SHADOWS IN THE NIGHT

Robert J. Boles

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Editor: Robert J. Boles

Editorial Committee: James S. Wilson, Robert F. Clarke,
Gilbert A. Leisman, Harold Durst

Ex officio: Dr. Edwin B. Kurtz, Head, Dept. of Biology

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SHADOWS IN THE NIGHT
Robert J. Boles

Almost everyone who has spent some time outdoors in the country has had cold shivers run up his back and the hair on the nape of his neck "stand on end" at the eerie cry of an owl. These much misunderstood birds have been subjects of fear and superstition for ages. It was once believed (and some people may even believe so today) that if one saw the silhouette of a screech owl at night, or heard its cry, it foretold some fearful misfortune was coming.

Ages ago the brains of an owl were considered to be a sure-cure ear-ache remedy. One of the owl's eyes was supposed to bring sleep, the other to keep you from sleeping. (If the eyes were placed in water, the one that sank was the one that brought on sleep, the one that floated was the "sleepless eye"). Owl blood, if it was rubbed on the face, was believed to cure facial paralysis. If the owl's blood was mixed with oil and rubbed on a person's head, it was believed to be able to get rid of his head lice.

We hope that this issue of The Kansas School Naturalist will serve to broaden the reader's understanding of this very valuable, but still persecuted, bird.

All owls are carnivores—that is, they require meat for their diet. This meat is usually secured in the form of small animals that are abroad during the night. The owl is well-adapted for his role as a nocturnal predator. The large head, the flattened face, the forward-facing eyes, the hooked bill, the strong, sharp, curved talons, and the soft feathers which let the bird glide silently through the night all play a role in making it the successful hunter it is.

There are some 134 different species of owls in the world. Some are as small as sparrows, others as large as a large rooster.

Though the owl has huge eyes, they are relatively immovable in their sockets, and the bird has poor depth perception and only limited accommodation. The almost constant movement of the owl's head up and down and sideways appears to aid them in overcoming these limitations.

Owls swallow the small mammals they capture entire. They have no crop, as do most other birds, but are able to digest meat from the bones and fur. These undigestible parts are cast up as "owl pellets," and often accumulate in large numbers under the roosting place of the owl. The pellets of young owls are relatively free of bones, however. This may be due to the high requirement for calcium for the skeletons of the growing birds. (Hawks differ from owls in their eating habits, in that they usually tear their prey apart and pick out the more digestible parts).

The large head of an owl, placing the ears some distance apart, plays an important role in the capture of prey by this nocturnal bird. In spite of its great eyes, the owl can see no better in complete darkness than can a human. Its sense of hearing is actually much more acute than its sense of sight. In an experiment run in a pitch-black room, an owl was able to capture seventeen straight mice in a row without a miss. It finally missed the eighteenth one when one of its ears was plugged with cotton. This also suggests what may be the main reason for the special soft flight feathers that
allow an owl to travel silently through the sky—to muffle sonic interference that would confuse the owl, and interfere with its ability to glide accurately down upon its prey in the darkness. The flattened face may also serve to "funnel" sound into the ears. By having the ears far apart in the wide head, an owl is better able to detect sound direction, much in the same way as we do. Its ears are also adapted to the acute of high sounds, such as the squeaking of a mouse. It is interesting to note that the few owls that pursue their prey mostly by day, such as the burrowing owl, have a much "harder" plumage, and the flight is not nearly as silent as is that of owls that are most active at night.

Tropical owls lay only one or two eggs in a clutch. The number of eggs laid increases in those species that occur further to the north, with some northern species laying as many as a dozen eggs. The number of eggs laid appears to be adjusted to the available food supply. For example, in years of high mouse populations, the clutches are considerably larger than in years of low rodent populations.

Most birds, such as robins and quail, wait until all of the eggs of the clutch are laid before they start sitting on them, thus having all of the eggs hatch within a few hours of each other. Owls, however, start incubating the eggs as soon as the first one is laid (a condition that is sometimes referred to as "staggered birth"). Twenty-five to thirty-five days are needed for incubation, so that by the time the entire brood is hatched, the little white, down-covered fellow who comes out of the last egg may have an older brother that is almost ready to fly. And, if food becomes scarce, he will be lucky if he doesn’t end up being one of his big brother’s meals. This has been interpreted as a mechanism for the survival of predaceous birds which must often face periodic shortages of game.

