

# Owl Pellets

## **Purpose**

Students will be introduced to owl digestive physiology and will investigate the skeletal anatomy of small rodents.

## **Background**

(following info is from <http://www.owlpages.com/physiology/digestion.html>)

Owl pellets are not what you think. Owls have a stomach divided into two parts. The glandular part is called the proventriculus. muscular stomach, also known as a gizzard. There are no digestive glands in the gizzard, and in birds of prey, it serves as a filter, holding back insoluble items such as bones, fur, teeth and feathers. Several hours after eating, the indigestible parts (fur, bones, teeth & feathers that are still in the gizzard) are compressed into a pellet the same shape as the gizzard. This pellet travels up from the gizzard back to the proventriculus. It will remain there for up to 10 hours before being regurgitated. Because the stored pellet partially blocks the Owl's digestive system, new prey cannot be swallowed until the pellet is ejected. Regurgitation often signifies that an Owl is ready to eat again. When the Owl eats more than one prey item within several hours, the various remains are consolidated into one pellet.

The pellet cycle is regular, regurgitating the remains when the digestive system has finished extracting the nutrition from the food. This is often done at a favourite roost. When an Owl is about to produce a pellet, it will take on a pained expression - the eyes are closed, the facial disc narrow, and the bird will be reluctant to fly. At the moment of expulsion, the neck is stretched up and forward, the beak is opened, and the pellet simply drops out without any retching or spitting movements.

To see a repeating video of an owl expelling a pellet, click on

[http://www.owlpages.com/physiology/gho\\_pellet.html](http://www.owlpages.com/physiology/gho_pellet.html)

## **Materials (for each student)**

Owl pellet

Dissecting kit (probes)

Bone identification worksheet

**Gloves (optional)**

**Butcher paper or placemats**

**White cardstock paper**

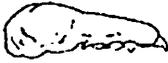
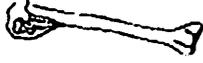
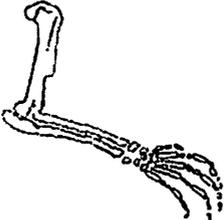
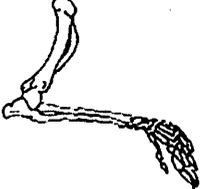
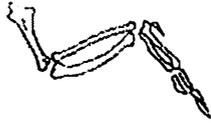
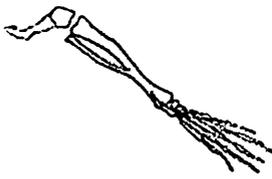
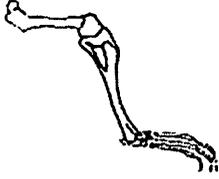
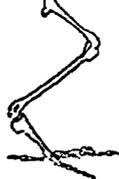
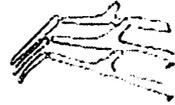
**Glue**

