Young Naturalists

Teachers Guide

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"Life in a Jar" Multidisciplinary Classroom Activities

Teachers guide for the Young Naturalists article "Life in a Jar," by Mary Hoff. Published in the July–August 2002 *Minnesota Conservation Volunteer*, or visit www.dnr.state.mn.us/young_naturalists/pond_life.

Young Naturalists teachers guides are provided free of charge to teachers, parents, and students. Each guide contains a brief summary of the article, suggested independent reading levels, word count, materials list, estimates of preparation and instructional time, academic standards application, preview strategies and study questions overview, adaptations for special needs students, assessment options, extension activities, Web resources, copy-ready study questions with answer key, and a copy-ready vocabulary sheet. There is also a practice quiz in Minnesota Comprehensive Assessments format. Users are encouraged to provide feedback through an online survey at www.dnr.state.mn.us/education/teachers/activities/ynstudyguides/survey.html. ***Note: This guide is intended for use with the PDF version of this article.***

Summary

This article guides students through looking at a sample of pond water they have collected. It reviews the five kingdoms of living things (animals, plants, fungi, protists, and monerans) and identifies members from each kingdom that might be present in the sample. It also reviews how living things can be categorized according to how they get energy (producers, primary consumers, secondary consumers, decomposers). Sections featuring photographs and descriptions of pond creatures are divided by organism size. The article includes a quiz that, when answered correctly, will provide the answer to the riddle: "What do you get when your puppy helps you with your pond study?"

Suggested reading levels: Mid- to upper-elementary and middle-school grades

Total words: 1,622

Materials: Buckets; clean, empty jars; turkey basters; empty white plastic containers or glass pie pans; sheets of white paper; magnifying glasses; microscopes; drawing and writing supplies

Preparation time: About one hour, not including extension activities

Estimated instructional time: Three 50-minute class periods (not including extensions)

Minnesota Academic Standards applications: "The Wonder of Water" may be applied to the following Minnesota Department of Education Academic Standards:

Language Arts

I. Reading and Literature
- A. Word Recognition, Analysis and Fluency
- B. Vocabulary Expansion
- C. Comprehension

II. Writing
- A. Types of Writing
- B. Elements of Composition
- C. Spelling
- D. Research
- E. Handwriting and Word Processing

III. Speaking, Listening and Viewing
- A. Speaking and Listening
- B. Media Literacy

Science

III. Life Science

Grade 3
- B. Diversity of Organisms
- C. Interdependence of Life

Grade 4
- A. Cells
- C. Diversity of Organisms

Grade 5
- E. Biological Populations Change over Time
- F. Flow of Matter and Energy

Grade 7
- A. Cells
- B. Diversity of Organisms
- C. Interdependence of Life
- E. Biological Populations Change Over Time
- F. Flow of Matter and Energy

Complete Academic Standards are available at www.education.state.mn.us. Teachers who find other connections to academic standards are encouraged to contact *Minnesota Conservation Volunteer.*

Preview

Begin your preview with a survey of the article. Ask your students to examine the photos and illustrations. Use the **KWL** strategy (Ogle, 1986) to find out what your students already know (**K**) about fungi, algae, and lichens; what (**W**) they would like to learn, and eventually, what they

learned (**L**) while reading the article and related materials, and through participating in extension activities. Display your **K** and **W** ideas on poster board or paper (see Vocabulary preview, below). Add to your **L** list as you read and discuss the article. See www.teach-nology.com/web_tools/graphic_org/kwl for a **KWL** generator that will produce individual organizers for your students.

Ask your students to skim the article. Have them note how it is organized. Review Carl Linneaus' classification and discuss the five kingdoms of living things.

- What do we mean by classification?
- Why do we classify things?
- What are some examples of everyday words that name groups or classes of things?
- How do we use classification to make our lives easier?
- Is it possible to find samples of living things from all five kingdoms in pond water? Why or why not?

Vocabulary preview

A transparency-ready vocabulary list is provided. You may want to give a vocabulary pretest to see which words your students already know. To keep preview time brief, you may wish simply to alert the students to watch for the words on the list as they read. Suggest they apply comprehension strategies to unfamiliar words, such as looking at the word in relation to the sentence, looking up the word in the dictionary, looking for other key words in the sentence, referring to a picture or illustration, and thinking, "What makes sense?" Spending too much time previewing or giving a long list of vocabulary words will intimidate many readers and dampen their interest in the article (Allen, 1995).