As a rule, only the female owl incubates the eggs. Evidently there is no active "women’s lib" group among owls, for, in spite of the old man shirking his egg-warming duties, most owls tend to remain paired for a long time, perhaps for life. Owls are courageous in the defense of their nests and young. They will often not hesitate to attack anyone approaching too close—and some people have the scars on their noggins to prove it. An owl "fluffs up" when scared or angry, making it look even larger and meaner, and may actually fly at the eyes of the person bothering it. A city newspaper ran a picture a few years ago of a local citizen, club in hand and a wire wastepaper basket over his head, who was taking no chances on his way home following such an attack.

Owls are known to do considerable migrating, but as yet not too much is known about these movements. Much of it is, no doubt, influenced by the great fluctuations that the smaller rodents often undergo. A sudden "crash" in one area will serve as a signal for heading for new hunting grounds.

The talons, rather than the beak, are used in the capture of prey. Diving down upon a rodent, these powerful claws are driven through a vital organ,
usually causing a quick and painless death. Just to be sure, the owl administers the “coup-de-grâce” at the base of the skull with its strong, hooked beak.

Owls have not been as adversely affected by DDT and the other pesticides as have hawks. The main reason seems to be due to the rodent diet of the owls. DDT is almost as deadly for rodents as it is for insects, so few rodents live to build up a heavy concentration of this deadly compound in their bodies. Hawks, on the other hand, build up heavy concentrations when they eat birds that in turn have concentrated the insecticide through the eating of poisoned insects.

The food habits of owls may be considered to be very beneficial to man. A study of the remains of 15,587 vertebrates taken from the pellets of owls showed that 95.5 percent were small mammals, mostly rodents, 4.2 percent birds, and the rest amphibians. The USDA reported, after an intensive study of 2,700 hawk and owl stomachs, that owls are the most beneficial of all birds.

In case any of you haven’t tried this—you can’t “twist an owl’s neck off” by walking around it in circles. It may look like it never takes its eyes off you, but it does. An owl can swivel its head some 270 degrees. At this point it quickly twists its head around the other way, and keeps on watching what you are doing.

BARN OWL (Tyto alba)

The barn owl has sometimes been described as a biological misfit. The grotesque white, heart-shaped face is responsible for the common name, “monkey-faced owl,” that is often used for this bird. It is the only owl with this facial pattern. Its legs are long and “knock-kneed,” and the toes are long and skinny. The head looks large, even for an owl, and the eyes appear smaller than the eyes of other owls. It bobs and twists, moves its head back and forth, and hunches itself into peculiar and distorted positions.

The ears of a barn owl are extremely sensitive, and scientists believe they hear most efficiently at frequencies above 9000 cycles per second. If you can imitate the squeak of a mouse, you may be able to call a barn owl to within a foot or two of you.

There is no defined nesting season, and nests may be found almost anytime of the year. This species tends to use the same nesting site year after year. It does not build the conventional type of nest, but piles new material on
top of the old, until the debris of many years gradually accumulates into a huge pile. The name “barn owl” comes from its use of abandoned barns and other old buildings, belfreys, lofts, and ruins as nesting sites. The felt-like pellets of regurgitated matter in old nesting sites may litter the floor below the nest, often to a depth of several inches.

The eggs are more rounded than are the eggs of most birds, and are pure white in color. There may be from five to ten or more in the clutch. Up to thirty-four days are required for incubation. As with most owls, there may be many sizes among the young in the nest. In good food years most of the young may survive, but in years of low mouse populations many of the young may starve or be eaten by the larger nestlings. At the nest the adults do not hoot, but give a toneless, snake-like hiss at intruders. At other times their cries have been described as “a series of nasal snores, punctuated with agonized screams.” The young owls will snap their bills, and hiss like snakes. The nestlings remain in the nest for about eight weeks.

The young appear to be always hungry, and will eat more than their own weight of food in a night if they can get it. Half grown young have been seen to be fed as many as ten prey items in a single night. In this almost unceasing search for food an adult owl may catch more mice than a dozen cats. Nature has also given the barn owl the ability to follow the course of mice even in extreme darkness. Some scientists believe they are able to use infrared light rays, the same principle that man uses with his “sniper scope” in locating the enemy at night.