**Procedure**

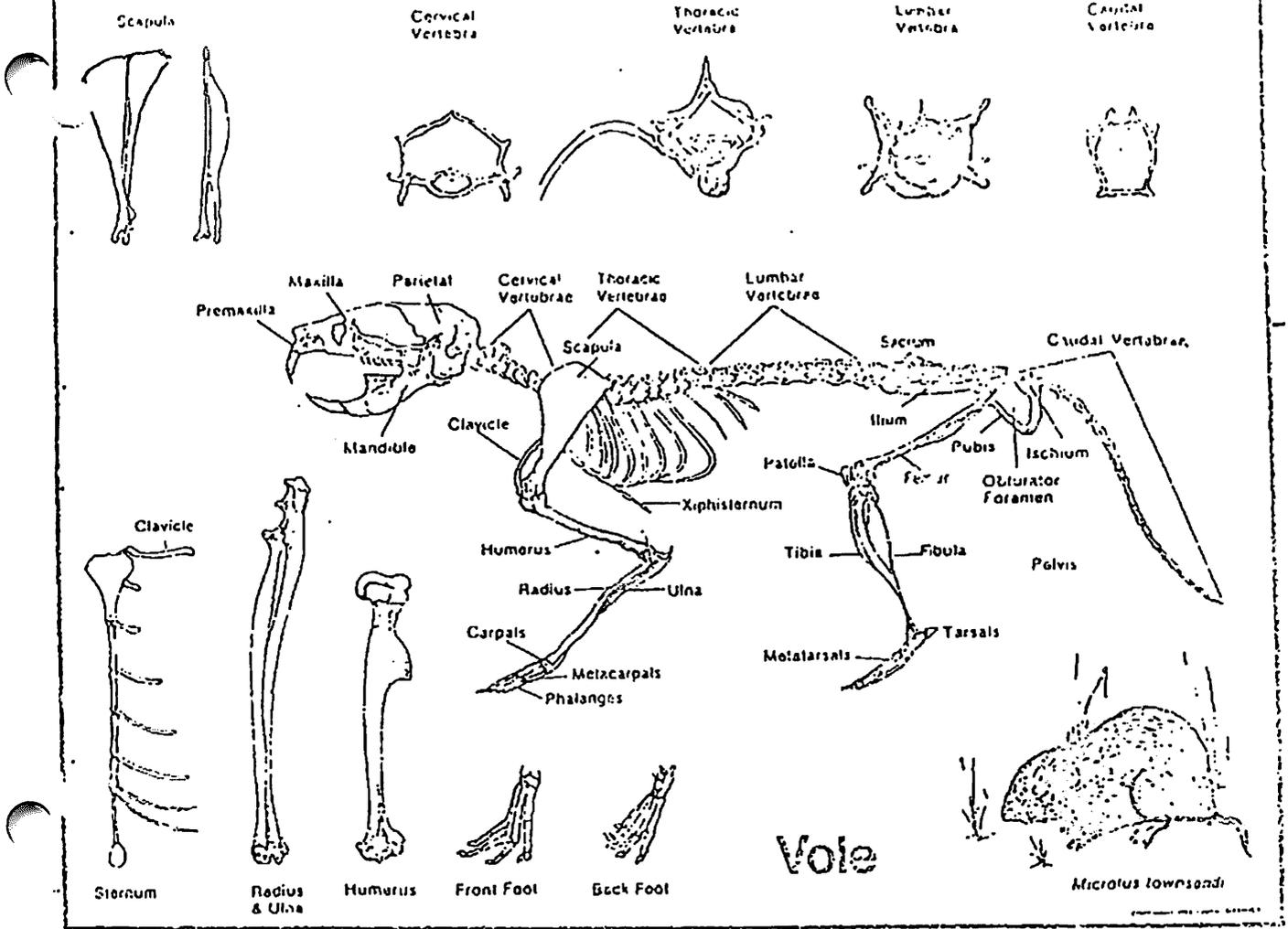
- 1. Give students introductory material about owl pellets.**
- 2. Students will work individually on their own pellet.**
- 3. Offer gloves to students who wish to use them.**
- 4. Allow about an hour for students to dissect the pellet. You may want to use extra time after lunch for students to complete the project.**
- 5. Students will glue their bones in the shape of the identified rodent onto the cardstock.**
- 6. Allow the students to take their completed projects home.**



# OWL PELLET BONE CHART

	RODENT	SHREW	MOLE	BIRD
SKULL				
JAW				
SCAPULA				
FORE LIMB				
HIND LIMB				
PELVIC BONE				
RIB				
VERTEBRAE				

# Identification Chart



Vole

Microtus townsendi

## Types of Skulls:

1. Vole - *Microtus*
2. Mole - *Scapanus*
3. Shrew - *Sorex*
4. House Mouse - *Mus*
5. Rat - *Rattus*
6. Deer mouse - *Peromyscus*

# Student Worksheet

Name \_\_\_\_\_ Date \_\_\_\_\_

## INTRODUCTION

Owl pellets are the undigested remains of prey ingested by an owl. The owl swallows its prey whole, and during the process of digestion, the soft parts of the prey are dissolved and passed on to the intestine for absorption. The hard, non-digestible parts – bones, teeth, fur, feathers, and chitinous remains of insects are compressed in the gizzard and passed on to the *proventriculus* where the pellet remains until it is expelled. These pellets are not eliminated as feces, but are regurgitated through the mouth.

Pellets are not found exclusively within the owl families. There are many species of birds known to regurgitate pellets; hawks, eagles, kites, harriers, falcons, and even robins are some of the more familiar ones. Out of all types of pellet ejectors, the efficiency of the process is probably as high in owls as in any other bird.

