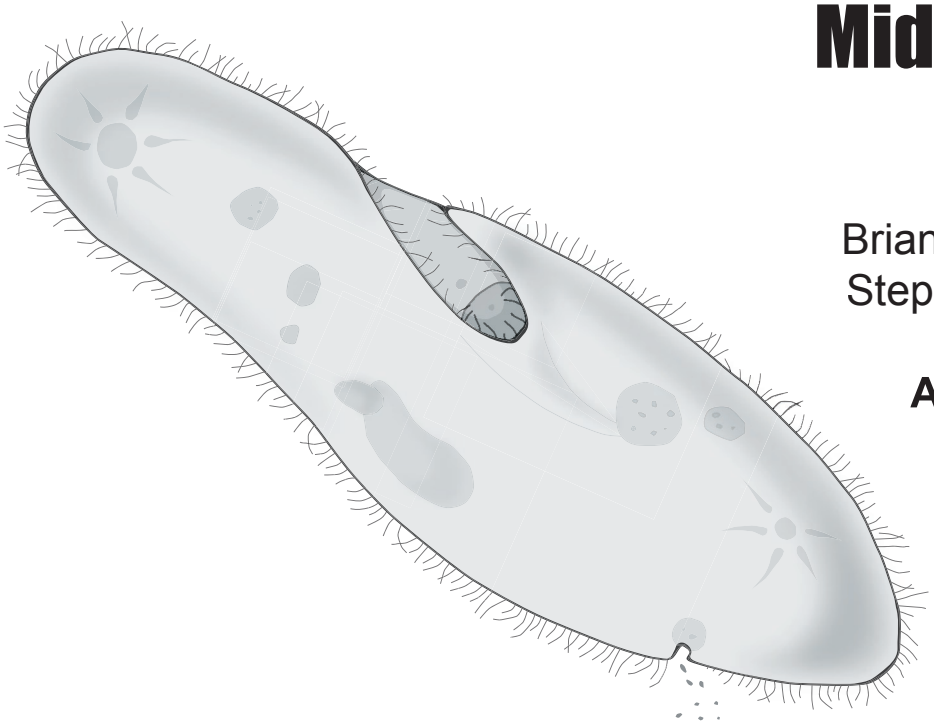
Classifying Monerans and Protists

Teacher's Guide
Middle School



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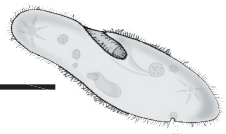

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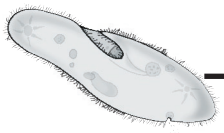

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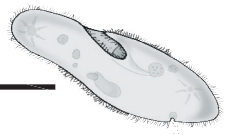

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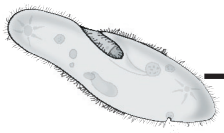


A Message from our Company. . .

Dear Educator:

Thank you for your interest in the educational videos produced by the Visual Learning Company. We are a Vermont-based, family owned and operated business specializing in the production of quality educational science videos and materials.

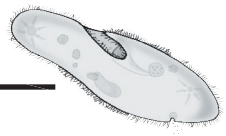
We have a long family tradition of education. Our grandmothers graduated from normal school in the 1920's to become teachers. Brian's mother was an elementary teacher and guidance counselor, and his father was a high school teacher and superintendent. This family tradition inspired Brian to become a science teacher, and to earn a Ph.D. in education, and led Stephanie to work on science educational programs at NASA.

In developing this video, accompanying teacher's guide, and student activities, our goal is to provide educators with the highest quality materials, thus enabling students to be successful. In this era of more demanding standards and assessment requirements, supplementary materials need to be curricular and standards based - this is what we do!

Our videos and accompanying materials focus on the key concepts and vocabulary required by national and state standards and goals. It is our mission to help students meet these goals and standards, while experiencing the joy and thrill of science.

Sincerely,

Brian and Stephanie Jerome



National Standards Correlations

National Science Education Standards

(Content standards: 5-8, National Academy of Sciences, c. 1996)

Life Science (Content Standard C)

Structure and Function in Living Systems

- All organisms are composed of cells - the fundamental unit of life. Most organisms are simple cells; other organisms are multicellular.

Diversity and Adaptations of Organisms

- Millions of species of animals, plants, and microorganisms are alive today. Although different species might look dissimilar, the unity among organisms becomes apparent from an analysis of internal structures, the similarity of their chemical processes, and the evidence of common ancestry.

Benchmarks for Science Literacy

(Project 2061 – AAAS, c. 1993)

The Living Environment - Cells (5C)

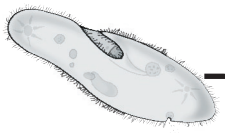
By the end of 8th grade, students should know that:

- All living things are composed of cells, from just one to many millions, where details are usually visible only through a microscope.

Diversity of Life (5A)

By the end of 8th grade, students should know that:

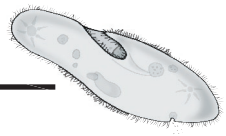
- One of the most general distinctions among organisms is between plants, which use sunlight to make their own food, and animals, which consume energy-rich foods. Some kinds of organisms, many of them microscopic, cannot be neatly classified as either plants or animals.