In the port city of Guayaquil, in Equador, the barn owl “never had it so good.” Great numbers of rats live in the banks of the Guayas River near the port. Owls, living in old buildings near the river, find a plentiful food supply readily available for what must be to an owl a happy life.

The color of barn owls may vary considerably. Some are quite light in color, others are rather dark. It has no close relatives in owldom, but the species has dispersed over the land until it is now almost world-wide in range.

An adult barn owl measures about eighteen inches in length.

GREAT HORNED OWL (Bubo virginianus)

Small mammals and birds have good reason to fear this huge nocturnal bird
of prey, with its twenty-four-inch body and sixty-inch wingspread. It is the common (in fact the only) large North American owl with ear tufts or "horns." You may often locate the whereabouts of one of these birds by listening to the noisy and excited clam­oring of a flock of crows. They dearly love to tease and pester a great horned owl. In fact, this is also a good way to attract crows, and a stuffed owl, or even a relatively good facsimile, will soon attract a noisy crowd of the large black birds. The ear tufts are considerably farther apart on this owl than on the long-eared owl, with which it may be confused.

The call is typically four to seven low, deep, penetrating "hoots." This is the species most deserving of the title "hoot owl." It may also give a dog-like yap or a cat-like squall at times. The great horned owl has been reported to sometimes "whistle like a train or coo like a dove." It is without a doubt one of the most articulate of the owls.

They are aggressive and powerful, and have sometimes been referred to as "tigers of the air." They may at times be highly destructive to chickens, game and song birds, rabbits, and squirrels. Once one has acquired a taste for chickens, it may be necessary to eliminate the individual, as this will probably be the only way to stop his predation. They may also catch young turkeys and guinea fowl, as these birds often choose to nest in trees, rather than in poultry houses, which may be closed against the owl for the night. If there are lots of birds, and the owl is not hurried, it has been ac­cused of just settling for the brains of its prey. This may be analogous to those humans who choose to dine upon choice Kansas City steaks and discard the rest of the beef animal. Of all the owls, the great horned owl most nearly deserves to be rated as destructive.

Even so, the good done through the large number of rats and mice it eats, thus saving crops for human use, probably outweighs any harm it may do, such as eating an occasional quail or pheasant. In fact, ninety percent of the diet of a great horned owl may be composed of mice. One may kill 7.6 mice each day, or 2,750 in a year. A pair of owls will then kill and eat some 5,500 mice, and, if they were to raise two young, the four could reduce the mouse population by 11,000 individuals in a year's time.

Rabbits also rate high in their diet, and the remains of over one hundred rats were found under one nest.

There is little competition for one favorite food item—they are especially fond of skunks—and often smell like it! As the skunk is one of the worst, if not the worst, transmitters of rabies, the great horned owl, in helping to control its numbers, may, indirectly at least, help to save man and his domestic animals from a horrible and lingering death from this dread disease.

In the days of your grandparents, when there was a farm home on almost every quarter-section, and each farm family kept a flock of poultry as an important source of food for the family, there is no doubt that the destruction of many great horned owls was necessary. Even so, they probably only caused any great economic loss during times of low rabbit and rodent popu­lations, when they were forced to turn to poultry for survival. However, to­day, when there are many fewer farm-
steads, and very few farmers raise or depend upon poultry for their primary protein supply or as a source of income, there is no justification for its wanton destruction. Our state government has wisely recognized this, and this valuable and interesting bird is now protected by state law.

Great horned owls usually lay three eggs. Such places as cavities in trees, or old hawk or crow nests are favorite nesting places. The adult birds apparently destroy the nest as soon as the young are old enough to balance themselves on a limb or in the fork of a tree. This may be to remove the conspicuous nest from view, and thus provide the young birds with some degree of protection from possible enemies.

**LONG-EARED OWL** (*Asio otus*)

The long-eared owl resembles the great horned owl, but is smaller, being only about sixteen inches in length. Also, the ear tufts are considerably closer together. It may be locally common in deciduous or coniferous stands of timber near open country, and may occasionally be seen resting on the ground. It looks larger in flight than it actually is, because of its long (forty-inch) wingspread.