The Common Barn Owl feeds in early morning and early evening and will usually produce one to two pellets per day. Glossy black when fresh, the pellet remains smooth and dark in color when dry. These pellets can provide valuable information pertaining to the diet of owls. By studying the contents of owl pellets, one may discover seasonal, regional, and habitat differences and even differences in individual tastes between owls. Also, pellets can be used to effectively illustrate the nature of food chains, to demonstrate the role of avian predators within the ecosystem, and to provide information about the presence and relative abundance of animals in a particular area. As an educational tool, pellets can also be used to introduce students to skeletal anatomy and to teach others how to identify an animal by its skull and jaw bones.

The pellets in this Pak are from one of the two owl families, Tytonidae or Strigidae. Each pellet has been fumigated to eliminate the presence of any insects and then individually wrapped for preservation. Unless otherwise stated, the pellets in this Pak are from the family Tytonidae and more specifically, the Common Barn Owl (*Tyto alba*).

## PROCEDURE

1. Work in pairs or teams as your instructor advises.
2. Measure the length and width of the pellet with the ruler provided.



Length \_\_\_\_\_

Width \_\_\_\_\_

3. Dissect the pellet by first breaking off a piece using your fingers. Take the piece of fur and roll it between your thumb and index finger, feeling for any hard substance. Dissecting the pellet can also be aided by using a probe, tweezers, or any other dissecting tool. Separate the bones from the fur and/or feathers and then sort the bones into different categories.
4. Identify the general family of prey in the pellet by using the skulls below and/or the "Key to Skulls found in Owl Pellets" which you can obtain from your instructor. Enter your findings in the student record below and also in the class chart your instructor has created on the chalkboard. When the class has completed the chart, enter the data in the class record below.

What was in your pellet?

Number of skulls or pairs of jawbones found in your owl pellet. \_\_\_\_\_

Prey Found	Numbers

## Class Findings

Prey Found	Vole	Mole	Shrew		
TOTALS					
Total number prey items found _____					
Total number of pellets dissected _____					
Average number of prey items per pellet _____					



