Cloverbud Investigators: Taking the Adventure Outside

The Superpowers of Owls!

October

Objectives: *Investigators will discover the mysterious world of owls. They will learn about their unique physical abilities and explore their place in the food chain.*

Background: The wise old owl - why is it when we think of owls, we think wise, smart, and curious? Humans have always had a fascination with owls. Owl lore dates back to the beginning of recorded history. In some cultures, people believed that owls were predictors of impending doom, evil, or even part of witchcraft. Owls even had a large role in the popular Harry Potter stories. Others saw owls as omens of good fortune, wisdom, and predictors of weather. Athena, the Greek Goddess of Wisdom, was said to be impressed by the charisma of owls and is often pictured with them. There is an entire genus of owls is named for her.

Maybe our fascination comes from the secretive behavior of owls. Owls are nocturnal, often heard but rarely seen. Their predatory behavior captivates bird lovers and wildlife biologist alike. Living at the top of the food chain, owls are superior hunters. They are built to seek out prey, attack quickly yet silently, and kill almost instantly.

This lesson is broken down into three segments. You can choose to do all three or pick your favorite. **Activity one**, **"The Superpower of Owls"** is designed to introduce investigators to the biology and abilities of owls as a species. **Activity two, "Who Hunts Who"** introduces the concepts of food chains, food webs, and how they are interconnected. **Activity three**, **"Owl Pellets"** brings together the information from activity one and two. It allows investigators to dissect a real owl pellet and identify the prey species that was consumed by a single owl in one feeding period.

Activity 1. The Superpowers of Owls

To understand what makes an owl a super predator, we need to look at its natural biology.

Terms used in this lesson:

Predator *– A predator is an animal that naturally obtains food by killing and consuming other animals.*

Prey *– An animal that is hunted and killed by other animals for food.*

Binocular vision *– Using two eyes with overlapping fields of view.*

Field of Vision *– The entire area that a person or animal can see when eyes are in one fixed position.*

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Ear Tuft *– Long feathers on the top of the head of some owls. They are unconnected with the true ears.*

Raptor *– A bird of prey, a meat-eating bird with a hooked beak, large sharp talons, and feeds on other animals.*

Mystery Activity 1: The Super Power of Owls

***Supplies*: Superpowers of Owls**

- Owl's Superpower handout
- Glue
- Picture of an owl or 3-D owl model (puppet or stuffed owl)
- Scissors

Do ahead: Copy the handout one per participant.

What to do: *Using the picture or 3-D owl model explain to the participants that they are going to learn about owls and all their superpowers. Pass out the "Superpowers of Owls" handout, scissors, and glue. Tell the participants that they are going to find, cut out, and glue on the word labels that describe the part of the owl we are learning about. As you talk about each, point them out on the owl picture or 3-D model.*

The first superpower of owls is their vision!

Explain that while most birds have good vision, owls have **"super vision"**! Unlike most birds who have an eye on each side of their head, owls have both eyes on the front of their face like humans. This gives them **"binocular vision"**, which means they see objects with both eyes at the same time, just like humans. Binocular vision allows an owl to have good depth perception and see things in 3-D.

To demonstrate this, do the following quick experiment

Ask the investigators to close one eye, then point to a fixed spot, like a tree or spot on a wall. Then without moving their finger, change which eye they have closed. Did it appear that their finger moved? That is because each of our eyes see an individual whole picture, it is our brain that combines the two pictures into one. This is our binocular vision; it allows us to locate the exact location of an object like a ball being tossed at us.

Owl's eyes are also much larger and better developed than most birds. In some species, their eyes can make up 5% of their body mass. If that were true of humans, a 100-pound person would have a 2.5-pound eyeball! This large size allows owls to have many more rods than other animals. These rods allow the eye to collect more light than a normal size eye and helps owls to see in the dark.

The second superpower of owls is their ability to turn their head all the way around to their back!