Student Learning Objectives

Upon viewing the video and completing the enclosed student activities, students will be able to do the following:

- Generally describe monerans as microscopic cells which do not contain a nucleus.
- Identify the three main shapes of monerans including cocci, bacilli, and spirilla.
- Define prokaryotic cells as cells which do not contain a nucleus, or other structures common in more advanced eukaryotic cells.
- State that many scientists divide monerans into two major kingdoms: Eubacteria, and Archaebacteria.
- Provide some examples of ways bacteria are helpful as well as harmful.
- List examples of some of the diverse members of the kingdom protista.
- Describe examples of animal-like protists including parameciums and amoebas.
- Identify some of the features found in certain animal-like protists such as a pseudopod, cilia, and flagella.
- Generally state some of the characteristics of fungus-like protists.
- Differentiate between animal-like protists, fungus-like protists, and plant-like protists.
- Define the terms heterotrophs and autotrophs.
- Describe the major characteristics of some of the fascinating examples of plant-like protists such as euglenoids, diatoms, dinoflagellates, and the various forms of multicellular algae.



Assessment

Preliminary Assessment:

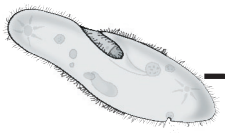
The Preliminary Assessment, provided in the Student Masters section, is an assessment tool designed to gain an understanding of students' pre-existing knowledge. It can also be used as a benchmark upon which to assess student progress based on the objectives stated on the previous pages.

Video Review:

The Video Review, provided in the Student Masters section, can be used as an assessment tool or as a student activity. There are two main parts. The first part contains questions that can be answered during the video. The second series of ten questions consists of a video quiz to be answered at the conclusion of the video.

Post Assessment:

The Post Assessment, provided in the Student Masters section, can be utilized as an assessment tool following completion of the video and student activities. The results of the Post Assessment can be compared against the results of the Preliminary Assessment to evaluate student progress.



Introducing the Video

Before showing the video to your students, ask them if they have ever had an infected cut, food poisoning, or strep throat. Ask if they know the cause of these uncomfortable problems. Write the word “bacteria” on the board. Tell students that bacteria make up a large group of organisms also referred to as monerans. Monerans are among the smallest living organisms on the planet, and are also considered to be one of the earliest life forms.

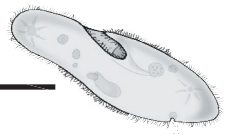
Next, ask students if they have ever heard of red tide poisoning, malaria, or another health related problem called giardia. These maladies are caused by another group of living things called protists. There are a wide range of protists, varying greatly in form and design. Explain to students that a major difference between monerans and protists is that the former are prokaryotes, and the latter are eukaryotes. Write these two terms on the board. Tell students to pay close attention to the video to learn more about the characteristics of prokaryotes and eukaryotes. Following the program discuss what the students learned about these two different types of cells.

Video Viewing Suggestions

The student Master “Video Review” is provided for distribution to students. You may choose to have your students complete this Master while viewing the program or to do so upon its conclusion.

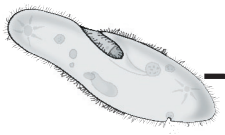
The program is approximately twenty minutes in length and includes a ten question video quiz. Answers are not provided to the Video Quiz on the video, but are included in this teacher’s guide. You may choose to grade student quizzes as an assessment tool or to review the answers in class.

The video is content-rich with numerous vocabulary words. For this reason you may want to periodically stop the video to review and discuss new terminology and concepts.



Video Script: Classifying Monerans and Protists

1. What living things do you come in contact with every time you eat yogurt,...
2. ...go swimming in the ocean,...
3. ...and brush your teeth?
4. Here is a hint: these living things are so small they can not be seen with the naked eye.
5. What are they? They are bacteria which scientists also refer to as monerans.
6. During the next few minutes we are going to take a close up look at the fascinating kingdom monera.
7. We are also going to discuss another kingdom of living things called protists.
8. Many of these organisms are also microscopic.
9. You may be familiar with protists such as amoebas and *Paramecium*.
10. We are not only going to explore the characteristics of both monerans and protists,...
11. ...but we are also going to see how scientists go about classifying these fascinating living things.
12. **Graphic Transition – What are Monerans?**
13. It may be hard to believe, but monerans are found just about everywhere.
14. They are on this piece of rotting fruit, they are on your skin, and they are even living inside your body at this very moment.
15. Fortunately, most bacteria are quite harmless,...
16. ...but some, such as streptococcus bacteria, can give you a bad case of strep throat.
17. Many different types of bacteria are used in making food.
18. For example, a type of bacteria called acidophilus is used in making yogurt.
19. Bacteria also play a very important role in decomposing once living things.
20. And bacteria are intentionally used in wastewater treatment plants such as,...
21. ...this one to help digest and eliminate waste products.
22. What exactly are monerans?
23. Monerans are microscopic organisms that consist of a single cell.
24. Some monerans are so small that there may be as many as several million in a teaspoon of soil.
25. And there are millions, if not billions, of monerans or bacteria in your mouth.
26. Bacteria, similar to cyanobacteria, are believed to have existed on earth for at least 3.5 billion years and are thought to be the first living things to inhabit the planet.



