



Microscopic Mysteries

What “invisible” creatures live where we sail?

Module 11: Chapters 1

Grade Level

Middle School

Subject Areas

Earth Science, Chemistry, Biology

Duration

Preparation time:

Lesson Time:

Part I: 15 minutes

Part II: 45 minutes

Part III: 90-120 minutes

Setting

Indoor/Outdoor/On-the-water

Skills

Gathering information, Organizing data, Graphing data, Identifying trends, and data analysis.

Vocabulary

Phytoplankton, zooplankton, holoplankton, meroplankton, food chain

Standards

[Click here to view aligned standards.](#)

Summary

Students construct plankton nets; collect plankton samples and learn to use microscopes to identify microscopic plants and animals in the samples.

Objectives

Students will:

- Construct a plankton net and collect plankton samples.
- Identify the parts of a microscope and describe the function of each part.
- Observe prepared slides at varying magnification with proper procedures/ techniques.
- Prepare and observe wet mount slides at varying magnification with proper procedure/technique.
- Compare and contrast the different levels of magnification for the microscope.
- Identify microscopic creatures in water samples.
- Gain a better understanding of the food chain.

Materials

- Microscopes
- Hand lenses
- Prepared slides
- Water samples
- Blank slides and cover slips
- Knee high hose, 1 per net
- 2, 32 oz. plastic food containers per net
- 3 large paper clips per net
- Small (preferably plastic) bottle with a fairly small mouth per net
- Scissors and or X-acto knife
- Stapler or Duct tape
- 1 rubber band (preferably heavy duty) per net
- 4 large washers per net
- Strong string (kite string) or fine nylon twine
- Eyedropper
- Rulers
- Small cup water
- 1-3oz. fishing weights in 1 oz. increments



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Procedure

Part I: Classroom

15 minutes

1. Review collecting water samples from Reach module 5, Water movement, Current and tide.

Write the word “plankton” on the board. Ask students what they know about plankton? What is plankton? Where does it come from? Are there different types of plankton (salt water, fresh water, animal, plant)? Is plankton important to animals and humans?

2. How can we see plankton if it is so small? Name tools scientists use to see items that are too small to view with their eyes?

Introduce hand lenses and/or microscopes. Demonstrate how a microscope functions. Review the parts of the microscope and how it works to magnify objects.

Complete student sheet 1 Parts of a microscope. Why would scientists deem it important to monitor the amount of plankton in the ocean/estuary or lake?

Part II: Classroom

45 minutes

1. Before the group arrives create four stations for them to begin using microscopes and hand lenses. Divide the whole group into 4 smaller groups and have them rotate through the 4 stations.



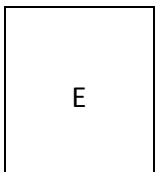
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2. Station 1 “What is it?”

Study the mystery photos and try to identify each one! HINT: They are all common objects that might be found in your home or a classroom. Write your guesses for the mystery items in the Station 1 section of your worksheet.

3. Station 2 “Make a simple lens”

You will need one slide, an eyedropper, and a small cup of water to create a simple lens. You will also need a standard ruler and a hand lens.



Place one drop of water in the middle of the slide and hold over the letter “e” in the box at right.

Move the slide up and down until you get the letter in focus. Measure the distance between the slide and table.

Place another drop of water in the middle of the slide and repeat the above procedure.

Add an additional drop and repeat again.

How does the view of the “e” change as you add more drops of water?

Now, use the hand lenses provided to view the letter “e”. Move the hand lens up and down until you get the words in focus. Measure the distance between the slide and table.

How does the view of the “e” with the hand lens compare to the water lens?

Write all your answers in the Station 2 section of your worksheet.

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4. Station 3 “Learn how to view a slide”
Select a slide and set it on the STAGE making sure the specimen is centered over the OPENING in the stage. Rotate the NOSEPIECE to center the LOWEST power OBJECTIVE lens (shortest objective) over your specimen. While looking through the eyepiece, rotate the large COARSE adjustment knob to get specimen in view.

Use the small FINE adjustment knob to SHARPEN the image and make it clear. To increase magnification, rotate the NOSEPIECE to center the next largest OBJECTIVE LENS (middle-sized objective) over your specimen. You may need to use the FINE adjustment knob to sharpen the image.

To view your specimen under the highest magnification, rotate the nosepiece to center the LARGEST objective lens (longest objective) over your specimen. You may need to use the fine adjustment knob to sharpen the image.