This owl is generally silent, except near its nest, where it makes a variety of low hoots, whistles, and shrieks. Sometimes its call has been described as sounding like the mewing of a kitten, or even the barking of a small dog.

The daylight hours are spent perched hidden in the thick foliage of evergreen or other densely-leaved trees.

Long-eared owls are sometimes seen in considerable flocks.

**BURROWING OWL** (*Speotyto canicularia*)

Many old-timers will remember this little owl under the name of "prairie-dog owl." In pioneer times, when the great prairie-dog towns stretched for...
miles across the west, there were many more of these interesting little fellows. They prefer to live in the burrows dug by the prairie dog, and don’t seem to mind that the community may also include the prairie rattlesnake among the inhabitants there. The owls are given little trouble by the prairie dogs, who happen to be strict vegetarians, and eat only plant material. A rattlesnake, however, would have little compunction about including a small burrowing owl as an item in its diet, and a mother burrowing owl would consider a tiny prairie dog a choice tidbit to take home to her hungry brood. Such interrelationships make the prairie-dog town an interesting ecological study in community structure.

Unlike many other owls, this owl is mostly diurnal in its activities. Its little stubby-tailed, long-legged, nine-inch body may often be seen perched on a fence post near the holes of the prairie dogs, or standing on one of the mounds around the prairie-dog hole. The little owl frequently bobs up and down by a quick bending motion of its legs. When hunting, it hovers above the ground, looking for prey below. It, like the other owls which are most active in the daytime, are not as silent in their flight as are the more nocturnal species.

The call is a cackling alarm note, and at night is described as a two-note "coo-c-o-o."

SAW-WHET (*Aegolius acadicus*)

This tiny, eight-inch owl is the smallest of the owls, and is the only tiny tuftless owl likely to be seen in this area. It is about the size of a robin. Though it has been reported from Kansas, there are no specimens on display in the Kansas State Teachers College Museum at the present time. It is normally a northern bird, and may be considered to be rare in the state. There may be more around than we realize, as it is nocturnal, and rests in the dense shrubby tangles or close to the main trunk of evergreens, usually near the ground, during the day. Looking like a knot on a branch or trunk, they are easy to miss.

The saw-whet is very tame, and can be readily approached, or even caught by hand. Many may be killed or injured by unthinking children. A few years ago one sat quietly on a branch while most of the students on a KSTC field trip took pictures of it, some from only a few feet away. If made a pet, saw-whets become unwilling to leave, even if turned loose. They subsist quite happily on a diet of liver, though it
may be necessary to force feed the newly captured owl a few times at first. They have been reported to follow their captors affectionately about the house, but to become quite irritated if a small light is not left on for them at night.

The name "saw-whet" is supposed to come from the call—like the sound of a saw being filed or whetted. They usually don't make any sound. When they do call, it may resemble a long series of short whistles. Perhaps the most remarkable quality about the bird's vocal ability is its ventriloquism. One tiny owl may make its voice seem to come from many places. A few years ago, in the state of Washington, during the flying-saucer craze, the "beep-beep" cry of the little bird was mistaken for the mysterious signals of invaders from outer space. Vigilante groups were actually formed to round up the "little green men" who were conversing in mysterious "beeps."

Saw-whet owls nest in holes in trees, especially those abandoned by flickers and other large woodpeckers. Five or six white eggs are laid.

These valuable little owls may sometimes fall prey to larger owls. The leg band from one that had been banded by researchers was later found in a pellet of a long-eared owl.

SCREECH OWL (Otus asio)

This ten-inch owl is the only little owl with ear tufts (young birds lack the conspicuous "ears"). The eyes are yellow. The name is absurd, as the owl certainly doesn't "screech" (though there are species that do; the real screech owl is a European bird). The call may be best described as a low, quavering whistle that is easily imitated. It has sometimes been called a "mournful or plaintive wail." In the South the bird is often called the "shivering owl." We are not sure whether this name comes from the call, or the fact that the cry gives some superstitious people the "shivers" when they hear it.

