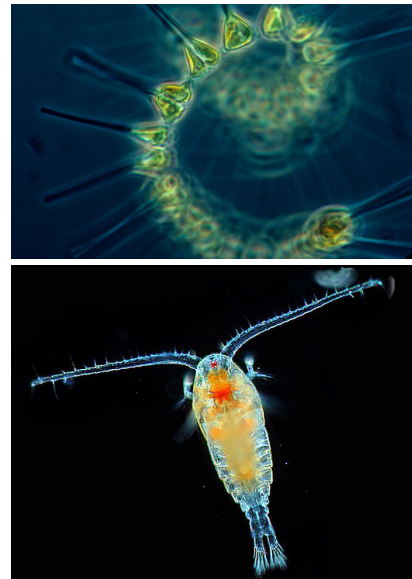


## 1.5.0 Plankton Lab

### Overview

All bodies of water that support living organisms will contain plankton. Any organisms that cannot control the overall direction of their movement is considered to be plankton, resulting in thousands of organisms over many taxonomic classifications all being grouped together based on a description of their movement abilities. The word “plankton” is derived from the Greek word “planktos” which translates to “drifter”. Plankton can sometimes control their small directional movements; however, the general direction of movement is determined by the currents in their environment.

There are a few ways to divide plankton into various sub-groups, with the most well-known groups being phytoplankton and zooplankton. Phytoplankton are plankton which can photosynthesize, such as diatoms, dinoflagellates, and cyanobacteria. The remaining types of plankton are all zooplankton, which are all organisms that can be taxonomically classified in the Kingdom Animalia. Another common set of two sub-groups that can be used to divide plankton are holoplankton and meroplankton. Holoplankton are organisms that spend their whole lives as plankton, whereas meroplankton are organisms that are planktonic during certain life stages. Plankton can also be divided into groups based on size, ranging from as small as  $0.2\mu\text{m}$  all the way to 200cm.



### Learning Objectives

- Collecting samples and data, as well as making observations, are integral parts of the scientific method.
- To identify plankton, scientists look at physical characteristics, such as color, size, and physical adaptations for certain behaviors.

### Student Activity: Collect and Identify Plankton

Students will collect plankton from a local body of water, then identify what groups their plankton can be organized into.

### Materials

5 plankton nets with collection bottles  
10 petri dishes  
5 microscopes, dissecting scopes, or hand lenses

Access to the Internet  
Drawing paper  
Scissors

## Advance Preparation

Read Unit 1 Chapter 5

Divide into teams of 2 to 3 students

Identify a nearby local body of water where plankton samples can be collected from


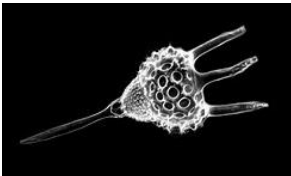

## Process and Procedures

Introduction – Whole Class:

1. With your class, discuss the terms phytoplankton and zooplankton.
2. Have your students practice identifying characteristics of different types of plankton. To do this, use a computer to do the following:
  - observe pictures of the plankton.
  - determine physical characteristics such as body shape, color and size.
  - find out what taxonomic group the plankton belongs in and the environment where it can be found.
3. Repeat Step 2 for the following types of plankton: diatom, dinoflagellate, cyanobacteria, copepod, and 2-3 types of planktonic larvae of common freshwater (e.g., mosquito) and marine (e.g., crab) organisms.
4. Have students research the six different groups that plankton can be characterized in based on size, between 0.2 $\mu$ m and 200cm. Students should record the names and sizes for each of these groups in their scientific notebook.
5. Lead a discussion about the body of water where students will be collecting their plankton samples. Guide students to understand the basics of the ecosystem you will be visiting, including the types of organisms they may find.
6. After discussion, ask students to record in their scientific notebooks their estimates for how many types of plankton they think they will observe in their collected samples.