Study questions overview

Study questions parallel the story (the answer to the first question appears first in the article, followed by the second, and so on). Preview the questions with your class before you read the article. Explain how the guide parallels the story. You may wish to read the story aloud and complete the study questions in class or in small groups. The questions may be assigned as homework, depending on the reading ability of your students. Inclusion teachers may provide more direct support to special needs students (see Adaptations section, below). The study questions may also be used as a quiz.

Adaptations

Read aloud to special needs students. Abbreviate the study questions or highlight priority items to be completed first. If time allows, remaining items may be attempted. For example, items 2, 3, 4, 5, 8, and 17 will give students some information about the five kingdoms of living things, the categories in which living things are divided depending on how they obtain energy, the importance of the food chain, and the characteristics that help living things survive. Peer helpers, paraprofessionals, or adult volunteers may lend a hand with the field trip, study questions, and lab

activity. With close teacher supervision, cooperative groups can also offer effective support to special needs students.

Assessment

You may use all or some of the study questions, combined with vocabulary, as a quiz. Other assessment ideas: (1) Ask students to pick one of the five kingdoms and develop a portfolio of researched facts, artwork, and writing. For example, a student could write a descriptive paragraph of at least five sentences with an accompanying drawing of an animal. (2) Ask individuals or groups to make oral and/or written presentations related to their studies of pond life. A group could devise a system of classification based on some other ideas—behavior or habitat—and provide some examples of living things that might be found in their new classification. (3) Assign a brief essay on one of the living things found in the article, to include a drawing, its kingdom, how it obtains energy, a physical description, and an explanation of the distinguishing characteristics of members of its kingdom.

Extension activities

1. Have students use the Discovery Puzzlemaker Web site (puzzlemaker.school.discovery.com) or www.puzzlemaker.com to create word puzzles using the names of living things found in their pond-water samples. Students can exchange puzzles and challenge classmates to solve them.
2. Have students work in pairs or groups to create a new species of animal that can survive in a particular type of environment such as the polar region, coniferous forest, temperate forest, rain forest, desert, ocean, freshwater (rivers, lakes, and wetlands), mountain, or grassland. Have them describe how the animal stays warm or cool, how big or small it is, how it obtains food and water, how it defends itself, and how it cares for its young.
3. Have students create a PowerPoint presentation or a Web site on a living thing found in one of the five kingdoms. Students can evaluate the living thing's habitat, describe it, and discuss its position in the food web.
4. Have students create a game their classmates can play by answering questions asking them to identify the kingdom a mystery living thing belongs to. Questions can be in the form of clues or pictures.
5. Build a pond community in your classroom. The Yale–New Haven Teachers Institute offers advice at www.yale.edu/ynhti/curriculum/units/1992/5/92.05.07.x.html.
6. Ask individuals or groups to do a skit portraying how people are classified in ways that are helpful and harmful.
7. Have students study and perform the poetry in the book Joyful Noise by Paul Fleishman. The poetry in the book is about insects and includes some of the insects students will find in their pond-water sample.

Lab activities

Have students complete the activity suggested in the article (see Lab Activity Guide too). A field trip to a pond is a wonderful way to review the

five kingdoms and provide the students with an opportunity to view the pond's natural habitat and surroundings. Students will be able to see other members of the kingdoms that might not be captured in their pond-water sample, but are important to the ecology of the pond.

Web resources

Classifying living things
www.hhmi.org/coolscience/critters/critters.html
www.kidport.com/Grade6/Science/AnimalKingdom.htm
Creature information
www.seaworld.org/animal-info/animal-bytes
Guide to backyard habitat
www.nationalgeographic.com/animals
Life Science Safari
vilenski.org/science/safari
Minnesota DNR *Healthy Rivers: A Water Course* (instructional CD-ROM available for purchase):
www.dnr.state.mn.us/healthyrivers

See also online resources listed on page 36 of the article.

Here's a sample of some of the related *Conservation Volunteer* articles available online at www.dnr.state.mn.us/volunteer/articles:

July–August 2005
"The Wonder of Water"
www.dnr.state.mn.us/young_naturalists/water
May–June 2004
"Gardens for a Rainy Day"
www.dnr.state.mn.us/volunteer/mayjun04/raingardens.html
May–June 2003
"Backwater Revival"
www.dnr.state.mn.us/volunteer/mayjun03/revival.html
September–October 2002
"Cattails"
www.dnr.state.mn.us/volunteer/sepoct02/cattails.html
July–August 2001
"What's Eating You?" (Young Naturalists article)
www.dnr.state.mn.us/young_naturalists/biting_bugs

References

1. Ogle, D.S. K-W-L Group Instructional Strategy. In A.S. Palincsar, D.S. Ogle, B.F. Jones, and E.G. Carr (Eds.), Teaching Reading as Thinking (Teleconference Resource Guide, pp 11–17). Alexandria, Va.: Association for Supervision and Curriculum Development, 1986.
2. Allen, Jane. 1995. *It's Never Too Late: Leading Adolescents to Lifelong Literacy*, Portsmouth, N.H.: Heinemann.