An owl's eyes are so large they cannot move them around in their sockets as humans can. *Have the investigators hold their heads still and look to the left using just their eyes. What is the farthest thing they can see? Now have them look to the right using just their eyes.* Explain that we can move our eyes from side to side without moving our head and this expands our field of vision. Owls cannot move their eyes because they are too big, so their field of vision is smaller, only about 70 degrees. To make up for this, owls have adapted to turning their heads 270 degrees to get objects within their *field of vision* without moving their body. They have a specially developed neck which has14 vertebrae. This allows them to swivel their head and look directly behind them while their body remains motionless. In comparison, humans have only four vertebrae in our neck, so we can only turn our heads about 90 degrees in one direction. Owls also can "bob" their neck, moving their head up down, and in a circular motion. This allows them to use their hearing to judge the distance of a sound.

The third superpower of owls is their hearing!

All birds have good hearing, but owls have super hearing! This is remarkable considering most owl species do not have visible ears! Owls do not have traditional ears like other animals. Some owls like the Great Horned Owl appear to have ears but these are just **"ear tufts"**, feathers that look like ears but are for display, not for hearing. Owls have opening called **"apertures"** that are hidden under their feathers. The apertures help the owl locate the exact location of a sound. In most species, the apertures are positioned on each side of the face; however, they are not symmetrical like human ears. They are offset with one being higher than their eyes and the other lower closer to their beak. The apertures can also be different sizes to help with triangulation of sound kind of like echolocation with bats. When hunting, owls rely heavily on hearing their *prey*. Specially developed facial disks in the owl's face help to collect sound, like a satellite dish collects TV signals. These facial disks and the offset apertures allow sound to reach the owl at different times. By lowering or raising its head, the owl can tell when the prey is directly in front of its face.

Silent flight is the fourth super power of owls!

Owls have modified feathers which are comb shaped at the tips. This modification greatly reduces the sound caused by air passing over them. The ability to fly and dive at prey without warning, greatly enhances their hunting abilities. The shape and size of the wings along with their relatively light body weight allows the owl to gain lift easily, glide for longer periods and reduces the need for flapping their wings. These features also help the owl to hunt in a stealth mode. In addition to their shape, the owl's feathers are camouflaged so it blends into its surroundings. The camouflage helps it hide during nesting, times of rest, or even as it hunts *prey*.

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The fifth superpower of owls are their feet and talons!

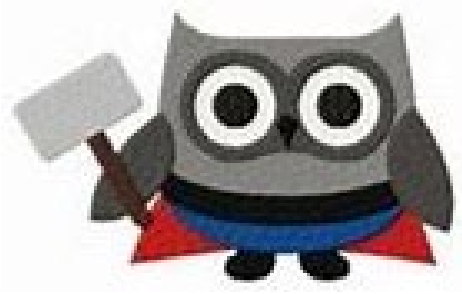
Owls have powerful talons (*hooked claws*), four per foot. Three of the talons face forward and the fourth one faces backward creating a powerful clamp, which is used to grab prey. Many owl species have the ability to swivel the outer toe backward and crush its prey while carrying it. The gripping and crushing power of a Great Horned Owl's talons is said to be equal to that of a full-grown German Shepard's bite. The color, length, and thickness of talons vary within each owl species. Owls also have a locking ratchet-like mechanism in their feet, which allows them to lock onto prey and hold it tight without the constant need to contract muscles.

The sixth superpower of an owl is the beak!

Like all *raptors*, owls have beaks designed to grip, kill and tear prey apart. Owl beaks are short and thick as compared to other raptors such as eagles or falcons. This allows owls to attack and kill much larger prey. Some large owl species are known to kill rabbits, ducks and even young foxes.

Investigate, Create, & Take:

Optional make it/take it craft – cut out owl shapes to use as templets allow the kids to pick different color paper and trace owl shapes to make their own **Super Owl**. Cut out and glue together.



