

APES: Owl Pellet Dissection, *A Study of Food Chains & Food Webs*



INTRODUCTION:

Owl pellets are masses of bone, teeth, hair, feathers and exoskeletons of animals preyed upon by raptors, or birds of prey. Pellets are produced and regurgitated not only by owls, but by hawks, eagles and other raptors that swallow their prey whole or in small pieces. Owls feed early in the evening and regurgitate a single pellet approximately 20 hours after eating.

Predatory mammals such as bobcats and wolves have teeth to grind up bones and claws, and, a digestive tract adapted to pass these ground parts. Owls, on the other hand, do not have teeth for grinding and cannot pass whole bone and claws through their digestive tract safely. The protein enzymes and strong acids that occur in the digestive tract of raptors do not digest the entire meal. The relatively weak stomach muscles of the bird form the undigested fur, bones, feather etc. into a bolus (or wet slimy pellets). This type of material has little nutritional value and must be passed from the body. In this process even the most fragile bones are usually preserved unbroken.

Scientists take advantage of this adaptation by collecting these pellets and examining their contents. Since owls are not very selective feeders, these pellets be used to estimate the diversity of available prey. The contents are also a direct indicator of what an owl has fed on; information that is crucial for species management and protection.

The owl pellets that you will be examining in this lab have been collected and fumigated from common barn owls (*Tyto alba*). Owl pellets themselves are ecosystems, providing food and shelter for communities that may include clothes moths, carpet beetles and fungi. Clothes moth larvae are frequently abundant in pellets, feeding on fur and feathers. The black spheres about the size of periods (.) that are found in the pellets are the droppings of the caterpillars. The larvae metamorphose near the surface of a pellet in cocoons made of fur.

MATERIALS:

1 owl pellet (wrapped in aluminum foil)	2 sheets of white paper
specimen jar with cap	metric balance (1 per table)
dishwashing detergent with dropper	2 Petri dishes
cheese cloth	ruler
forceps	stereoscopic dissecting microscope
dissecting probe	water
paper towel	

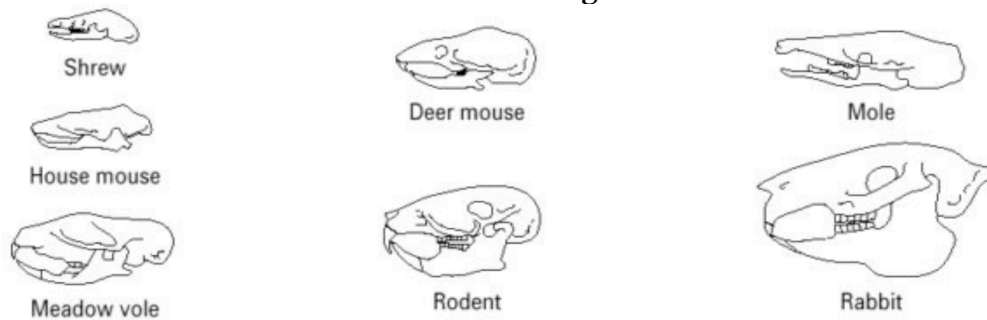
PROCEDURE:

- 1) Read the introduction & answer the prelab questions on your Data, Observations & Analysis page.
- 2) Unwrap and examine the outside of the owl pellet. Put all data and observations on the Data, Observations & Analysis page. Describe the external features. Measure and record its length and width in centimeters. Measure and record the owl pellet mass in grams.
- 3) To investigate the interior of the pellet you must soften it by soaking it in water. Fill the specimen jar 3/4 full with water. Add a few drops of dishwashing liquid and the pellet to the jar. Close the jar and shake *gently* for about 30 seconds. Let the jar stand for five minutes and shake again for 30 seconds.

- 4) When the pellet has fallen apart, have your partner hold the cheese cloth, and *slowly* pour the contents of the jar over the cheese cloth. Be careful not to allow any animal fragments, bone, or fur wash into the sink.
- 5) Place the cheese cloth on a piece of white paper. Pick bones, teeth, insect parts, and any other prey evidence out of the fur and place all prey evidence (*except skulls*) in a petri dish. Place the skulls on a second sheet of paper. Use probes or forceps, as necessary, but proceed carefully to avoid crushing any small bones. Separate the fur and other soft matter as you search for bones by placing them in a separate petri dish.
- 6) One lab partner should attempt to identify each of the bones keeping a tally on the Data, Observations & Analysis page using the diagrams. Use the dissecting scope as needed to identify small bones and separate the occasional litter (i.e. small stone, cartilage, etc.) from the prey matter.
- 7) Another lab partner should use the **dichotomous key** below this step and diagrams to identify the prey species by skull. (*NOTE: You may not always need to locate the mandible (lower jaw) of the skulls to identify the prey specimen. If you have more than one skull, identify each.*) If you are unable to determine the species based on dichotomous key and skulls chart, consider referring to the extra charts located on the front chalkboard.

<i>Does the animal have....</i>	<i>Then...</i>
1. a) 3 or fewer teeth on each side of its upper jaw? b) 4 or more teeth on each side of its upper jaw?	go to 2. go to 3.
2. a) 2 biting teeth on its upper jaw? b) 4 biting teeth on its upper jaw?	go to 4. it's a <u>rabbit</u> .
3. a) a skull length of 23 mm or less and brown teeth? b) a skull length of more than 23mm and <i>approx.</i> 44 teeth?	it's a <u>shrew</u> . it's a <u>mole</u> .
4. a) the roof of its mouth extending past the last molar? b) the roof of its mouth not extending past the last molar?	go to 5. go to 6.
5. a) a skull length of 22 mm or less? b) a skull length of more than 22 mm?	it's a <u>house mouse</u> . it's a <u>rat</u> .
6. a) flat molars? b) rounded molars?	it's a <u>meadow vole</u> . it's a <u>deer mouse</u> .

Rodent Skull Diagram



- 8) Once all bones have been identified, collect your bones in the specimen dish. Carefully dry as many as you can with one or two pieces of paper towel. Add the other organic matter (i.e. fur and small miscellaneous pieces). Fill in the Data Chart on your Observations page. Then, make a small mark

on your specimen dish to be able to identify it, and place your petri dish(s) Under the heat lamps for drying. Check the organic matter after 24 hours to record the total biomass of your sample.

Biomass:

It is not enough to simply know how many of each prey animal the barred owl eats because the animals are different sizes. The owl might have eaten a greater number of mice than rats, but because the rat is so much larger, the owl might have gotten more "food" from the rats.

If you had 3 hamburgers for lunch and 10 French fries (single pieces), you would probably feel stuffed, but it would be the hamburgers that filled you, not 10 French fries.

When we calculate the **biomass** for each prey, we are taking into account how heavy the animal is.

We get biomass units by multiplying the number of each animal by a **conversion factor** that is based on the weight. For example, if the owl ate 4 mice and 1 rat, the calculations would look like this:

Prey	Frequency	Conversion Factor	Biomass Units
Mouse	4	1	4
Rat	1	12	12

Even though the owl ate more mice, it got 12 units of food from the rat and only 4 from the mice. Aren't you glad that you get your biomass from hamburgers rather than rats and mice?

- 9) Clean up all materials and wipe the top of your lab table with a damp sponge (it will air dry)
- 10) Look at the "Barn Owl Pellet Interactive Study Results" and add your statt to the chart on the front board. We will compare our % data statistics with those for ALL classes performing this lab. Hypothesize from which area of the country your owl pellet was retrieved. Record this hypothesis in Analysis question #2 of the Data, Observations, & Analysis page.
- 11) Answer all remaining questions on your Data, Observations, & Analysis page.