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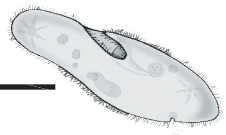
27. Fossilized remains of bacterial mats called stromatolites provide clues about these ancient organisms.
28. Today there are a wide variety of bacteria. Let us take a look at some of the characteristics of them.
29. **Graphic Transition – Characteristics of Monerans**
30. **You Compare!** Describe the shape of this bacteria compared to this bacteria.
31. That is right, this bacteria has a round shape.
32. Whereas, this bacteria has a spiral shape.
33. Scientists often classify bacteria based on their shape.
34. The three main shapes of monerans include cocci which have a spherical shape, bacilli which are rod-shaped, and spirilla which are spiral shaped.
35. Bacterial cells are smaller than plant or animal cells.
36. A typical bacterial cell is surrounded by a cell membrane and a cell wall. Liquid material called cytoplasm fills the cell.
37. Bacterial cells are referred to as prokaryotes. Prokaryotic cells do not contain a nucleus, or other internal structure common in plant and animal cells.
38. Other than these common characteristics, monerans vary greatly in their form and in how they obtain food.
39. **Graphic Transition – Eubacteria**
40. Scientists are not in complete agreement on how to classify monerans, but one system of classification separates monerans into two distinct kingdoms - eubacteria and archaebacteria.
41. Eubacteria are everywhere around us.
42. If you have ever had an infected cut, eubacteria are likely responsible for the infection.
43. The organisms within the eubacteria kingdom are diverse, and scientists use a wide variety of characteristics to classify them.
44. One such characteristic is whether the bacteria are aerobic or anaerobic.
45. Aerobic bacteria such as salmonella require the presence of free-oxygen.
46. On the other hand, anaerobic bacteria grow in the absence of oxygen.
47. Another characteristic useful to scientists categorizing eubacteria is based on how they obtain food.
48. Some bacteria such as cyanobacteria are autotrophs.
49. **You Decide!** What are autotrophs?
50. Autotrophs are living things that make their own energy - either from the sun's light energy or from chemicals in their environment.



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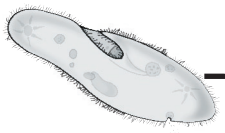
51. Other bacteria, such as escherichia coli, are heterotrophs. Heterotrophs need to eat other things for their energy.
52. Let us now take a look at the other kingdom of bacteria - Archaebacteria.
53. **Graphic Transition - Archaebacteria**
54. Archaebacteria are the extreme monerans of the bacteria world,...
55. ...in that many live in extreme or hostile environments.
56. Archaebacteria tend to be chemosynthetic meaning they produce energy from chemicals in their environment.
57. Among other characteristics, archaebacteria are classified based on where they live and how they obtain their energy.
58. One group of archaebacteria, such as those found in the mud of this marsh, are methane producing, often forming smelly methane gas.
59. Let us now turn our attention to another kingdom of living things – Protists.
60. **Graphic Transition – Kingdom Protista**
61. Believe it or not, this large piece of kelp, this microscopic paramecium and this microscopic diatom are all members of the kingdom protista.
62. The question “What is a protist?” is not a simple one to answer.
63. This is because protists vary widely in their shape, size, and form.
64. Protists can be one celled or many celled.
65. Protists do, however have something in common – they are eukaryotic meaning they have a nucleus and other structures in their cells not found in prokaryotic cells.
66. The kingdom protista is divided into numerous different phyla and the classification of these organisms changes periodically.
67. While there are at least a dozen different phyla, we will discuss protists that are animal-like, fungus-like, and plant-like.
68. Let us first take a look at animal-like protists.
69. **Graphic Transition – Animal-like Protists**
70. Animal-like protists are referred to as protozoa.
71. Protozoans are often grouped by how they move.
72. Ciliates for example, move via tiny hairs called cilia which move back and forth rapidly propelling the organism through water.
73. Classic ciliates with which you may be familiar are *Paramecium*.
74. *Paramecium* use cilia to propel themselves through the water, just as oars on a boat push a boat through the water.
75. Ciliates possess one or more nuclei, and a food vacuole which is used to digest food.



