long slender form just makes them look like they are traveling very fast. Even the "Blue Racer" was timed at a maximum speed of only 3.6 miles per hour.

Some of the colors of snakes are not due to pigment, but to small crystals in the scales that break up light rays in the way a spray of water does to form a "rainbow."

Snakes are unable to change their color as many lizards can, but changes may occur from young to adult in both color and pattern in some forms.
Poisonous snake bites are relatively rare—in fact, wasps and honeybees kill more people each year in the United States than do poisonous snakes.

The biggest cause for the reduction in the number of snakes in the United States has not been active campaigns of snake killing, but changes in the environment brought about by the activities of man.

A blood sinus in the back of the head of the "sand" lizards allows them to emerge from the sand in the morning already "warmed up" and ready to go. When the lizard buries for the night, the top of the head is just below the surface. The sun warms the blood moving through the sinus and brings the lizard's body temperature high enough that he can respond rapidly to an emergency, such as predator attack, as soon as he exposes himself from the sand. This is an extremely important protective device, since the areas where these lizards live are usually lacking in concealing cover.

Old time cowboys used to put their lariats around their sleeping area at night, in the belief that a snake would not cross a horse-hair rope.

A Hognose Snake will roll onto its back and "play 'possum" if disturbed. It may even let its mouth hang open and its tongue hang out. Evidently it thinks it only looks dead when it is on its back, for it will quickly turn over again if placed on its stomach.

The male Marsupial Tree Frog helps the female place the fertilized eggs in a pouch of skin on her back, where they are carried until they hatch.

The South American Short-head is a little warty toad that spends almost its entire life underground.

A snake's egg is covered with a tough, leathery shell.

A “flying lizard” lives today in southwest Asia and the islands of that area. It is a small lizard that lives in trees and uses its flight to travel from tree to tree. Its ribs are extremely long and the skin of the sides is loose, so that when the ribs are erected the effect is that of a pair of wings. These wings are gaudily colored and when they glide from their perch to another tree, much like a flying squirrel, they appear like a butterfly. The flash of colors is utilized in courtship and territorial display.

Amphibians have been on earth for over 280,000,000 years.
Snakes ("Milk Snakes") do not suck milk from cows, in spite of stories of people claiming to know of such cases. There is a myth in Brazil that claims one kind of snake may enter people's huts and take milk from the human mother.

Frogs do not drink water, but must absorb the necessary body moisture through their skins.

The majority of amphibians may be considered beneficial to man — the rest cause few problems.

The term "amphibia" literally means "double life," and refers to the necessity of many toads, frogs, and salamanders spending part of the life cycle in water and the other on land.

Some amphibians retain gills throughout their lives and never leave the water. One such, is the Mudpuppy.

All turtles lay eggs, which they bury in a nest in soil or sand, cover, and desert. Even sea turtles, that spend their entire lives at sea and are ill-equipped to travel on land, must come ashore on a sandy beach to lay eggs.

Some frogs spend their entire lives in trees, never descending to the ground. Their eggs are laid in rain water caught in cup-like leaves of certain "air plants" which cling to the branches of trees.

The poisonous Coral Snake is so inoffensive that it is often captured by hand under the impression that so handsome a creature must be harmless (But the extreme potency of its venom makes such handling highly dangerous.)

Any snake can swim if placed in water.

About ten days before a snake is to shed its old skin, its eyes become milky and opaque, making them look as if they were filled with smoke. The snake is blind during this time. However, the eyes will clear up about a week before the snake actually sheds its skin.

Tree Frogs often "sing" when stimulated by rising humidity, thus predicting a storm.

In Europe, the Fire Salamander, when handled, smells like vanilla and the frog, Pelobates, has the odor of onions.
In Australia, there is a lizard, the Moloch, which is even "horny-er" than the Kansas Horned (Toad) lizard.

Many persons believe that the small lizard bought at fairs and circuses, called a "chameleon," can live on sugar and water. Not so! They are insect eaters and will soon die on a diet of offered sweets.

Some poisonous snakes have the fangs located in the rear of the upper jaw.

Male snakes and lizards have two copulatory organs, known as "hemipenes."

Whereas most turtles withdraw the head straight back into the shell, there are some turtles in the Southern Hemisphere that bend their necks to the side.

The baby turtle trade has fallen off almost completely since it was discovered they were transmitting dangerous bacteria, Salmonella.

Two types of Kansas turtles lack hard shells. They look somewhat like pancakes and the shell is leathery. But watch out for their long necks and jaws that are not soft!

No amphibian lives in the sea.

The skin of the North American Pickerel Frog secretes a substance which will kill frogs of other species that come into contact with it.

Snakes are distinguished from all types of lizards by the fact that the two halves of their lower jaws are separated, connected only by an elastic ligament. This is an adaptation for swallowing large prey organisms.

Snakes that give birth to their young usually do so in late summer or early fall.

The largest terrestrial turtles occur on islands, such as Aldabra and the Galapagos. Since they can exist for a long period without food or water, they were prized as a food source of fresh meat by sailors of the past two centuries, who made it a practice to stop by the islands when in the vicinity. These turtles are no longer endangered by this type of predator, but by modern pirates who loot the islands for food, shells, and zoo specimens; and by animals brought to the islands by man, such as goats and rats.

Turtles apparently do live to a ripe old age. Although there are not too many records of their longevity, authenticated records indicate that some individuals have lived for over 100 years.
THE SECOND 12 YEARS

The new editor of the Kansas School Naturalist, starting with Volume 27, will be Dr. Robert F. Clarke. Dr. John Breukelman started the publication with Volume 1 in October, 1954. After serving as editor for the first 14 years of the Naturalist's history, he turned the position over to me. Starting with the October, 1968 issue, I served as editor for the next 12 years. As I will be retiring from active service as of the close of the fall semester, Dr. Clarke has assumed the editorship of future issues. I have appreciated many helpful suggestions and constructive criticism from our readers during the past 12 years, and I hope you will give him the same support and cooperation you have given me.

Robert Boles, retiring editor.

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SCOOPED!!!

We have hoped for years to publish a colored issue of The Kansas School Naturalist on the beautiful flowers of the Kansas prairie. However, we have been "scooped" by Mr. Clenton E. Owensby, whose new book, Kansas Prairie Wildflowers, is now available from the Iowa State University Press, South State Avenue, Ames, Iowa 50010. The numerous color plates are excellent, and it is a much more extensive work than we would have been able to do with an issue of the Naturalist. We recommended it to all flower lovers as a fine addition to your nature library.

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New Books

Good reading habits and an enjoyment of reading should start as early in a child's life as possible. Also, it is often easier to sit and passively watch TV than to find something interesting to read. We have recently examined some new books by the Children's Publicity Department of Charles Scribner's Sons (397 Fifth Avenue, New York, N.Y. 10017) that should help stimulate youngsters to spend more of their time reading:

Haley, Gail E., The Green Man
Milne and Milne, Gadabouts and Stick-At-Homes
Murphy, Louise, My Garden
Freschet, Bernice, Five Fat Racoons