There are two color phases of the screech owl. Adult birds may be either gray or reddish. This is a permanent coloration, and has nothing to do with the sex of the bird. However, there is a record of a captive gray screech owl, fed only liver, that moulted and turned red. As this is the only case of this type recorded, there is insufficient evidence to state that the color of a screech owl is influenced by the diet it consumes.

These owls are often found in cities, where they use the larger trees with
holes in the trunks, such as those made by flickers, for homes. A screech owl is usually only seen as a "face" peering out of a hole. If you suspect that there may be one of these owls hiding in a hole in a tree, make a few sharp raps on the side of the trunk with a stick, and the owl, if present, will come up to the opening and peer out at you.

Unlike most other birds, they do not make any attempt to keep the nest area clean, but let it get quite filthy. They may be quite aggressive in defense of their nests or territories. One person who had to walk by such an area defended by a pair of screech owls took to carrying an umbrella to protect himself from these furry little fighters.

Unlike many humans, screech owls are believed to mate for life.

If caught away from home, an owl will sit motionless on a branch close to the tree trunk, where its excellent camouflage makes it very difficult to see.

Screech owls eat tiny prey, such as frogs, mice, moths, June beetles, grasshoppers, crickets, etc. They may eat house sparrows in the cities, especially during the winters when "times are hard." As most cities have great numbers of house sparrows, the few that the screech owl takes has little effect upon the total population. However, they feed more extensively upon insects than any other owl except the burrowing owl. As many as fifty grasshoppers have been found in one screech owl's stomach. Surprisingly as it may seem, they are reported to catch quite a few fish, especially in winter.

A study in Massachusetts recently reported the little screech owl as perhaps its most beneficial bird, due to the large number of insects and rodents it consumes.

**BARRED OWL (Strix varia)**

The barred owl may be rather easily recognized by its round head, no "ears," and its twenty-inch long body. They are fairly common as owls go. This woodland species likes solitude, living in dense stands of deciduous timber, and seldom ventures into cities.

It has a mild and gentle disposition for so large an owl. It may be approached quite closely, and many are killed, especially by boys with .22 rifles, who either don't know or don't care that it is one of our most valuable feathered friends. Like all other owls, it is legally protected, making it an offense to kill one.

Blue jays and crows may sometimes "pester" a sleepy, sun-dazed barred owl, just as they will gang up on a resting great horned owl.

The barred owl may be the most proficient of the "hooters." Some say the bird sounds like he was saying "Who cooks for you? Who cooks for you-all?" or "Old fool, old fool, don't do it, don't do it." This call is rather
easy to imitate, and the owl may come close to the imitator, even if the imitation is poorly done. Sometimes the call may resemble a “cackle with an idiotic laugh.” In pioneer days, when cougars still roamed the area, the call was sometimes mistaken for the cry of this great cat. Barred owls may sometimes call during the daytime, the call sounding like the barking of a dog in the distance. The owl may come up to you if you respond.

Nests are usually constructed in hollow trees. The abandoned nests of other owls, crows, or hawks may be used. Barred owls have been known to return to the same nest or vicinity for as long as twenty to twenty-five years.

Barred owls and red-shouldered hawks may act as a “two-man rodent-control team” in reducing the number of rodents, the owl taking the “night shift” and the hawk taking the “day shift.” They may even share the same wooded area, and have been known to lay their eggs in the same nest, both incubating the eggs at the same time.

**SNOWY OWL (Nyctea scandica)**

The snowy owl is a large, yellow-eyed, diurnal arctic bird, about the size of a great horned owl. There are no ear tufts. It occasionally winters in the United States, and sometimes appears in Kansas. Most adults are almost pure white. We are most likely to see the darker immature birds, which go farther south in the winter than do the adult birds.

It perches near the ground in open country, often allowing bird-watchers to approach quite closely without taking wing.

This owl is silent south of its breeding grounds, so Kansas people have probably never heard its call.

The snowy owl feeds upon rabbits, lemmings, and other rodents. It will even kill the Arctic hare, which is twice its weight. The numbers of this owl increase during time of high lemming populations. When these owls are seen this far south it is usually due to a low lemming cycle in the far north. Fish are a favorite food item, and, surprisingly, the snowy owl is a good fisherman, catching the fish alive. They will also pick up dead fish along the shore.