Study Questions

"Life in a Jar," by Mary Hoff
Minnesota Conservation Volunteer, July–August 2002
www.dnr.state.mn.us/young_naturalists/pond_life

Name _____ Period _____ Date _____

1. How does a pond obtain the nutrients living things need?_____

_____

_____

2. Why are the microscopic residents of a pond important? _____

_____

3. A pond creature's _____, _____, and _____ help it survive in its watery world.

4. The five kingdoms of living things are:
   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

5. What are the four categories that define how living things get the energy to stay alive?
   1. _____
   2. _____
   3. _____
   4. _____

6. Duckweed belongs to which kingdom? _____

7. Dragonfly and damselfly nymphs are the _____ of flying insects with big wings.

8. Mosquito larvae eat _____, _____ and _____.

9. Diving beetle larvae are also known as _____.

10. _____ have 14 legs.

11. Water scavengers belong to which kingdom? _____.

12. This insect "skates" on top of the water. _____.

13. A _____ is a mythological creature with only one eye.
For a bonus point, what is the tiny crustacean that also has one eye? _____
_____

14. Daphnia belong to the group of crustaceans known as _____
_____.

15. Paramecia are oval-shaped protists covered with hairs, called _____, that propel them through water.

16. Water mites have eight legs on their fat bodies. What familiar relative on land is also known for having eight legs? _____.

17. Bacteria belong to which kingdom? _____.

18. Desmids, diatoms, dinoflagellates, euglenoids, and volvox all belong to a group called _____.

19. Desmids belong to which kingdom? _____.

20. One-celled _____ are brownish and shaped like tiny covered boxes.

Study Questions Answer Key

"Life in a Jar," by Mary Hoff
Minnesota Conservation Volunteer, July–August 2002
www.dnr.state.mn.us/young_naturalists/pond_life

1. How does a pond obtain the nutrients living things need? **Water that runs into a pond when rain falls or when snow melts carries nutrients. Leaves and other plant parts that fall or wash in bring even more.**
2. Why are the microscopic residents of a pond important? **They are an important source of food for one another and for bigger living things around them.**
3. A pond creature's **body parts, shape,** and **behavior** help it survive in its watery world.
4. The five kingdoms of living things are: 1. **animals**; 2. **plants**; 3. **fungi**; 4. **protists**; 5. **monerans**
5. What are the four categories that define how living things get the energy to stay alive? 1. **producers**; 2. **primary consumers;** 3. **secondary consumers;** 4. **decomposers**
6. Duckweed belongs to which kingdom? **The plant kingdom.**
7. Dragonfly and damselfly nymphs are the **young** of flying insects with big wings.
8. Mosquito larvae eat **detritus, bacteria,** and **algae.**
9. Diving beetle larvae are also known as **water tigers.**
10. **Scuds** have 14 legs.
11. Water scavengers belong to which kingdom? **The animal kingdom.**
12. This insect "skates" on top of the water: **Water strider.**
13. A **cyclops** is a mythological creature with only one eye. For a bonus point, what is the tiny crustacean that also has one eye? **Copepod.**
14. Daphnia belong to the group of crustaceans known as **water fleas.**
15. Paramecia are oval-shaped protists covered with hairs, called **cilia**, that propel them through water.
16. Water mites have eight legs on their fat bodies. What familiar relative on land is also known for having eight legs? **A spider.**
17. Bacteria belong to which kingdom? **Monerans.**
18. Desmids, diatoms, dinoflagellates, euglenoids, and volvox all belong to a group called **microscopic algae.**
19. Desmids belong to which kingdom? **The protist kingdom.**
20. One-celled **diatoms** are brownish and shaped like tiny covered boxes.

Lab Activity Guide

"Life in a Jar," by Mary Hoff
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www.dnr.state.mn.us/young_naturalists/pond_life

As you read through the article, in small groups or as a class review the article's descriptions of living things students might find in pond water. Discuss:

- How is each valuable to the ecosystem?
- Do these living things depend on the pond, or can they survive in other ecosystems as well?
- What are some examples from the article of animals, plants, fungi, protists, and monerans?
- What physical characteristics can you see in the photographs that make the living things especially suited to their pond-water habitat?