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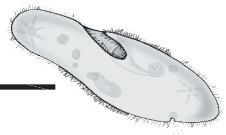
76. Another group of protozoans are called flagellates.
77. Flagellates move through the water by waving a whip-like flagellum back and forth.
78. Sarcodines, another group of protozoans are characterized by movements of the cell membrane and cytoplasm called a pseudopod.
79. The term pseudopod comes from the Greek words meaning “false foot”.
80. As you can see this sarcodine, called an amoeba, is moving with its pseudopod.
81. The amoeba has no definite shape, and feeds by engulfing its prey.
82. Amoebas have a nucleus and a food vacuole.
83. Amoebas reproduce by dividing into two new cells.
84. Through a complex series of events the cell replicates not only its body, but also the genetic material contained within the nucleus.
85. **Graphic Transition – Fungus-like Protists**
86. In 1845 and 1846 an estimated one million people in Ireland died and half the population fled to other countries in search of a better life.
87. This massive upheaval in Irish society was due to The Great Irish Potato famine.
88. The cause of the potato famine was due to fungus-like protists that destroyed potato plants throughout the country.
89. Fungus-like protists can also attack other crops such as corn, cabbages, and grapes.
90. What exactly are fungus-like protists? Scientists are still trying to answer this question.
91. We do know that they are heterotrophs, meaning they need to eat other living or once living things.
92. One type of fungus-like protists are slime molds.
93. At some stage in their lives, slime molds form a moist shapeless ooze that forms over once living things such as dead trees.
94. Slime molds reproduce via small structures called spores which give rise to cells.
95. **Graphic Transition – Plant-like Protists**
96. **You Compare!** What is one main difference between plant-like protists and animal-like protists?
97. While animal-like protists need to eat other things for their energy, plant-like protists produce their own food.
98. Plant-like protists are autotrophs, producing their food from the sun’s light energy.
99. An important by-product of this process is oxygen.
100. It is thought that plant-like protists produce about 70 percent of Earth’s oxygen supply.



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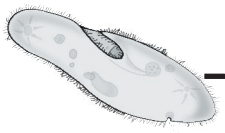
101. There are a wide variety of plant-like protists – ranging from single-celled organisms to large multicellular algae.
102. The plant-like protists are often generally referred to as algae.
103. Let us take a look at some of the fascinating examples of plant-like protists.
104. One of the most interesting groups are euglenoids.
105. A close inspection of this euglena reveals a whip-like flagellum with which it propels itself.
106. While these single celled protists do have the ability to make food from the sun's energy, in the absence of light they can become heterotrophic, obtaining food from the environment.
107. Every time you put toothpaste on your toothbrush you are using another type of plant-like protists called diatoms.
108. Diatoms are microscopic protists which have a glass-like shell and live in the water.
109. Many possess beautiful geometric shapes.
110. When diatoms die and collect on the bottom of the ocean they form course, powdery, diatomaceous earth that serves as an excellent polishing agent.
111. Another group of plant-like protists are called dinoflagellates.
112. Dinoflagellates can be heterotrophic or autotrophic.
113. Dinoflagellates are single celled algae found mostly in oceans.
114. The actions of flagella cause the cell to twirl or roll in the water.
115. Some dinoflagellates cause a very serious problem referred to as red tide.
116. Certain dinoflagellates responsible for red tide possess a powerful toxin which can be very harmful to humans who eat shellfish contaminated by toxic dinoflagellates.
117. The last three groups of plant-like protists are generally referred to as either green, red, or brown algae.
118. The three different groups are broadly categorized based on the dominant pigment they contain.
119. These algae are common in both fresh water and salt water in unicellular forms and multicellular forms.
120. An example of green algae includes sea lettuce.
121. An example of red algae includes Irish moss which is found along the intertidal zone. This algae contains a substance called carrageenan used to thicken ice cream and other products.
122. One of the most well known examples of brown algae is kelp. Giant kelp can reach an amazing length of over 100 meters.



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123. Graphic Transition – Summing Up

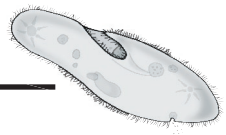
124. During the past few minutes we have explored some of the fascinating characteristics of both monerans...
125. ...and protists. The process by which these organisms are classified was discussed.
126. We began by studying some of the basic features of monerans also called bacteria.
127. And, we examined some of the various shapes of bacteria, while seeing how bacterial cells, also called prokaryotic cells, are different from more advanced eukaryotic cells.
128. The two different kingdoms of monerans were briefly highlighted- Eubacteria and Archaebacteria.
129. Next, we focused on the diverse kingdom of protists.
130. While protists do vary widely, they are all eukaryotic.
131. More specifically we took a look at animal-like protists such as paramecium and amoebas.
132. And we discussed some of the characteristics of fungus-like protists.
133. Finally, we explored the wide variety of plant-like protists including euglenas, diatoms, dinoflagellates, as well as green, red, and brown algae.
134. So, the next time you get a bacterial infection,...
135. ...eat some yogurt,...
136. ...or see some algae on the beach, think about some of the things we discussed during the past few minutes.
137. You just might think about monerans and protists a little differently.

138. Graphic Transition – Video Quiz

Fill in the correct word to complete the sentence. Good luck, and let us get started.

1. Monerans are also known as _____.
2. Monerans consist of a single ____.
3. _____ cells do not possess a nucleus.
4. _____ bacteria require the presence of free oxygen.
5. Many archaebacteria live in _____ environments.
6. Protists contain one or more _____ cells.
7. An amoeba is a type of _____ protist.
8. Slime molds are a type of _____ protist.
9. Plant-like protists are often called _____.
10. Kelp is an example of a _____ protist.