Nests are built on the ground. The female tends to the incubating, while the male stands protectively by.

It is a shame that so many people kill this great and valuable bird on sight.

**SHORT-EARED OWL (Asio flammeus)**

The short-eared owl is a bird of the open country, and may be common over plains, sloughs, and marshes. The “ears” are short and hard to see.

Though normally a nocturnal hunter, the short-eared owl may sometimes be seen foraging on cloudy or foggy days. They may do more hunting with their ears than with their eyes, however. Their flight is irregular, and the wings tilt upward like those of a marsh hawk.
Most people have never heard the call of a short-eared owl, as it is usually silent.

Short-eared owls are highly migratory, and may become periodically abundant in areas overrun by rodents. During migration they may sometimes be seen in flocks of hundreds. They sometimes roost on the ground in the winter.

Their nests are built on the ground, near water.

The great vole (a crop-eating rodent) plague that history records as occurring in 1890-1892 in Scotland is thought to have been largely due to the disappearance of voles' natural enemies, especially the birds of prey. A great increase in the number of short-eared owls played a large part in bringing the vole plague under control.

SOME SUGGESTED ACTIVITIES

Locate a grove of woods near your school in which an owl or pair of owls are reported to make their home. Someone who has heard the regular nightly calling of an owl should be able to point out such an area to you. Ask the owner for permission for your teacher to take your class to the grove some clear, moonlit night for a first-hand visit among some of our owl friends. Upon reaching the grove, have everyone sit down, keep quiet, and listen.

A. Let various students try to imitate the owl's call. Some students may do such a realistic impersonation that the owl will answer them, and even come up to the group.

B. If your school has a battery-operated tape recorder you may:
   a. Record the squeaks of laboratory mice on tape, and play the tape back while in the woods. Some owls, such as the barn owl, may actually come to within a few feet of the recorder.
   b. Record the call of the owl on tape and play it back to him. Owls resent the intrusion of other owls into their territories, so you will probably soon have an angry visitor.

C. Plan a field trip to visit a prairie dog town, if there is one near your school. As the burrowing owl, which lives in the holes dug by the prairie dogs, is active during the day, it is more easily observed than most owls. Watch for them standing on the edge of the mound that surrounds a prairie dog hole, or perched upon a fence post near the prairie dog town.

   Watch the owl's head and body movements. Do you have any idea why it does this?

   Have someone walk in a circle around one of the owls. Note that it appears to keep an eye on the person walking around it at all times. How does it keep from twisting its head off?

D. Locate an owl feeding station, and collect a supply of owl pellets. Take them back to the classroom, and carefully take them apart. Don't damage the delicate little skulls that you will find in them. How many rodents does an owl eat at a meal (a pellet represents one meal)? How many different kinds of skulls can you find? Are there any shrew or bird skulls in the pellets? Figure out the percentage of the different food items eaten. Does your data agree with that reported in the text of this issue?
WHAT DID YOU LEARN ABOUT OWLS?

At the left are silhouette sketches of the different owls mentioned in this issue of The Kansas School Naturalist. The sketches of the owls are in proportion to their actual sizes. See if you can identify each of the owls.

Below are questions about owls and their activities. See how many you can answer after you and your classmates have read the material.