WARNING: Be careful using the COARSE adjustment knob with the HIGHEST power objective! Always watch the stage from the SIDE to make sure the slide doesn’t touch the objective LENS.

Choose one specimen and draw it as it appears in three different powers of magnification. Answer all of the questions in the Station 3 area of your worksheet. Done? Be sure to clean up your area and put away your materials!

5. Station 4 “Make a wet mount slide”
Place ONE drop of sea/ pond water in the middle of a clean slide. Place a COVER SLIP

on one side of the drop of water and slowly lower it over the drop of water. Place the SLIDE on the STAGE making sure the specimen is centered over the OPENING in the stage. You may need to move the slide around for viewing.

Rotate the NOSEPIECE to center the LOWEST power OBJECTIVE lens (shortest objective) over your specimen. While looking through the eyepiece, rotate the large COARSE adjustment knob to get your specimen in view.

Use the small FINE adjustment knob to SHARPEN the image and make it clear. To increase magnification, rotate the NOSEPIECE to center the next largest OBJECTIVE LENS (medium-sized objective) over your specimen. You may need to use the FINE adjustment knob to sharpen the image.

To view your specimen under the highest magnification, rotate the nosepiece to center the LARGEST objective lens (longest objective) over your specimen. You may need to use the fine adjustment knob to sharpen the image.

WARNING: Be careful using the COARSE adjustment knob with the HIGHEST power objective! Always watch the stage from the SIDE to make sure the slide doesn’t touch the objective LENS.

Use the water guides to help you identify the organisms you see in your samples. Answer all of the questions in the Station 4 section of your worksheet. Done? Be sure to clean up your area and put away your materials!



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Part III: Classroom/Outdoor

90-120 minutes

1. Take samples of seawater and fresh water.
How can we concentrate our amount of plankton on our slides?
2. Introduce plankton nets and discuss use.
Demonstrate how to assemble and use.
(Depending on desired outcomes, time, and abilities, you can have preassembled nets prior to class or have students assemble in groups or as individuals).
3. To assemble nets, take 2, 32 oz. food containers, place one inside the other, and carefully punch three holes with a single hole punch evenly spaced around the perimeter of the containers.

Carefully cut bottoms off both containers using sharp scissors or an X-acto knife (instructors may want to complete this step prior to class for all students).

While being careful not to rip the stocking, slide one container into the top of a knee high stocking and the other container over the outside of the stocking. Make sure the holes in both containers line up (the top of the knee high stocking should now be held open firmly between the two containers)

Fold 1 inch of the stocking over the outside container and insert heavy-weight paper clips into holes you previously punched.

Attach 1, 24 inch piece of string to each paper clip. Slide 1 large washer onto each piece of string and tie the ends of all three pieces to the fourth washer (you will later attach a longer length of line to this washer when you are ready to take samples).

Cut toe off end of the stocking, insert small collection bottle into hole you have created, and secure with a heavy-duty rubber band around lip of the bottle. Your plankton net is now complete and ready to use once you attach a longer line & desired weight to get samples from various depths.

4. Rig sailboats, go sailing, and tow nets rigged for various depths from the stern. Nets can be rigged for different depths by adding more line and weight. Keep track of which samples came from which depths. Alternately, use nets from shore or a dock.
5. Return to classroom and analyze samples by making wet mount slides and examining them with microscopes or hand lenses. Draw & graph findings on student sheet 3.

Resources:

<http://www.msnucleus.org/watersheds/mission/plankton.pdf>

<http://sciencespot.net/Pages/classbio.html>

[Information to construct your own plankton nets and Van Dorn bottles](#)

<http://sciencespot.net/Media/micromyspic.pdf>

Name _____

Station 1 - Solve the Mystery

Read the directions for each section on the cards provided at each station. Write all answers on this worksheet! Do not make any marks on the materials at each station!

1. _____	9. _____	17. _____
2. _____	10. _____	18. _____
3. _____	11. _____	19. _____
4. _____	12. _____	20. _____
5. _____	13. _____	21. _____
6. _____	14. _____	22. _____
7. _____	15. _____	23. _____
8. _____	16. _____	24. _____

Station 2 - Make It Simple

1. Complete the chart to show your observations using the water drop and hand lenses.

Lens	Observations	Distance from Page
Single Drop of Water		
Two Drops of Water		
Three Drops of Water		
Hand Lens		

2. What do you predict would happen to the magnification if you used more drops of water?

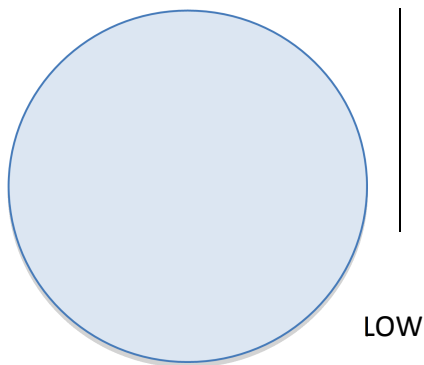
3. How does the view of the “e” with the hand lens compare to the water lens?

