

Who Eats Whom?

Overview The way animals and plants behave is so complicated because it not only depends on climate, water availability, competition for resources, nutrients available, and disease presence but also having the patience and ability to study them close-up.

We're going to build an eco-system where you'll farm prey stock for the predators so you'll be able to view their behavior. You'll also get a chance to watch both of them feed, hatch, molt, and more! You'll observe closely the two different organisms and learn all about the way they live, eat, and are eaten.

What to Learn Predators and prey are necessary for each other's ecosystem. They each evolve physical characteristics and behaviors for survival. It can be difficult to observe such a small system, so the Predator-Prey column allows us to see mantises eating fruit flies, and fruit flies breaking down fruit.

The praying mantis has a long neck and a triangular head that can turn 180 degrees to search for their prey. They have two large compound eyes and three other simple eyes between them. They are built for "preying!" They use their front legs to capture their prey, and the spikes on their legs to hold their food in place.

Did you know that fruit flies don't really eat fruit? They actually eat the yeast that growing on the fruit. Fruit flies actually bring the yeast with them on the pads of their feet and spread the yeast to the fruit so that they can eat it. You can tell if a fruit fly has been on your fruit because yeast has begun to spread on the skin.

Materials

- four 2-liter soda bottles, empty and clean
- 2 bottle caps
- one plastic lid that fits inside the soda bottle
- small piece of fruit to feed fruit flies
- aluminum foil
- plastic container with a snap-lid (like an M&M container or film can)
- scissors and razor with adult help
- tape
- ruler
- predators: spiders OR praying mantis OR carnivorous plants (if you're using carnivorous plants, make sure you do the Carnivorous Greenhouse experiment first so you know how to grow them successfully)
- soil, twigs, small plants

Experiment

To Make Fruit Fly Trap

1. Cut bottle below the shoulder. (Start cut with a razor, finish with scissors, with adult help.)
2. Screw cap on tight.
3. Drill a hole in center of cap.
4. Set a lid in the bottom of the bottle.
5. Cover the cap with a piece of foil to begin forming a little cup. Remove the foil and finish forming into a cup.
6. Make three foil cups and place a piece of fruit in each.
7. Place cups on the lid at the bottom of the bottle.
8. Slide the top of the bottle in upside down.
9. Tape to seal around the rim of the fruit fly trap.

To Make the Predator-Prey Column

10. Cut bottle #1 above the shoulder. (Start cut with a razor, finish with scissors, with adult help.)
11. Cut bottle #1 below the hip.
12. Cut bottle #2 one pinkie's width lower than the shoulder.
13. Put the cap on bottle#2
14. Drill a 4 mm hole into the cap of bottle #2.
15. Cut 1 finger above the hip on bottle #2.
16. Measure 4 cm above the hip on bottle #3 and cut.
17. Take bottle #1 middle part and slide the top of bottle#2 into it upside down.
18. Measure 4 mm up from the bottom on bottle #3 and cut.
19. Set #11 above (bottle#1 middle and top of bottle#2) into #12 above (bottom of bottle#3).
20. Put the shorter base on top of the whole structure.
21. Poke air holes in the top.

To Make the Water Feeder

22. Drill a hole in the bottom of the vial (with adult help).
23. Insert the wick into the hole.
24. Tie a knot in the part of the wick that is inside the vial, to plug the hole.
25. Drill a hole in the side of the predator prey column. Put the wick through the hole and attach the vial to the bottle with tape.
26. Keep the vial filled with water.
27. Place the tray that is in the bottom of the fruit fly trap in the bottom of the predator prey column. Remember to do this outside.
28. Put plants and spiders in the top portion of the predator-prey column.

29. Draw a complete diagram of both apparatus (Fruit Fly Trap and the Predator-Prey Column), labeling each part:

Reading

Organisms that might be in your Predator-Prey Column

Insects are not only the most diverse subgroup of arthropods, but with over a million discovered species it is the most diverse group of animals on earth. Although they can't all be as beautiful as a butterfly, they all play important roles in their ecosystems—just think of where we would be without bees!

The segmented exoskeletons of insects have a hard, inner layer called the **cuticle**, and a water-resistant outside layer called the **exocuticle**. Insects are divided into two major groups: **winged insects** and **wingless insects**. Air is taken in through structures called **spirials**, and delivered directly to the body. Most insects are **oviparous** (hatch from eggs after the eggs are laid).

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Exercises

1. What shape is the head of the mantis?
2. How many eyes does a praying mantis have?
3. How else has the mantis head evolved to stalk their prey?
4. How does a praying mantis hold its food?
5. Do fruit flies eat fruit?
6. How do predators and prey change over time?

Answers to Exercises: Who Eats Whom?

1. What shape is the head of the mantis? (triangular)
2. How many eyes does a praying mantis have? (two compound and three simple. Five total)
3. How else has the mantis head evolved to stalk their prey? (their head can turn 180 degrees)
4. How does a praying mantis hold its food? (with its front, spiky legs)
5. Do fruit flies eat fruit? (No, they eat the yeast that grows on fruit.)
6. How do predators and prey change over time? (they develop physical traits and behaviors to help them survive (ie eat or avoid being eaten))