1. What color are owl eggs?
2. How does the nesting behavior of owls differ from that of such birds as robins, ducks, and pheasants?
3. Which owl has made the most use of man's building activities in finding a place for its nest?
4. Compare the shape of an owl's egg with that of most other birds' eggs.
5. What do owls most often eat?
6. Which are the most important in finding prey, the owl's eyes or its ears?
7. Which is used to capture the prey, the talons or the beak?
8. Which owl is most likely to be destructive to poultry, such as chickens, turkeys, and guinea fowls?
9. What are two inferences you might make about the rodent population when you see a large number of owls in the area, or hear of a marked increase in the predatory activity of owls upon poultry?
10. What mammal does the great horned owl eat that most other animals are glad to stay away from?
11. Which two owls include a considerable number of insects among the items of their diet?
12. What is an "owl pellet"? Where should you look for them? How are they of use in studying the habits of owls?
13. What owl, besides the burrowing owl, does much of its hunting for food during the day?
14. At what time of day are owls in general most apt to be active?
15. Which owl, the barn owl or the burrowing owl, do you think is the most nearly silent in its flight?
16. Why do ornithologists think owls move their heads up and down and sidewise when looking at a person?
17. What explanation has been given as to why the barn owl can see and follow the movements of mice even in extreme darkness?
18. Why has DDT had a less adverse effect upon owls than it has upon hawks?
19. Which owl is the only one that has a white, heart-shaped face?
20. Which of the nine species of owls discussed in this issue of The Naturalist are the largest? Which of these two large owls are you most likely to see in Kansas? How would you tell them apart?
21. Which is the smallest of the owls?
22. Which species of owl probably most nearly deserves the common name "hoot owl"?
23. What is the only small owl with ear tufts?
24. Which owl has been referred to as the "tiger of the air," because it is so aggressive and powerful?
25. Where would you look for a burrowing owl if you wanted to show one to your class?
26. The snowy owl usually perches on or near the ground in open country. What inference might you make as to how this habit may have come about?
27. What are two ways you might distinguish a great horned owl from a long-eared owl?
28. What bird appears to get a great deal of satisfaction out of "pestering" a great horned owl when it finds one perched in a tree?
BACK TO SCHOOL DAYS!
SUMMER SESSION, 1971

The Department of Biology at Kansas State Teachers College offers a varied selection of courses for all kinds of needs and likes. Many are especially for the elementary, junior, high school, and community college instructor. Workshops, outdoor classrooms, environmental biology, travel—there's something for you. For further information, write the instructor in charge or the Department of Biology. All courses numbered 400 and above may be taken for graduate credit.

Environmental Biology—On Campus

Nature Study (BI 300)—2 credits, 1:30-3:20 MWF, June 7–July 9, Wilson

Conservation (BI 328)—2 credits, 1:30-3:20 Daily, July 12–July 30, Wilson

Workshop in Conservation (BI 430)—3 credits, 9:30-11:20 Daily, June 7–June 25, Parenti

Environmental Biology (BI 536B)—3 credits, 7:30-10:20 Daily, July 12–July 30, Ashshapanek

Human Ecology (BI 537)—3 credits, 1:30-3:20 Daily, June 7–July 3, Clarke

Environmental Biology—Off Campus (Advance registration desired)

Environmental Biology (BI 536C and 409F)—6 credits; field course in Wyoming Wilderness:
June 4–July 8, Ashshapanek
June 11–July 16, Boles
June 9–August 13, Parenti

Field Biology (BI 609B)—2 credits, May 15–May 23, Prophet and Ransom, at University of Oklahoma Biological Station at Lake Texoma.

Workshop in Environmental Studies (BI 575)—2 credits, June 27–July 9 or July 11–July 23; Menhusen; especially for elementary teachers; field course in Colorado Rockies.

Science Teaching

Workshop in Environmental Studies (BI 575)—see listing above.

Field and Laboratory Biology (BI 303)—3 credits, 10:30-2:20 Daily, June 7–July 9, Menhusen

Behavioral Objectives and Instruction (BI 504)—3 credits, 3:30-5:20 Daily, July 12–August 13, Kurtz (for non-science or science teachers)

Microscopy and Instrumentation

Microtechnique (BI 334)—2 credits, 10:30-11:20 Daily, June 7–July 9, McElree

Instrumentation Workshop (BI 609B)—2 credits, by arrangement, June 28–July 9, Keeling (construction of low cost lab instruments)

Electron Microscopy Workshop (BI 609C)—3 credits, 9:30-12:20 Daily, July 12–July 30, LeFever

Other Graduate Courses

Plant Taxonomy (BI 442)—3 credits

Myology (BI 503)—3 credits

Morphology and Paleobotany of Vascular Plants (BI 657)—3 credits

Ichthyology (BI 572)—3 credits

Evolution (BI 625)—3 credits

Also projects, thesis and seminars

Other Undergraduate Courses

Principles of Biology (BI 100)—3 credits

Human Anatomy and Physiology (BI 262)—3 credits

Human Anatomy and Physiology Laboratory (BI 263)—2 credits

Basic Bacteriology (BI 346)—3 credits

Also projects and seminars