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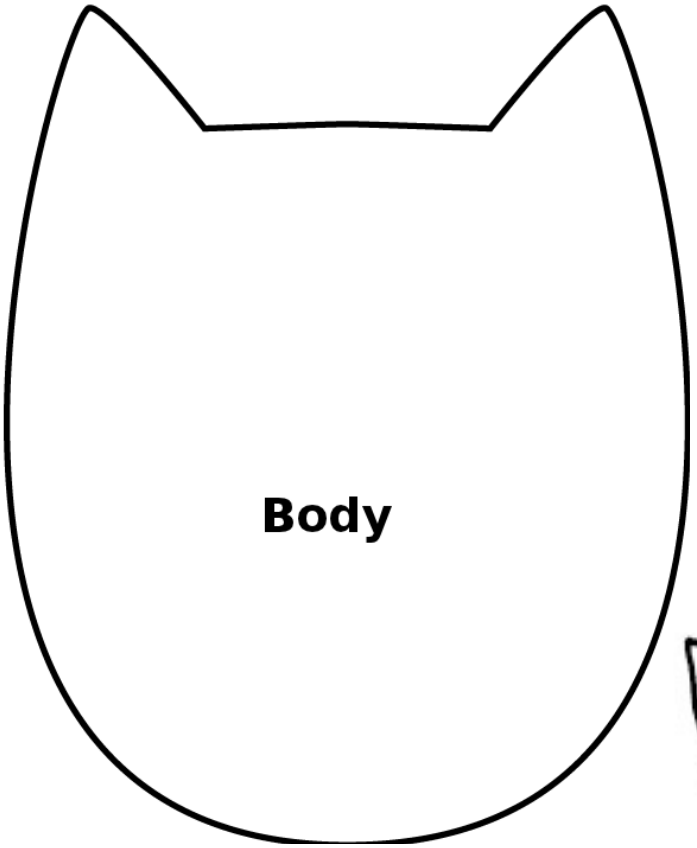

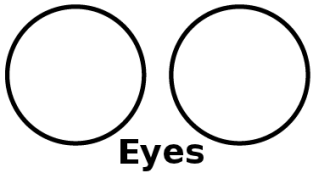

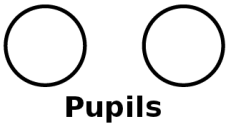

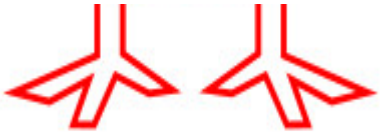

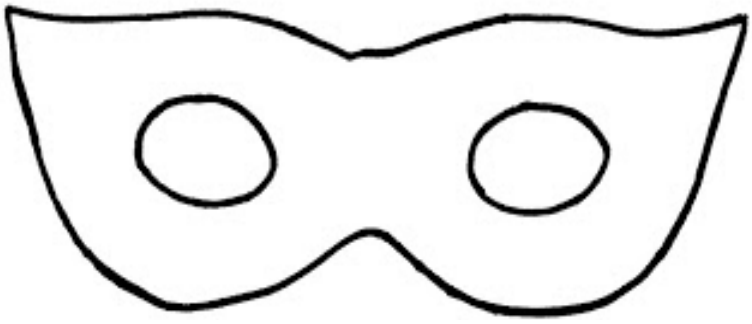

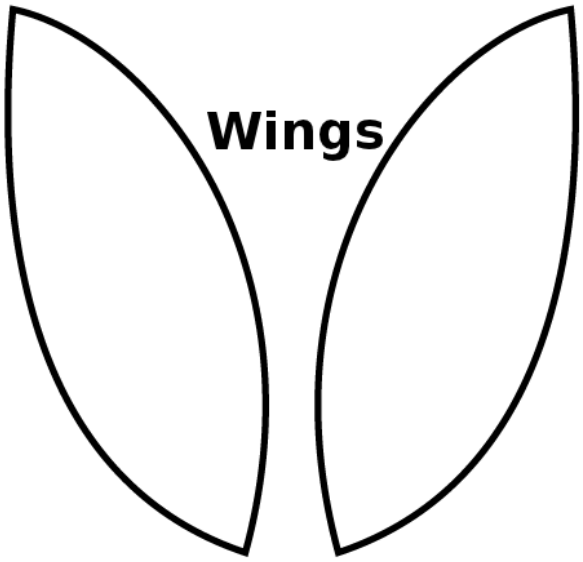

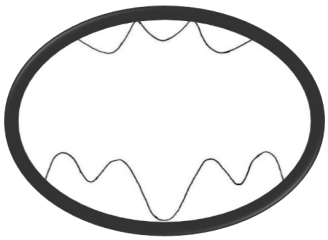

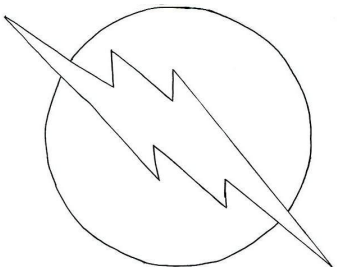

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Activity 2. "Who Hunts Whooo?"