Answers may be found on page 17



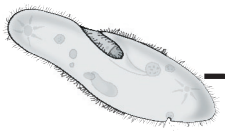
Student Assessments and Activities

Assessment Masters:

- Preliminary Assessment
- Video Review
- Post Assessment

Student Activity Masters:

- Pond Protists
- Prokaryotes vs. Eukaryotes
- What are Protozoans?
- Vocabulary of *Classifying Monerans and Protists*



Answers to Student Assessments

Preliminary Assessment (pgs. 20-21)

1. bacteria
2. cell
3. smaller
4. prokaryotes
5. autotrophs
6. archaebacteria
7. many
8. eukaryotic
9. protozoa
10. algae
11. false
12. true
13. true
14. false
15. true
16. true
17. false
18. true
19. false
20. false

Video Review (pg. 22)

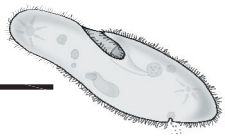
1. One bacteria has a round shape and the other bacteria has a spiral shape.
2. Autotrophs are living things that make their own food. They either use the sun's light energy or use chemicals in their environment to produce energy.
3. Animal-like protists need to eat other things for their energy. Plant-like protists produce their own food.

Video Quiz (p. 22)

1. bacteria
2. cell
3. prokaryotic
4. aerobic
5. extreme
6. eukaryotic
7. animal-like
8. fungus-like
9. algae
10. multicellular

Post Assessment (pgs. 23-24)

1. autotrophs
2. many
3. algae
4. smaller
5. eukaryotic
6. prokaryotes
7. bacteria
8. protozoa
9. cell
10. archaebacteria
11. false
12. true
13. false
14. true
15. false
16. false
17. true
18. true
19. true
20. false



Answers to Student Activities

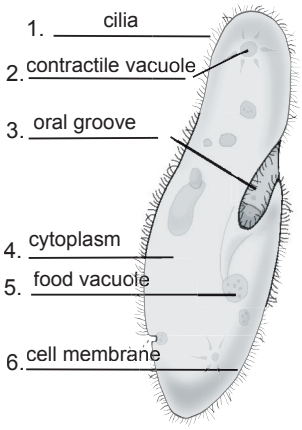
Pond Protists (p. 25)

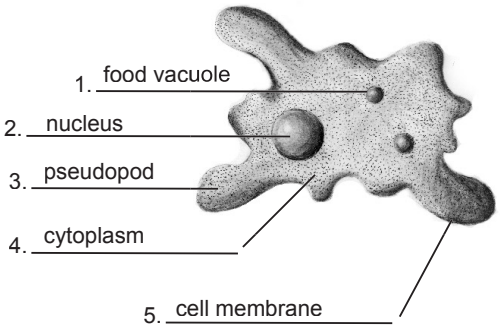
1. Protists such as amoebas, parameciums, and stentors are heterotrophic. Organisms with green pigments such as different kinds of algae are autotrophic.
2. The various types of algae are producers in that they create their own food via photosynthesis. They serve as the base of the food pyramid and are the first link in the food chain. Organisms that eat the producers are called consumers.
3. There are not many organisms compared to the amount of water - this makes it difficult to locate protists. Many of the protists are also rapidly moving thus making them difficult to observe. There are also hundreds if not thousands of different kinds of protists in a given body of water, making it difficult to identify a given species.

Prokaryotes vs. Eukaryotes (pgs. 26 - 28)

1. In this activity the bacterial cells are prokaryotic cells. The examples of eukaryotic cells were provided by the instructor (i.e. plant cells, animal cells, etc.)
2. Eukaryotic cells are many times larger than bacterial cells.
3. Eukaryotic cells possess a nucleus, food vacuoles, and other structures such as chloroplasts in the case of plant cells. Bacterial cells do not have a nucleus.
4. Generally speaking, prokaryotic cells are smaller and more simplistic than eukaryotic cells.

What are Protozoans? (p. 29)