Station 3 – Select-A-Slide

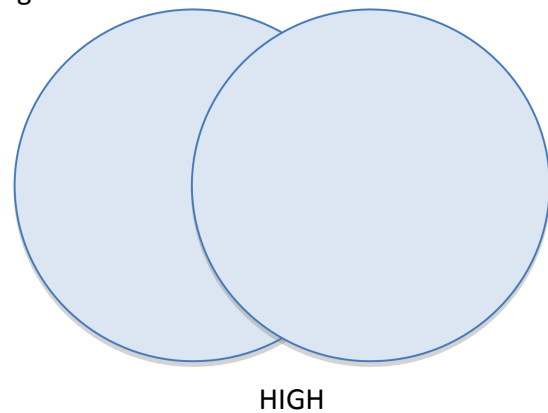
1. Read the station card to answer these questions:
2. a. What should you do before viewing a slide? _____
3. b. Which objective provides the highest magnification - short, medium, or long? _____
4. c. What is the warning? _____

Name of Specimen: _____

1. View some of the prepared slides and then select one to draw. Draw a view of this specimen at three different powers of magnification – low, medium, and high.
2. How does the view of the specimen compare as the power of magnification increases? Write at least one sentence that summarizes your observations.



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Station 4: Make a wet mount slide

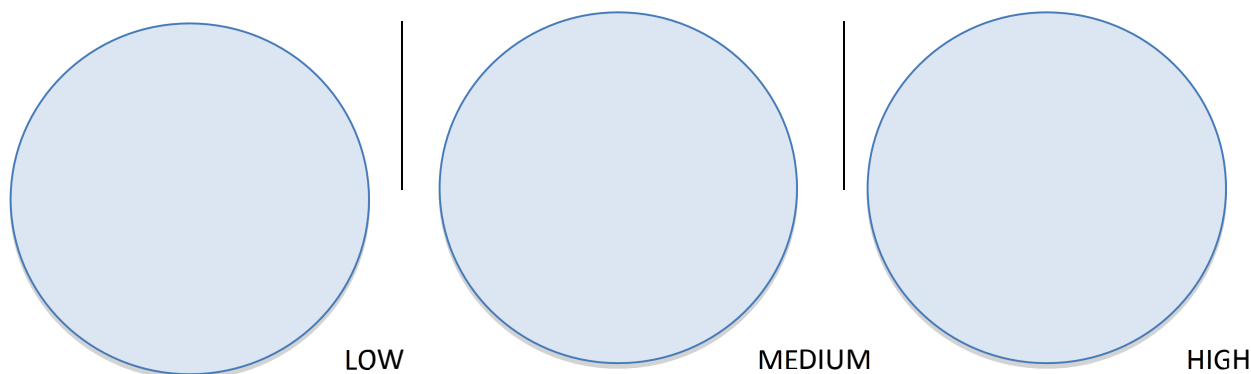
1. Read the station cards to answer the following questions:

- What is the name of the piece that is used to cover the drop of water? _____
- Which objective should be used first - low, medium, or high power? _____
- What do you need to do when you are done at this station? _____