Objective: *The goal of activity two is to introduce the concept of food chains, food webs and ecosystems. To help investigators understand a predator/prey relationship, how ecosystems are all later connected, and the roles owls and other predators play at the top of a food chain.*

Terms used in this lesson:

Food chain *– a hierarchical series of organisms each dependent on the next as a source of food.*
Food Web *– a system of overlapping and interdependent food chains.*
Ecosystem *– a biological community of interacting organisms and their physical environment.*
Organism *– an individual animal, plant or single-celled life form.*

Mystery Activity 2: "Who Hunts Whooo?"

Do ahead: Print off organism nameplates, punch small holes in nameplates, and use about 18" of yarn to hang plates around neck. (These can be laminated for repeat use)

Print the Who Hunts Whooo handout/one per participant.

***Supplies*: Who Hunts Whom?**
- Who Hunts Whooo handout?
- Different colored markers
- Two different colored balls of yarn
- Organism name plates
- Scissors

What to do: Using the "Who Hunts Whooo" handout, lead a discussion about what each animal on the page might eat. For example, the songbirds might eat the seeds, the rabbit might eat the grass, the mouse might eat the seeds, the woodpecker might eat insects, the mole might eat insect, the snake might eat the mouse, etc. Next, using the markers allow them to draw a line to make their own food chain. Discuss that in a *food chain* an organism can be both *predator* and *prey, each have a place in the food chain*. There are many animals that eat mice, so they are at the bottom of the food chain. Few animals eat owls, so they are at the top of the food chain. Next, share some of the food chains they created. Did any food chains overlap? For example, both the songbirds and the mouse could eat the seeds. Both the snake and the owls could eat the mouse. Both the weasel and the owl could eat the songbirds. Discuss how an *ecosystem* is a delicate balance and all species are connected.

Play the food web game: Each participant will become an organism in our ecosystem. Hand out the organism cards and have them wear them around their neck and stand in a circle. Explain that you will start the ball of sting at the bottom of a food chain and their goal is to toss the string to something that eats them or something they eat. For example, the person who has the seed card can toss the string to the mouse (mice eat seeds). The mouse then tosses the string to the weasel, (weasel eats mouse), who tosses it to the owl (owl eats weasel) who tosses it to the rabbit (owl eats rabbit) who tosses it to grass (rabbit eats grass) and so on until they have as many connections as they can think up. This is the *food web* of their ecosystem. Now explain, "What if something happens in our ecosystem that poisons all the mice?" Have the mouse drop the string, then say," All the animals that ate a mouse also got poisoned" and they drop the string, then all the animals that ate those animals were poisoned and they drop the string. Explain how an event that may only look as if it affected one single species can really affect the whole *food web*.

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Have the group pick up their string and try a few more examples like:

What happens if we take out all the prey species? (Predators starve)

What happens if we take out all the predators? (Prey overpopulates and eats up all the grass, seed etc. and they starve).

Activity 3. What do owls eat? Exploring Owl Pellets

Introduction: *In this lesson, the explorers will take on the role of a wildlife biologists. Their goal is to figure out how many and of what prey species the owl ate during its last meal. This is done by dissecting real owl pellets and using skeletal bone keys to identify skulls and bones found in the pellet.*

Background – Owl's Digestion System

Owls cannot chew their food so they have developed a unique way to digest their prey. When they catch smaller animals, they simply swallow them completely like a snake swallows its prey. If they catch larger animals, they use their beaks to rip them into pieces that can be swallowed. The owl digests the fleshy parts, but they cannot digest bones, fur, and feathers; they must rid their stomach of all the indigestible parts. To do this, owls have a gizzard that packs these parts into an oval shaped mass called a *pellet*, and then they regurgitated (spit out) the pellet out. The pellets may contain the parts of more than one animal. Owls normally spit out a pellet 6-10 hours after eating. These pellets help biologists figure out what the owls have been hunting, and it also lets them learn about the food chain in that habitat.