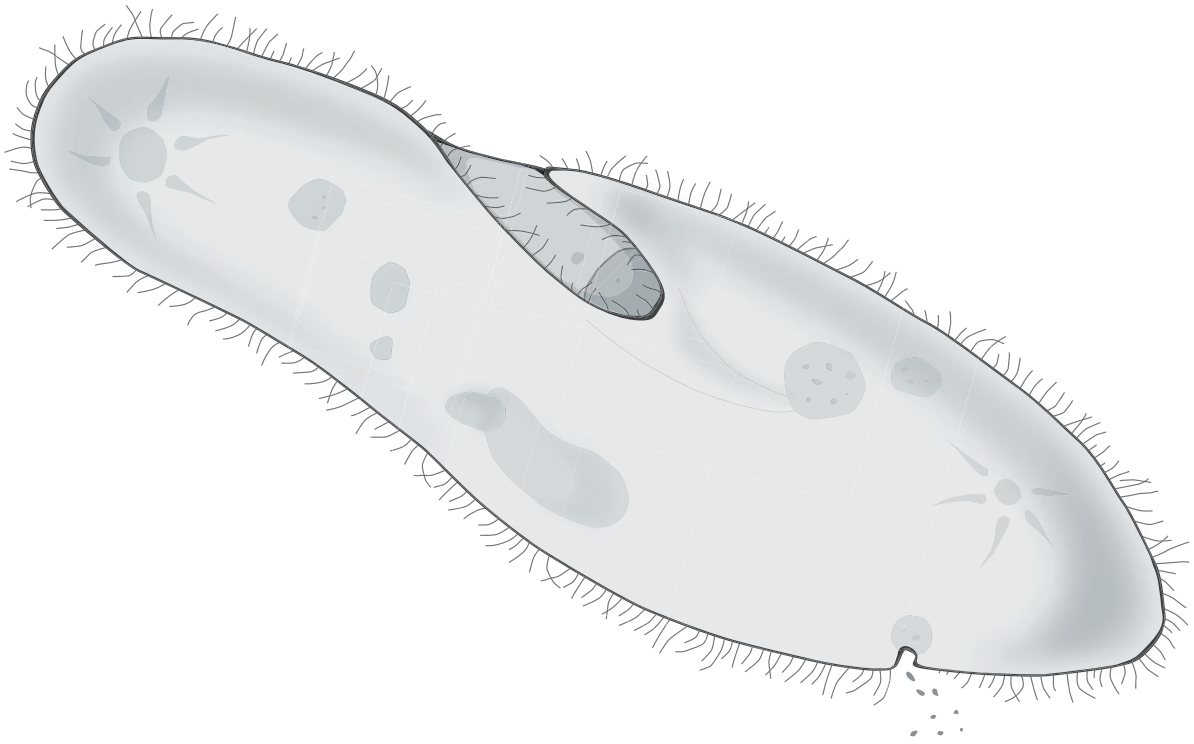




Vocabulary of *Classifying Monerans and Protists* (p. 30)

1. f - monerans
2. d - prokaryote
3. i - archaebacteria
4. a - protists
5. h - protozoa
6. b - ciliates
7. j - slime mold
8. c - algae
9. e - dinoflagellates
10. g - multicellular algae

Assessment and Student Activity Masters



Preliminary Assessment

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. Monerans are commonly referred to as _____.

2. Monerans are microscopic organisms that consist of a single _____.

3. Bacteria are _____ than plant and animal cells.

4. Bacterial cells are referred to as _____ , and they do not contain a nucleus.

5. _____ are organisms that make their own food.

6. _____ are bacteria that sometimes live in extreme or hostile environments.

7. Protists can be single celled or _____ celled.

8. Protists are made up of _____ cells.

9. Animal-like protists are often referred to as _____.

10. _____ is the term used to generally describe plant-like protists.

algae	bacteria
eukaryotic	smaller
archaebacteria	autotrophs
prokaryotes	many
cell	protozoans

Preliminary Assessment

Directions: Decide whether the statement is true (T) or false (F).

11. Monerans are commonly referred to as plants. T F

12. Monerans are so small there may be as many as several million in a teaspoon of soil. T F

13. Scientists often classify bacteria based on their shape. T F

14. Bacteria are always heterotrophs - eating other things for food. T F

15. Protists vary widely in shape, size and form. T F

16. An amoeba has no definite shape, and feeds by engulfing its prey. T F

17. Plant-like protists are referred to as protozoans. T F

18. Diatoms are microscopic protists which have a glass-like shell. T F

19. Red tide is caused by multicellular red algae. T F

20. Green, red, and brown algae are classified by the zone of the ocean they inhabit. T F

Video Review

Directions: During the course of the program, answer the questions as they are presented in the video. At the end of the video, answer the Video Quiz questions.

You Compare!

1. Describe the shape of this bacteria compared to this bacteria.

You Decide!

2. What are autotrophs?

You Compare!

3. What is one main difference between plant-like protists and animal-like protists?

Video Quiz:

1. Monerans are also known as _____.
2. Monerans consist of a single _____.
3. _____ cells do not possess a nucleus.
4. _____ bacteria require the presence of free oxygen.
5. Many archaebacteria live in _____ environments.
6. Protists contain one or more _____ cells.
7. An amoeba is a type of _____ protist.
8. Slime molds are a type of _____ protist.
9. Plant-like protists are often called _____.
10. Kelp is an example of a _____ protist.

Post Assessment

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. _____ are organisms that make their own food.

2. Protists can be single celled or _____ celled.

3. _____ is the term used to generally describe plant-like protists.

4. Bacteria are _____ than plant and animal cells.

5. Protists are made up of _____ cells.

6. Bacterial cells are referred to as _____ , and they do not contain a nucleus.

7. Monerans are commonly referred to as _____.

8. Animal-like protists are often referred to as _____.

9. Monerans are microscopic organisms that consist of a single _____.

10. _____ are bacteria that sometimes live in extreme or hostile environments.

eukaryotic	protozoans
archaebacteria	many
autotrophs	prokaryotes
cell	bacteria
algae	smaller

Name _____

Post Assessment

Directions: Decide whether the statement is true (T) or false (F).