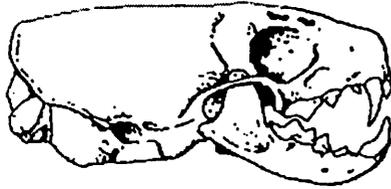
Family Talpidae - Mole



Genus Rattus - Rat



Subfamily Microtinae - Vole



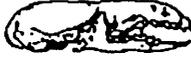
Family Mustelidae - Weasel



Family Geomyidae - Pocket gopher



Family Leporidae - Rabbit



Family Soricidae - Shrew



Genus Mus - House mouse



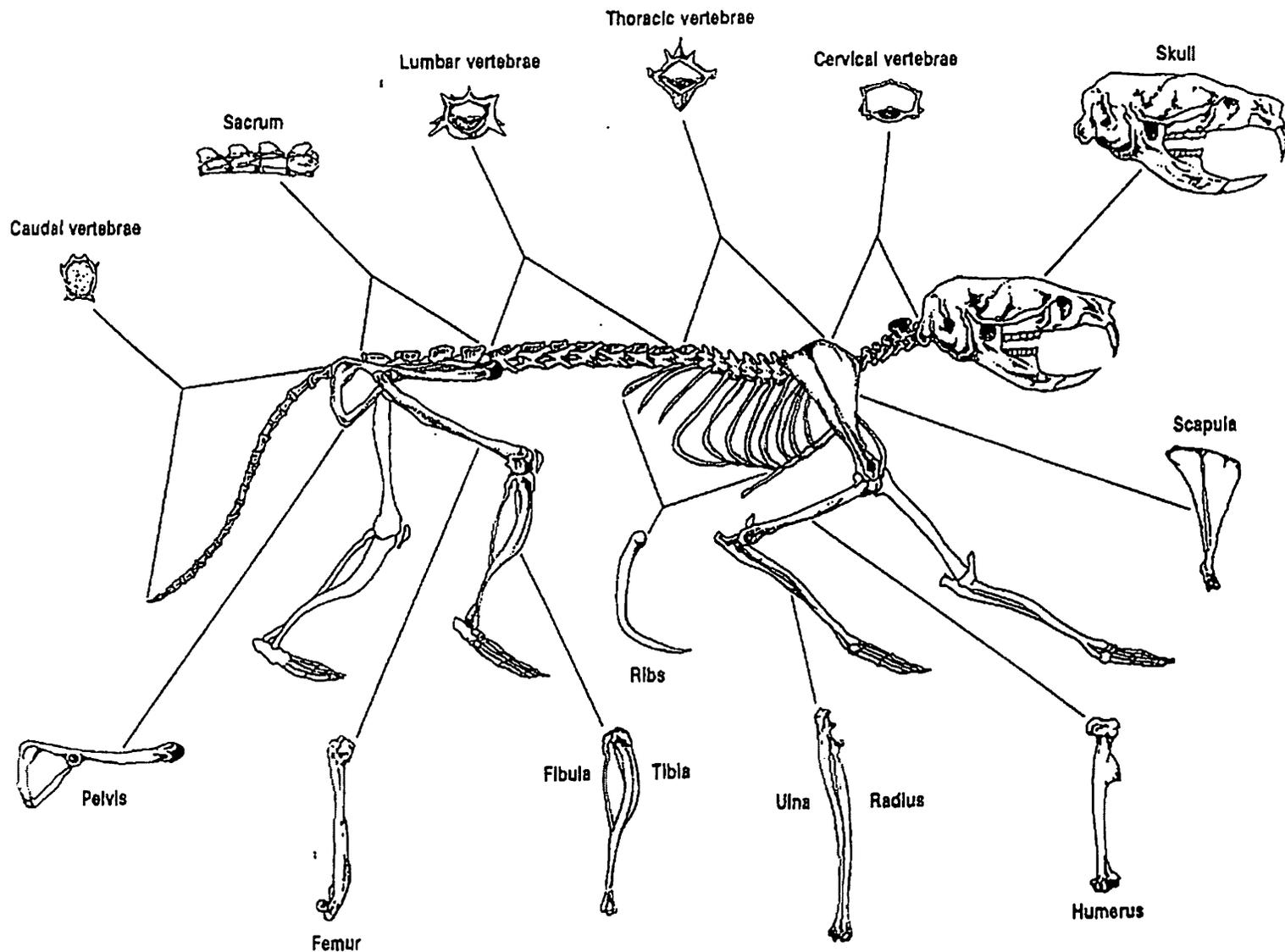
Subfamily Cricetinae - Deer mouse

- Most pellets contain a Vole (*Microtus*). Obtain the "Vole Stick Sheet" from your instructor, identify the individual bones of the vole skeleton, and paste/tape the bones in the appropriate places. If your pellet does not contain a vole, you should be able to get the different bones from someone else in the class that has found 2 or more voles in their pellet or from the extra bones the class may have. If your instructor wishes for you to reconstruct the vole skeleton, first identify the bones as above, then secure the bones together using a toothpick to apply the glue.
- Answer the questions below.

### QUESTIONS

- What are owl pellets? \_\_\_\_\_
- How are owl pellets formed? \_\_\_\_\_
- Do only owls produce pellets? \_\_\_\_\_
- What important information can be obtained from owl pellets? \_\_\_\_\_
- In reference to your classroom data, what kind of prey seems to be most abundant? \_\_\_\_\_  
Least abundant? \_\_\_\_\_
- Is it possible that the prey identified from the pellets does not reflect the true mammal population in the wild? Why or why not? \_\_\_\_\_
- Assuming that the barn owl regurgitates one pellet per day, how many prey items would the owl that produced your pellet consume per year? \_\_\_\_\_
- During the nesting season the young need an enormous amount of food for growth. If the nest contains three young and each of the young eat five mice per night for a month and the two adults eat four per night, how many mice would the parents have to capture in 30 days? \_\_\_\_\_
- On a separate sheet of paper, create a food chain for each of the prey items found in your pellet. Place the owl at the highest trophic level.

**Optional:** Placing the owl at the highest trophic level, create a food web using the following items: vole, deer mouse, mole, house mouse, weasel, shrew, snake, starling, frog, salamander, spider, (grubs, earthworms, centipedes), crane fly, (seeds, plants, roots).