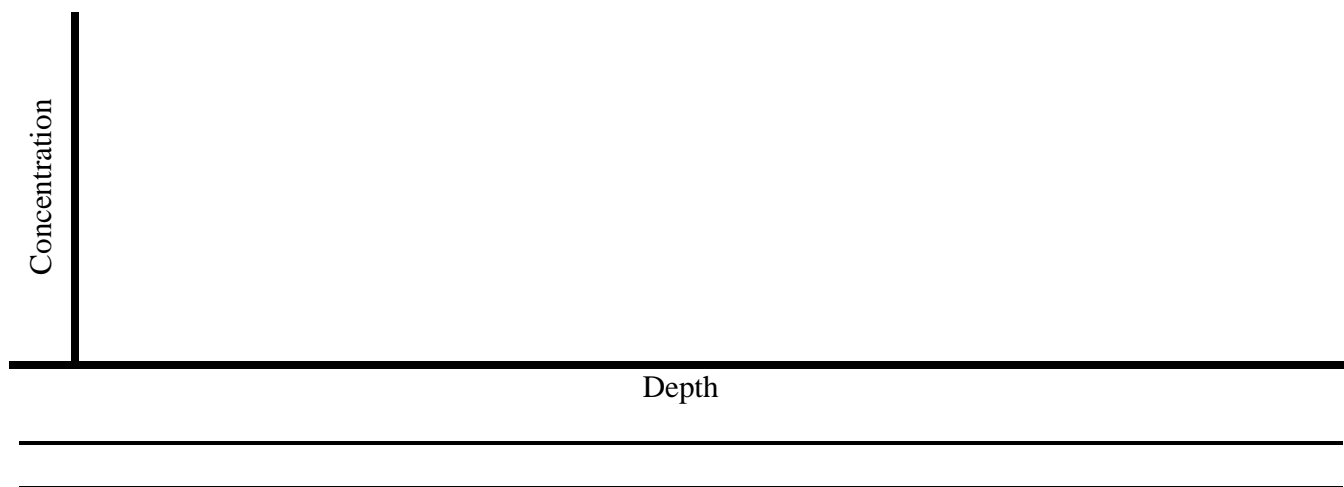
2. After you have viewed a few drops of pond water, write at least two sentences to summarize your observations. Be sure to include the names of the organisms you were able to identify.

Analyze the plankton you have collected:

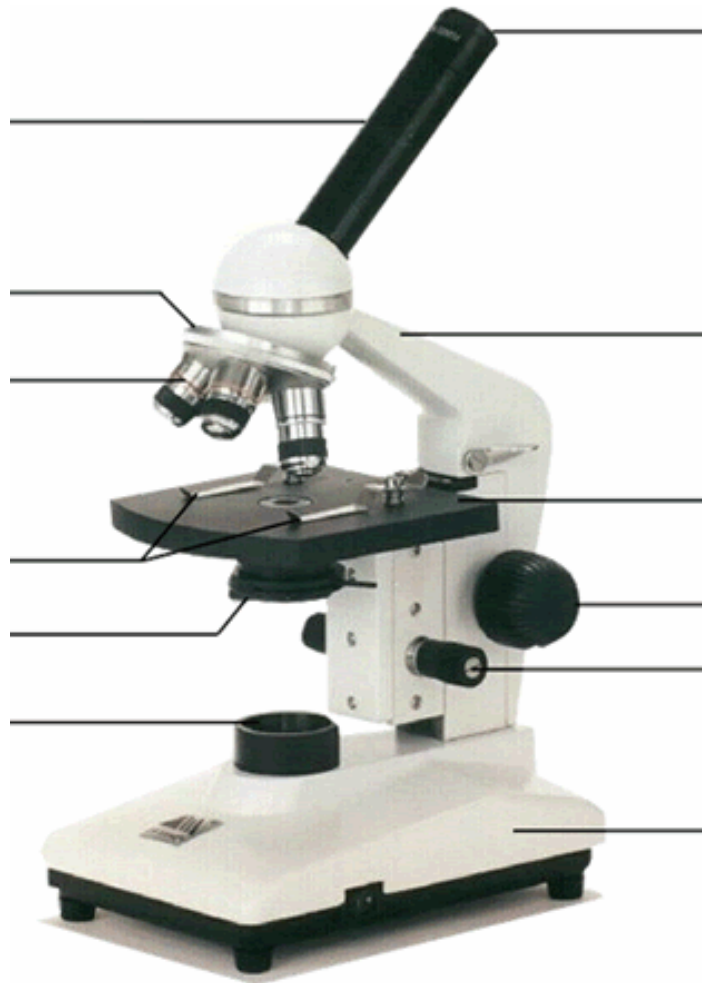
- View some of the wet mount slides you have prepared from the plankton samples you have collected and then select one to draw. Draw a view of this specimen at three different powers of magnification – low, medium, and high.
- How does the view of the specimen compare as the power of magnification increases? Write at least one sentence that summarizes your observations.



Graph your Concentrations of Plankton: Right a sentence to explain any differences you see.



Label the parts of the Microscope.



