

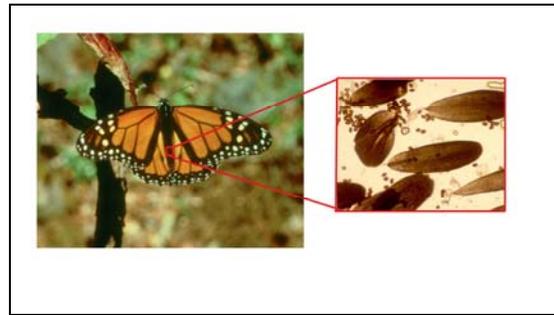
Lesson 3: Scales and Spores!

Background:

Almost every day you can find scientists at the Altizer lab at the University of Georgia looking through microscopes for tiny parasites of monarch butterflies. *Ophryocystis elektroscirrha* (OE) parasite spores can be most easily found between butterfly scales on the surface of many monarchs. An OE spore may be brown or black and shaped like a lemon. A butterfly scale is about 100 times larger than an OE spore and often looks like a leaf, but can have many different shapes. It is easy for deadly OE parasites to be undetected because of their size. In fact, OE parasites are so tiny that you can not see them with just your eyes.



Checking MonarchHealth samples for OE spores.



Magnified picture of scales and OE spores taken from the abdomen of a monarch.

It is the job of scientists in the Altizer lab to check all *MonarchHealth* samples for OE parasites. Every year scientists look at hundreds of samples taken from monarch butterflies from areas across the country. They have learned that OE spores can be found anywhere on an adult monarch's body, but the greatest number of spores is usually on the abdomen. That is why *MonarchHealth* samples are always swabbed from the abdomen of a butterfly.

At the lab, each sample must be checked using a microscope. The scientists can see thousands of monarch scales as they search for OE spores. The spores in each sample are first counted. Then, scientists use the *OE Infection Rating Scale* to determine whether a monarch has a mild or severe infection. The more spores they find in a sample indicate more severe infections.

In this activity you will do the same thing that scientists do. You will look at samples taken from actual monarch butterflies. Instead of using a microscope, you will use photographs taken through a microscope. You will look for and count OE spores. Then you will use the *OE Infection Rating Scale* to determine how infected your monarch is with parasites. Now that your *MonarchHealth* samples are on their way to Altizer's lab, get ready to look at scales and spores!

Lesson 3: Scales and Spores!

Materials:

- *Scales and Spores! – Data Table*
- *Scales and Spores! – Monarch Tape Samples*
- *Scales and Spores! – Discussion/Analysis*
- *Monarch Physical Rating Scales* (page 2)
 - *OE Infection Rating Scale*

Procedures:

- 1) Examine each photo online through the *MonarchHealth* website or as provided in handouts.
- 2) Identify OE spores.
 - a) Before checking your samples, look at the photograph below of monarch butterfly scales and OE spores as seen through a microscope.



- b) Become familiar with the differences between scales and spores. Notice the size and shape of each.
 - c) Remember that there may be other things in the tape samples. Air pockets and glue from the tape are easy to see in areas with only a few scales. The tape may also pick up debris from the butterfly.
- 3) Count the OE spores.
 - a) Fill in the heading on the *Scales and Spores! – Data Table*.
 - b) Look at the monarch tape sample. Count all of the OE spores in the sample.
 - c) Record the number of spores in the data table.
 - 4) Determine the OE Infection Score and Description.
 - a) Use the *OE Infection Rating Scale* on the second page of the *Monarch Physical Rating Scales* form to score the OE infection.
 - b) Compare the number of OE spores in the sample with the different spore number ranges shown in the second column of the *OE Infection Rating Scale*.
 - c) Find the OE infection score that matches the number of spores in the sample.
 - d) Record the OE infection score in the data table.
 - e) Use the third column of the *OE Infection Rating Scale* to find the description of the infection.
 - f) Record the “Infection Description” in the data table.
 - 5) Repeat steps 2 through 3 for each monarch tape sample.
 - 6) Fill in the heading and answer the questions on *Scales and Spores! – Discussion/Analysis*.



Scales and Spores! Data Table

Name _____ Class _____ Date _____

Sample #	# of OE Spores	OE Infection Score	Infection Description
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			



Scales and Spores! Discussion/Analysis

Name _____ Class _____ Date _____

1. Scientists at the Altizer lab make tape samples by pressing a small piece of clear adhesive tape against the abdomen of an adult monarch. Why is the abdomen the best place to make a tape sample?

2. Making a tape sample does not harm a butterfly, but part of its body sticks to the tape. What part of the butterfly's body sticks to the adhesive tape?

3. What do the monarch scales in these samples look like? Describe and draw a monarch scale.

4. What do OE spores look like? Describe the size, color, and shape of an OE spore.

5. How do you tell the difference between OE spores and monarch scales?

6. Which of the ten monarch butterflies tested were not infected with OE parasites?

7. Which of the ten monarchs were mildly to severely infected with parasites?

8. Which of the butterflies in this activity were the mostly likely to have short lives and/or deformed wings?

9. Is it difficult to find and count OE spores in a tape sample? Explain your answer.