### Activity – Whole Class

1. Assign students to carry the plankton nets to the body of water where you will be collecting samples. All students must bring their scientific notebooks and a writing utensil with them to the plankton collection site.
2. Once at the plankton collection site, divide the students into 5 groups with each group containing one plankton net. Have the groups spread out as much as possible when collecting their plankton samples. When collecting their sample, all students in the group must be participating. Once the sample has been collected, students should record observations about their collection site, taking care to make note of any characteristics at their site that may differentiate it from other groups' sites.
3. Return inside and provide each student group with two petri dishes. Students can add small amounts of water from their plankton sample to each petri dish and then observe their samples under magnification. Encourage the students to observe the whole sample and not focus on a single area. If using a microscope or dissecting scope and students are making slides, students should make dime-sized plankton samples to help make observing moving zooplankton under magnification easier.
4. In their scientific notebooks, have students sketch each plankton they observe and write down a brief description of its physical characteristics (shape, color, etc.).
5. Once students have recorded their observations for at least five to six different types of plankton from their samples, have them organize their observations in a table like the one below:

	Plankton Example #1	Plankton Example #2	Plankton Example #3
Image or Sketch			
Phytoplankton or Zooplankton	Phytoplankton	Zooplankton	Zooplankton
Size	20-200µm (Microplankton)	20-200µm (Microplankton)	0.2-20mm (Mesoplankton)
Holoplankton or Meroplankton	Holoplankton	Holoplankton	Meroplankton
Name	<i>Navicula sp.</i> (diatom)	<i>Podocyrthis sp.</i> (radiolarian)	<i>Gadus microcephalus</i> (Pacific Cod larvae, fish)

### Activity – On Your Own

1. On a sheet of drawing paper, have students create a dichotomous key to identify all of the different plankton that they observed in their sample. Instead of identifying their plankton in the final step of their key, students should have a number (plankton 1, plankton 2, etc.).
2. Using a separate sheet of drawing paper, have students recreate sketches of their plankton that can be differentiated between using their dichotomous key. These sketches should not have any text accompanying them.
3. Cut up the sheet containing the plankton sketches to create individual plankton cards.
4. Have the students letter each of their plankton cards in sequence (card A, card B, etc.) and write their names on the back of each of their plankton cards and their dichotomous key.

### Activity – In Class

1. Divide the students into pairs so that each pair has students who worked with different plankton samples in the previous portion of this activity.
2. Have the students exchange their dichotomous key and plankton cards.
3. Using their partner's dichotomous key, identify which card (A, B, etc.) matches with each of the numbered plankton at the ends of the dichotomous key.
4. Once both students are done, have them check with their partner if they correctly identified all of the plankton.

### Assessment

In their scientific notebooks, have the students write down a brief summary of what they learned about plankton diversity at your plankton collection site. Their summary should include a comparison of their observations with the estimates they made during the introduction section of the activity.

## Expected Outcomes

**What's the take-away?** Plankton are an extremely diverse group of organisms with the one shared characteristic of being a “drifter”. Scientists use additional shared characteristics to classify plankton further. By observing behaviors and physical characteristics, plankton can be further classified into smaller groups, such as phytoplankton (photosynthesizers) or zooplankton (animals).

### What does the student work product look like?

#### Work product #1: Data Table

Students should each produce a table that summarizes information about the plankton samples that were collected from the water. Data tables should include space for the following information on 5-6 plankton samples:

- image or sketch of organism
- name of the organism
- phytoplankton or zooplankton
- holoplankton or meroplankton
- size category (macroplankton 2→20 cm, mesoplankton 0.2→20 mm, microplankton 20→200  $\mu\text{m}$ , nanoplankton 2→20  $\mu\text{m}$ , picoplankton 0.2→2  $\mu\text{m}$ , femtoplankton < 0.2  $\mu\text{m}$ )

\*Display or print images of the different types of plankton that were used during the group discussion to assist students in the identification of their samples.

#### Work product #2: Dichotomous Key

Students should each produce a dichotomous key that can be used to identify the plankton samples that were collected from the water. The key will include sketches of each organism and a series of yes/no questions that can be used to identify each sample. Sample student questions:

- Is the plankton moving?
- Is the plankton between 20→200  $\mu\text{m}$ ?
- Is the plankton round in shape?

#### Assessment

Students should each produce a written summary of their experience with the activity. Look for students' work to describe what they did, why they did it, and what they discovered along the way. Student responses should include a description of the diversity in their samples and why the diversity is significant.