Word Bank: Ocular Lens (eye piece), Diaphragm, Base, Arm, Objective Lens, Stage Clips, Light source, Nose piece Coarse Adjustment knob, Stage, Fine Adjustment Knob

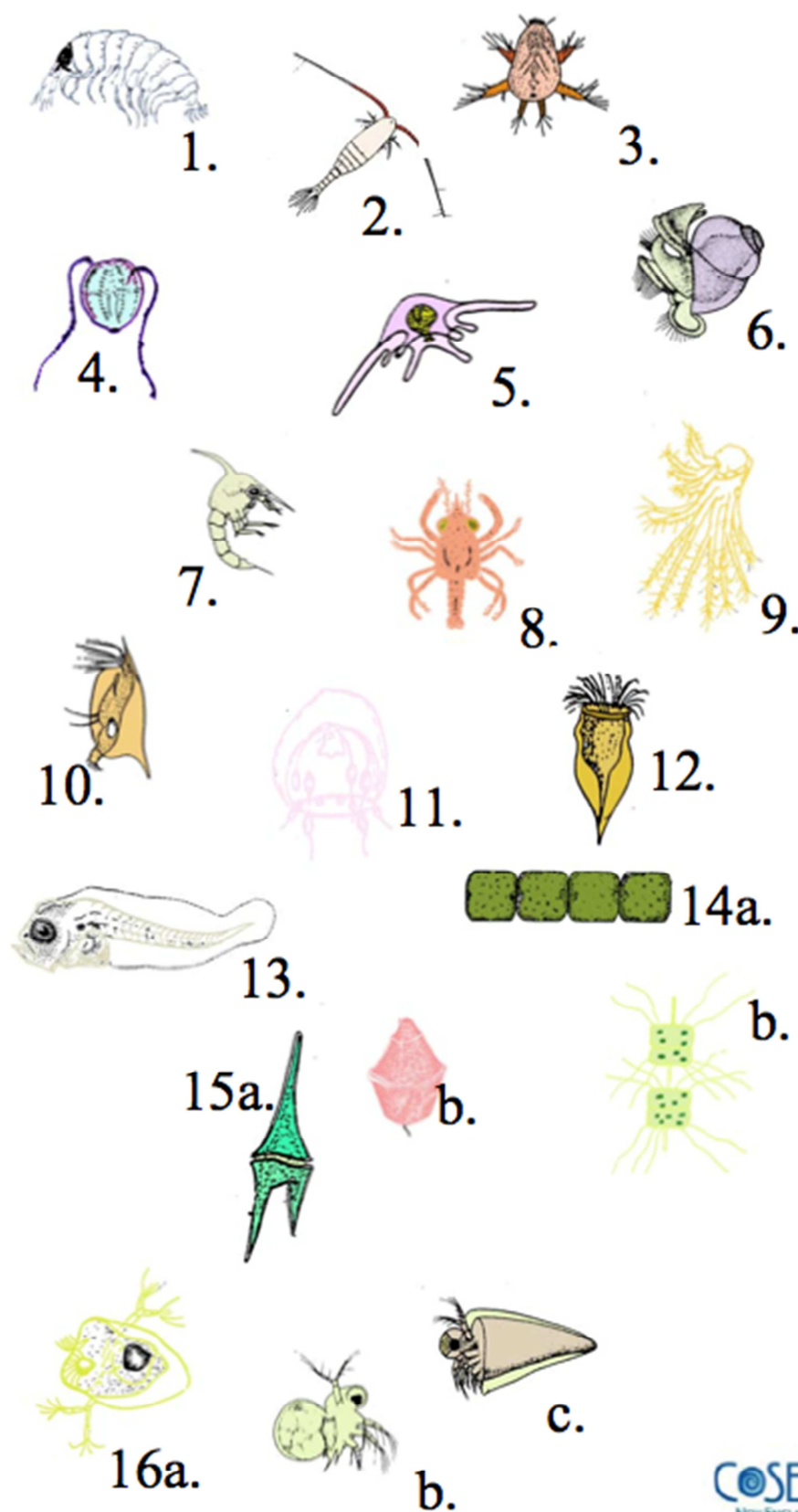


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Identification of Common Marine Plankton

Key



1. Amphipod
2. Copepod
3. Nauplii
4. Comb jelly
5. Brittle star Larva
6. Gastropod Larva
7. Zoea larva of crab
8. Megalops larva of crab
9. Exoskeleton of Barnacle molt
10. Ostracod
11. Small jellyfish
12. Tintinnid
13. Fish Larva
14. Diatoms
15. Dinoflagellates
16. Cladoceran & cladoceran larva

Note: Drawings are not to scale

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