Terms used in this lesson:

Owl Pellet *– Indigestible body parts that form into an oval shaped mass in the gizzard of an owl and regurgitated through the mouth.*

Vole *– A small mouse-sized rodent that has rounded ears: Their fur is reddish, brown, or black in color with a gray underside. Voles prefer to live in ground vegetation and make trails through the grass or snow. Voles are primarily herbivores and will feed on the roots, bulbs, bark, and seeds of many ornamental plants and grasses.*

Mole *–Living mainly underground moles have large front feet used for digging; their ears and eyes are very small and not visible. Moles are insectivores and feed on earthworms, grubs, beetles, and other arthropods found in soil. Their skulls are flat, broad, with a pointed snout and 10 upper teeth on each jaw.*

Shrew *– Are mouse-sized mammals that eat mostly insects but will also eat earthworms, slugs, seeds, and roots. They have round broad skulls, pointed snouts, with nine upper teeth on each jaw. Many shrews have dark tips on their teeth due to deposition of iron. Shrew's feet are small like that of a mouse; they have tiny but visible eyes. Shrews can be found using tunnels made by moles and voles and sometimes will enter buildings.*

Mice – *Small rodents; Adults are usually less than 8 inches from their nose to the tip of their tail with half of their length being their tail. Mice have round bodies, narrow snouts, and ears that are large compared to the size of their heads. Their fur can be brown, dark gray, or black with their paws and feet almost hairless.*

Rats *– An adult rat can reach up to 16 inches from nose to tip-of-tail. They are much larger than mice. Their bodies are longer and tube-shaped, and their snouts are blunt. They have small, hairless ears and their fur can be brown, gray, black or even white in color. They also have hairless paws and feet. Rats have thick shorter scaly looking tails.*

Bird- *Bird skulls are easy to identify due to their beaks and lack of teeth.*

Mystery Activity 3: What do owls eat? Exploring Owl Pellets.

Do ahead: *Order owl pellets or an owl pellet kit. These can be purchased from many sources found on-line. Costs vary but range about $2-$3 per pellet. Kits can range from $10 -$50+ depending on the number of supplies included. Purchase or download dichotomous keys or common owl pellet bone charts. (Keys or charts normally come with kits or can be purchased separately.) We recommend laminating the charts for repeated use.*

Procedure:

Step 1. Open the owl pellet - remove the foil wrap. You may choose to have children wear gloves for examining the owl pellet.

***Supplies*: Dissecting an Owl Pellet**

Materials:

- Tweezers
- Owl pellets
- Dissecting needle or tooth pick
- Magnifier or hand lens (microscope optional)
- Collection dish
- Dichotomous key for identifying owl pellet bones or skeleton charts
- Glue (optional)
- Rubber gloves (optional)
- Common owl prey page

Step 2. Inspect the pellet, make note of the color, size, shape, and texture. Have the investigators guess what they think is inside based on the size and color. Explain that by examining an owl pellet experts can tell what species of owl it came from.

Step 3. Gently break the pellet in half. Look for any bones or hard pieces sticking out.

Step 4. Continue to use your fingers to break the pellet into smaller pieces.

Step 5. Use a toothpick to carefully separate the bone fragments from the fur or feathers.

Step 6. Use tweezers to carefully remove the bone fragments and place them in a collection dish.

Step 7. Use a magnifying glass to examine each bone and group similar bones together.

Step 8. Examine skulls, including jawbones. These can be very helpful in identifying the species.

Step 9. Optional - Arrange bones of animal on cardboard key and use glue to attach in place.

- Using owl pellet keys will help with the identification of skulls. Investigators may need assistance identifying the shape and size of the skulls. By looking at the teeth, adult helpers can help them narrow down if they are looking at a rodent, like a rat, or an insectivore like a shrew or a bird. Once they narrow down species by shape of the skull, they can sort limbs, pelvis, and other bones for that species.

Making Connections to nature:
Ohio is a great place to study owls. Did you know that according to the Ohio Division of Wildlife 12 of the 19 North American Owl species have been recorded in Ohio?

Common Owls of Ohio

Barred Owl – This owl is 21 inches tall and has a wingspan of 42 inches. Weighing only about 1.6 pounds, this owl likes to live in mature forests, swampy woods, or forested ravines. These owls can be heard calling their familiar "who cooks for you" call during the day. Barred owl diets are made up of mice, voles, and other small prey including amphibians, and fish. These owls are tree cavity nesters and have been seen in all 88 counties in Ohio.