11. Green, red, and brown algae are classified by the zone of the ocean they inhabit. T F

12. Diatoms are microscopic protists which have a glass-like shell. T F

13. Bacteria are always heterotrophs - eating other things for food. T F

14. Monerans are so small there may be as many as several million in a teaspoon of soil. T F

15. Red tide is caused by multicellular red algae. T F

16. Plant-like protists are referred to as protozoans. T F

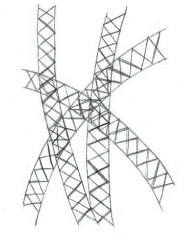
17. Scientists often classify bacteria based on their shape. T F

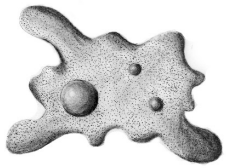
18. An amoeba has no definite shape, and feeds by engulfing its prey. T F

19. Protists vary widely in shape, size and form. T F

20. Monerans are commonly referred to as plants. T F

Pond Protists





Background: A pond, river, or wetland near your home or school most likely contains a remarkable diversity of protists, most of which you have never before seen. In this activity you will observe some of the different kinds of animal-like and plant-like protists from a local water source.

Materials: Microscope, glass slide, cover slip, dropper, biology textbook, guide to protists, and water sample

Directions:

1. Obtain a sample of water from your teacher. Using a dropper, carefully place a drop of water on a microscopic slide, and cover with a cover slip.

2. Your teacher will give you reminder instructions on the use of the microscope. Observe the slide under low and high power.

3. On the back of this piece of paper make a chart of the protists you observed. Make three columns with the headers labelled: Protist, Movement, and Plant-like/Animal-like.

4. Using the various resource books provided by your teacher, identify the protists you observe. Record how they move, and decide if it is an animal-like protist or a plant-like protist.

5. Look at several different samples of water until you are satisfied with the number of different kinds of organisms you have observed.

Questions:

1. Describe which organisms you think are heterotrophic and which are autotrophic. Explain your basis for your decision.

2. Describe the roles the different protists play in the aquatic community. Use the term producer and consumer in your answer.

3. Describe what made it difficult to locate, observe and identify the protists.

Prokaryotes vs. Eukaryotes

Background: You probably already know that cells are the basic building blocks of life. All living things are made up of cells. But, did you know that there are many, different kinds of cells. In fact, within our own bodies there are billions of cells, of which there are thousands of different kinds. One of the ways scientists group cells is based on the structures they contain. One of the most basic ways scientists group cells is based on whether they are prokaryotic or eukaryotic. Prokaryotic cells are simpler cells which do not possess a nucleus or other structures found in more complex cells. Bacterial cells are examples of prokaryotic cells. More advanced eukaryotic cells do possess a nucleus. The cells of plants and animals, including humans, are made up of eukaryotic cells.

Materials: microscope, prepared slide of bacterial cell, prepared slide of eukaryotic cell, or a slide made by your teacher of a plant cell.

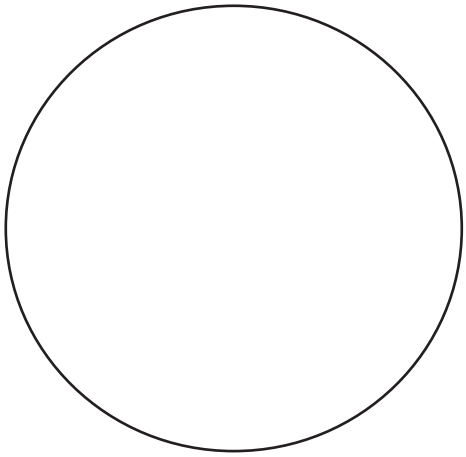
Directions:

1. In this activity you will compare a simple prokaryotic bacterial cell to a eukaryotic cell. Begin by carefully turning on your microscope and make sure it is in working order.

2. Obtain the prepared slide of bacteria from your instructor. Carefully place the slide on the stage of the microscope.

3. Using the lowest power on the microscope, bring the bacteria into focus.

4. With caution turn the objective on the microscope to the next most powerful objective. Bring the bacteria into focus. In the circle below make a sketch of the bacteria while paying special attention to correctly drawing the size of the bacteria in relation to the size of the field.



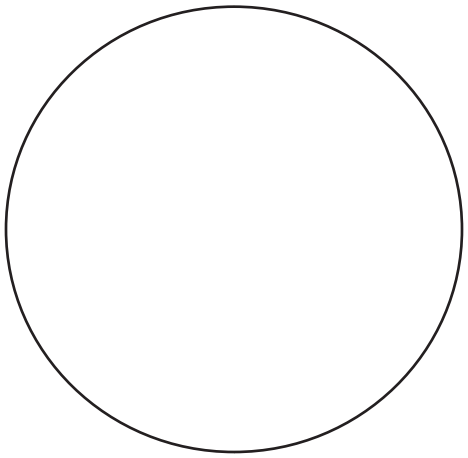
Prokaryotes vs. Eukaryotes cont.

5. After finishing your sketch, turn back to the lowest power objective. Carefully remove the prepared slide.

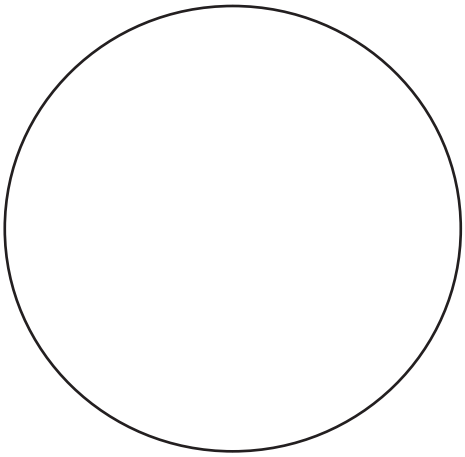
6. Now obtain a slide of a eukaryotic cell. Carefully place the slide on the stage of the microscope.