# Vole

*Microtus townsendi*

Cervical Vertebra



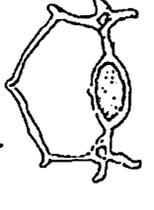
Thoracic Vertebra



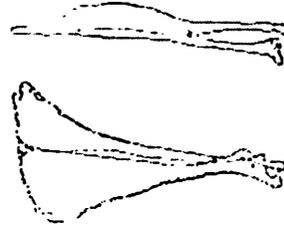
Lumbar Vertebra



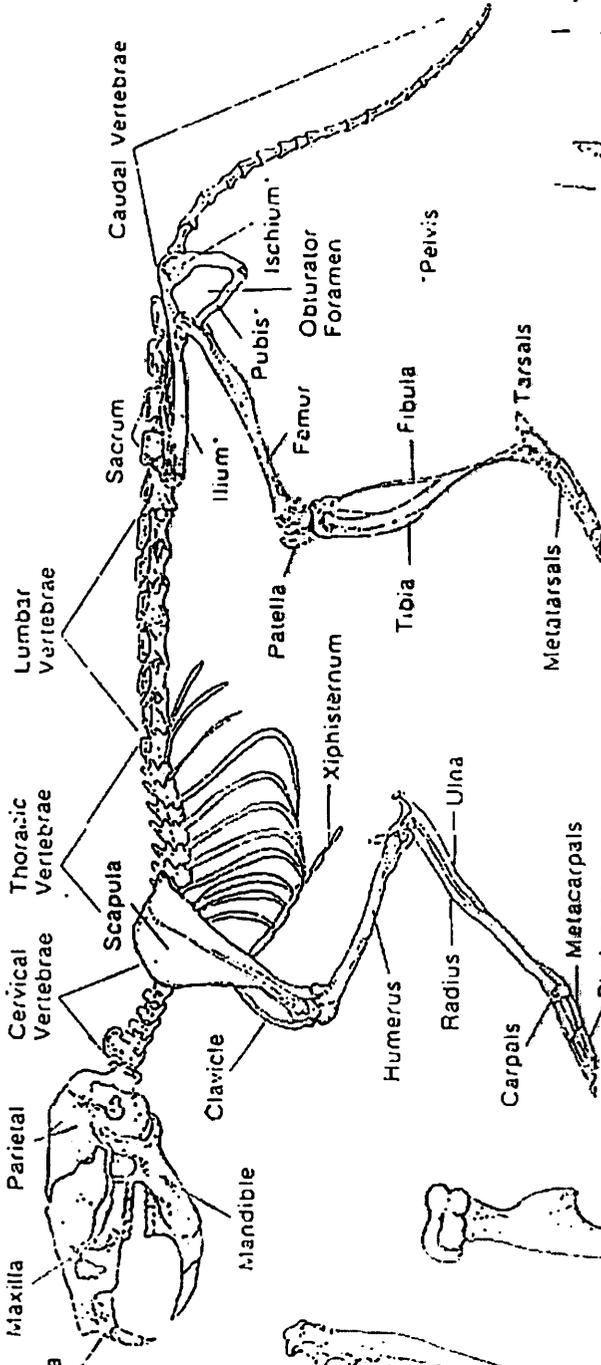
Caudal Vertebra



Skull



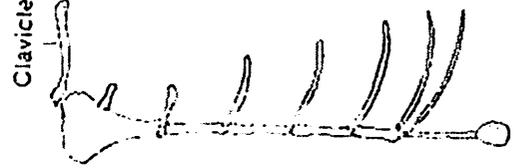
Premaxilla  
Maxilla  
Parietal  
Mandible  
Clavicle  
Scapula  
Cervical Vertebrae  
Thoracic Vertebrae  
Lumbar Vertebrae  
Sacrum  
Caudal Vertebrae



Ilium  
Pubis  
Ischium  
Obturator Foramen  
Femur  
Tibia  
Fibula  
Tarsals  
Metatarsals

Xiphisternum  
Humerus  
Radius  
Ulna  
Carpals  
Metacarpals  
Phalanges

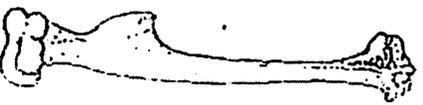
Sternum



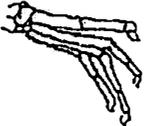
Radius & Ulna



Humerus



Front Foot



Back Foot



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