Eastern Screech-Owl – This owl is only 8.5 inches tall with a 20-inch wingspan. Weighing only about 6 ounces, this owl likes to live in woodlands and open spaces with a mix of trees and pastures. One of the most common in Ohio, it can be seen in red or gray colors. This little owl has a diet of invertebrates, other birds, snakes, lizards, salamanders, crayfish, insects, minnows and fish. These owls are cavity nesters and often use old woodpecker nests. They have very distinct quivering whistles and have been seen in all 88 counties in Ohio.

Great Horned Owl – At 22 inches tall and a wingspan of 44 inches this is one of the larger owls found in Ohio. Weighing 3.1 pounds, it is the heaviest of the Ohio owls. This owl lives in scattered woodlots, open fields, and meadows but will not be found in old growth forests. As the second most common Ohio owl, it can capture prey as large as a cat, but its diet is made up of mainly rabbits, rats, muskrats, groundhogs, birds, mice, voles, ducks, and pheasants. This owl has a very thick body and large ear tuffs. They do not build nests but will take over large stick nests made by hawks, herons, and eagles. This owl is sometimes called a hoot owl because of its "hoot" call. This owl has been seen in all 88 counties in Ohio.

Long Eared Owl – At 15 inches tall and with a 36-inch wingspan, this owl is a medium size owl. It weighs 9 ounces and looks a bit like the great horn but smaller. This owl likes to live in meadows, and open fields. It is a Northern Ohio owl and is not likely seen in Southern Ohio. This owl is one of the few who root in larger groups in winter. Their diet is made up of small mammals, meadow voles, mice, and small birds. Like the Great Horned owl, this owl will take over stick nests build by other birds. This owl seldom calls and is very secretive.

Taking the Adventure Outside: Go *owl calling. Each species of owl has its own unique calls. Some sound like a "hoot" other more like a "quavering whistle" and some are more "monotone piping." "The male of the species is normally lower pitched than females. Some species call all the time, while others normally only call during mating season. The best time to go owl calling is during the owl's active periods. In Ohio, not all owls are nocturnal. Different species are active at different times of the day. Therefore, an owl can be nocturnal (active only at night), diurnal*

(active during daylight hours), or crepuscular (active only at dusk and dawn). Wildlife biologists believe this allows lots of owl species to live in the same area without competition. Therefore, before you plan your owl calling, it is best to know which species you are trying to attract, when they are most active, and if they are prone to calling. Rural locations with little noise pollution are great choices. On clear windless evenings, owl calls can be heard over a long distance. The best chances of hearing owls is during their early nesting periods. For Ohio owls this is early winter through spring, but owls can and will call at any time of year. Playing, recordings can be a good way to get owls to call. You can also purchase owl calls and with a little practice, you can talk to your owl neighbors. Caution should be taken not to overdo owl calling during nesting. It can disrupt the owls' natural nesting behavior. Remember most owls are secretive so be patient.

***Career Connections**: Ornithologist, Wildlife Biologist, Forestry, Biologist, and Ecologist.*

Go Over Findings:

- Name two common owls found in Ohio.
- What did you find in your owl pellet?
- What is the difference between predator and prey?
- What are the owl's superpowers?
- Why are food webs important to owls?

Sources: Owls of Ohio division of wildlife, https://wildlife.ohiodnr.gov/portals/wildlife/pdfs/publications/id%20guides/pub423.pdf

Pinterest crafts

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Nature Watch

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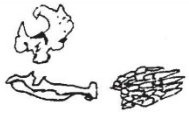
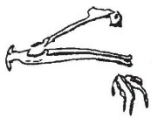
NATURE WATCH

Owl Pellet Bone Sorting Chart

Use this chart to identify the different types of bones that you discover in your owl pellets.

	Rodent	Mole	Shrew	Bird
Skull				
Jaw				
Shoulder Blade				
Front Leg				
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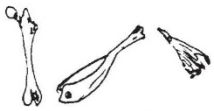
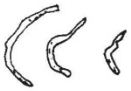
Back Leg				
Rib				
Vertebrae				
Misc. Items	Caterpillar larvae & caterpillar cocoons 		Caterpillar droppings 	

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Common Owl Prey

Mouse

Mole

Rat

Vole

Shrew

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