7. Bring the cell into focus under the lowest power objective.

8. Next, turn to the next most powerful objective. Bring the cells into focus. In the space below make a sketch of the cells while paying special attention to correctly drawing the size of the cells in relation to the size of the field.



9. Now carefully turn to a higher power objective if your microscope has one. Bring a single eukaryotic cell into focus. Draw the cellular structures in the circle below. Try to identify the nucleus. If you are viewing plant cells, try to identify chloroplasts and the cell wall.



Prokaryotes vs. Eukaryotes cont.

10. After you have sketched the eukaryotic cell, carefully return to the lowest power and remove the slide.

Questions:

1. In this investigation - what cells were prokaryotes and what cells were eukaryotes?

2. Compare the size of the bacteria to the size of the eukaryotic cells.

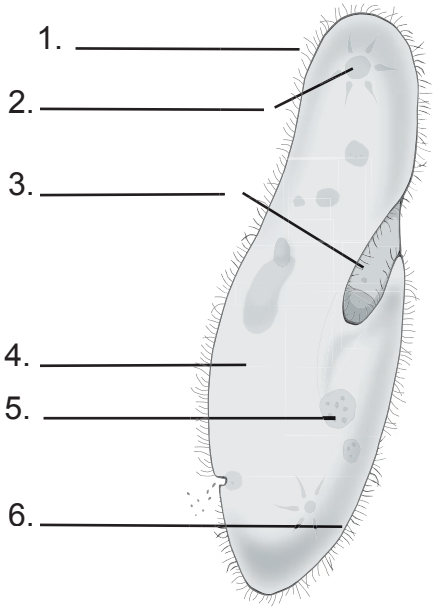
3. Compare the structures of bacteria to the eukaryotic cells.

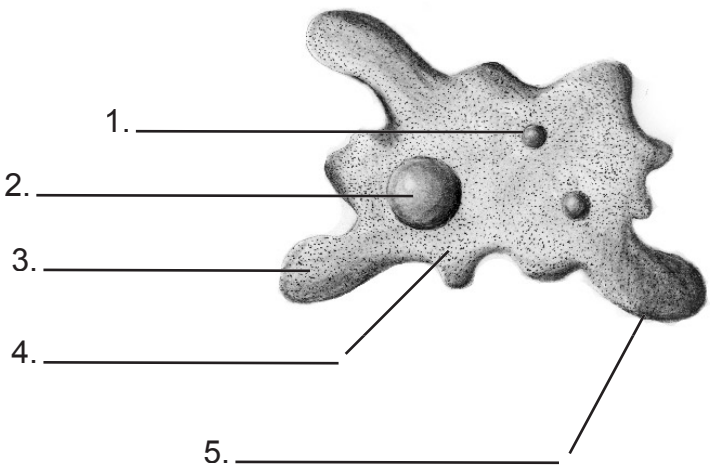
4. What general statements can you make about prokaryotic cells compared to eukaryotic cells?

What are Protozoans?

Background: Animal-like protists are generally referred to as protozoans. What exactly are protozoans? There is not a simple answer to this question because protozoans come in a wide variety of shapes and sizes. There are tens of thousands of known species of protozoans. Protozoans are single-celled eukaryotic cells which almost always are so small that a microscope is needed to see them. A close inspection of protozoans reveals a fascinating group of creatures possessing a wide array of interesting structures used for movement and obtaining food.

Directions: Using textbooks, encyclopedias, and other resources, label the structures on the diagrams of a paramecium and an amoeba. Match the correct term to the structure. Then briefly state the function or "job" of the structure on the back of this page.





cytoplasm
oral groove
cilia
food vacuole
cell membrane
contractile vacuole

pseudopod
cytoplasm
nucleus
cell membrane
food vacuole

Name _____

Vocabulary of Classifying Monerans and Protists

Directions: Unscramble the vocabulary words in the first column. Match the words to the definitions in the second column.

____ 1. rmsnaeno _____

____ 2. koryoetrpa _____

____ 3. rheatraiecbaca _____

____ 4. ttssripo _____

____ 5. zroooapt _____

____ 6. ileitsca _____

____ 7. esmli dmlo _____ _____

____ 8. aelag _____

____ 9. tlaodelgfiselna _____

____ 10. rmaullutlilce aagel _____ _____

a. single-celled eukaryotes which are quite diverse.

b. protozoans which move by means of beating cilia.

c. general name given to plant-like protists.

d. single-celled organism which does not contain a nucleus.

e. single-celled algae of which some species can cause red tide.

f. group of simple unicellular organisms which do not possess a nucleus; bacteria.

g. categories include green, red, and brown algae.

h. animal-like protists.

i. monerans which sometimes live in extreme, hostile environments.

j. an example of a fungus-like protist.