

# A Study of Predator-Prey Relationship



## Pre-Lab

The predator-prey relationship is important in any ecosystem.

1. How can we measure that relationship?
2. Propose two ways to study what predators eat over the course of a day. Be sure to describe what data you would be collecting and how you would be collecting it.
3. What is an owl pellet? What is it made of?

The common barn owl, *Tyto alba*, has an average mass of 340g, is approximately 30cm in length, and has a wingspan of about 85cm. Common barn owls produce one or two pellets per day depending on the abundance of food.

## Purpose

To dissect the owl pellets, identify the bones, and determine what the owl has eaten. You will also determine the approximate food energy in the prey by extrapolating measurements of lower jaws to body mass.

## Materials

Forceps, owl pellet, 2 dissecting needles, sheet of white paper, small cm/mm ruler

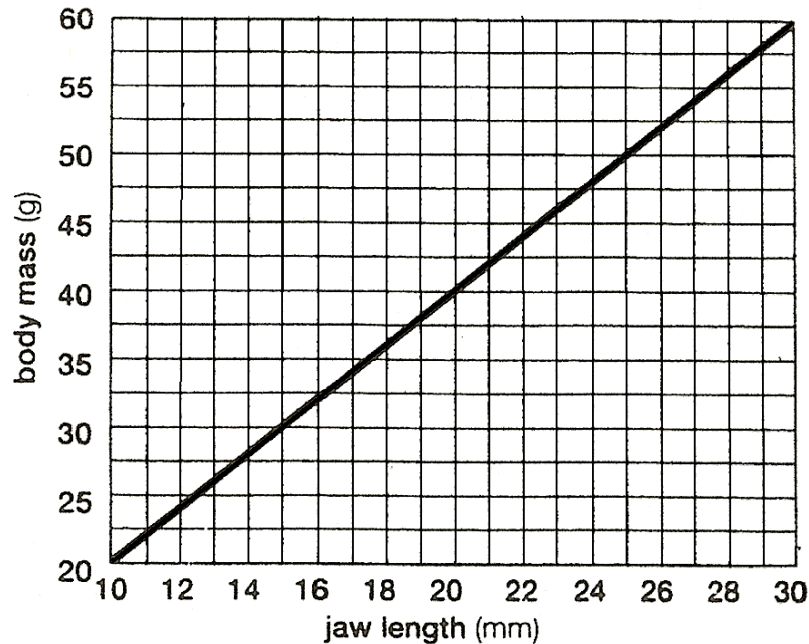
*\*owl pellets have been treated to they contain no living organisms\**

## Procedure

1. On a sheet of white paper, carefully unwrap the owl pellet.
2. Mass the owl pellet in grams and record the mass in data table 1.
3. Using the dissecting needles and forceps carefully pick apart the owl pellet.
  - a. Separate bones from other material.
  - b. Place hair and other remains in a pile, set aside until the lab is completed.
4. Examine the bones. Separate the skulls and jaw bones from the other bones.
  - a. Use the supplied diagram to identify the mammalian skulls and jaws.
  - b. *\*Important\** vole or meadow mouse (*Microtus*) lower jaw bones are two pieces. Be sure to pair right and left halves of vole jaws.
  - c. Identify non-mammalian skulls and remains, such as birds, snakes, lizards, and insects. Record the data in data table 1.
5. In **millimeters**, measure the length of one vole jaw bone from each pair of jaw bones. Measure as shown in class. Then record your data in data table 3.
6. To determine how much food energy the pellet represents, you will relate jaw length to live mass of vole.
  - a. See the graph of jaw length to body ratio. Use the graph to complete data table 3. Record your data for each vole jaw.
7. Practice identifying other bones and articulate the bones into partial skeletons, if time allows.
8. Dispose of the owl pellet and paper as instructed. Return equipment. Wash your hands thoroughly.



## Predator-Prey Relationship: Data Analysis



### 1. Graphing Frequency

Use the class jaw data to prepare a frequency distribution graph of jaw lengths.

- Group the Vole Jaws in 5mm ranges (0mm-5mm, 6mm-10mm, 11mm-15mm, 16mm-20mm, 21mm-25mm, 26mm-30mm, 31mm-35mm and so on if necessary.)
- Label the x-axis Vole Jaw Length Ranged (mm) and the y-axis Frequency.
- Create a bar graph using the data.

### 2. Estimated Live Mass

- The relationship between jaw length and live vole mass is an estimation. What factors may influence the ratio?
- From data table 3, determine the total estimated live mass of prey eaten by the owl that made your pellet.
- How much live mass was indigestible material?
- How much live mass was digestible material?

### 3. Owl Diet (*Show your work for any credit!*)

- Assume that an owl produces 1.5 pellets per day, how much food does the owl that produced your pellet consume per day? Include both the mass and estimate for the number of prey animals. (Hint: Your data is for one pellet!)
- What is the total mass that an owl will consume in one year (365 days)?
- Estimate the number of prey items your owl will eat in one year.
- Barn owls may live up to 17 years. Estimate the total mass that an owl will consume in its lifetime.
- Estimate the number of prey items your owl will eat in its lifetime.
- Explain at least three sources of error in your calculations.

### 4. Average Owl Prey

A single pellet may not be from a typical day. The pellet may represent a day where the owl that produced your pellet found more food than usual or less food than usual.

- The average of the data from all the pellets examined in class provides a better estimate. Explain why.

### 5. Owl Food Web

Draw a food energy pyramid of the owls, the prey they consume, and the producers. (Assume all prey are herbivores.)