Review the categories into which living things are divided depending on how they get energy (food webs). Discuss:

- What are some examples in the article of producers, primary consumers, secondary consumers, and decomposers?
- Do you think it is possible to find samples of all four categories in your sample of pond water? Why or why not?

Have the students use the Lab Worksheet as they complete the activity. The worksheet lists each living thing covered in the article and asks students to:

- indicate whether they found it in their sample
- assign it to the appropriate kingdom
- draw a picture of it as they see it in their sample.

Working in small groups, pairs, or individually, have students transfer a sample of pond water to a glass jar. Have them look though the sides of the jar and identify on the worksheet living things they see.

Have students transfer samples of pond water to white plastic containers or glass pie plates on white paper. Have them use magnifying glasses to identify living things and mark them on the worksheet.

Have the students transfer drops of pond water to microscope slides so they can identify the smallest of living things. Have them continue to identify on the worksheet the living things they see under the microscope.

LAB WORKSHEET **NAME**_____

1 Backswimmers

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

2 Duckweed

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

3 Dragonfly nymphs

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

4 Damselfly nymphs

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

5 Fairy shrimp or pond shrimp

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

6 Midge larvae

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

7 Mosquito larvae

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

8 Diving beetle larvae or water tigers

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

9 Scuds

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

10 Water boatmen

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

11 Water scavenger beetles

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

12 Water striders

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

13 **Whirligig beetles**

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

14 **Amoebas**

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

15 **Copepods**

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

16 **Daphnia**

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

17 **Paramecia**

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

18 **Water mites**

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

19 **Bacteria**

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

20 **Desmids**

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

21 Diatoms

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

22 Dinoflagellates

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

23 Euglenoids

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

24 Volvox

Was this living thing in your water sample?

Yes No

Circle the correct kingdom.

Animal Plant Fungi Protist Moneran

Draw a picture of the living thing you found in your pond-water sample.

Lab Activity Answer Key

"Life in a Jar," by Mary Hoff
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LIVING THINGS	KINGDOM
1. backswimmers	Animal
2. duckweed	Plant
3. dragonfly nymphs	Animal
4. damselfly nymphs	Animal
5. fairy shrimp or pond shrimp	Animal
6. midge larvae	Animal
7. mosquito larvae	Animal
8. diving beetle larvae or water tigers	Animal
9. scuds	Animal
10. water boatmen	Animal
11. water scavenger beetles	Animal
12. water striders	Animal
13. whirligig beetles	Animal
14. amoebas	Protist
15. copepods	Animal
16. daphnia	Animal
17. paramecia	Protist
18. water mites	Animal
19. bacteria	Moneran
20. desmids	Protist
21. diatoms	Protist
22. dinoflagellates	Protist
23. euglenoids	Protist
24. volvox	Protist

Minnesota Comprehensive Assessments Practice Items

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www.dnr.state.mn.us/young_naturalists/pond_life

Name _____Period _____Date_____

1. Ponds are rich in nutrients. How do nutrients get into the pond water?
   A. with rain water and snow melt
   B. in sunlight
   C. when plant parts fall or are washed in
   D. A and C

2. Amoebas and algae are examples of _____.
   A. bacteria.
   B. protists.
   C. fungi.
   D. none of the above.

3. Humans are _____.
   A. producers.
   B. primary consumers.
   C. secondary consumers.
   D. decomposers.

4. Water boatmen are _____.
   A. operators of water taxis.
   B. dock workers.
   C. algae eaters.
   D. amoebas.

5. Your jar of pond water may contain up to _____ different kingdoms.
   A. 10.
   B. 5.
   C. 15.
   D. 3

Minnesota Comprehensive Assessments Practice Items Answer Key

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1. Ponds are rich in nutrients. How do nutrients get into the pond water? **D. with rain water and snow melt** and **when plant parts fall or are washed in.**
2. Amoebas and algae are examples of **B. protists**.
3. Humans are **C. secondary consumers**.
4. Water boatmen are **C. algae eaters**.
5. Your jar of pond water may contain up to **B. 5** different kingdoms.

Vocabulary

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algae Plants without roots or stems that grow in water or on damp surfaces.

bacteria Microscopic living things that exist all around you and inside you. Many bacteria are useful, but some cause disease.

carbon dioxide A gas that is made up of carbon and oxygen, with no color or odor. Animals release carbon dioxide, and plants absorb it during the day.

fungi A plantlike organism that has no leaves, flowers, roots, or chlorophyll.

larvae Insects at the stage of development between an egg and a pupa. A caterpillar is the larva of a moth or a butterfly.

molecule The smallest part of a substance that displays all the chemical properties of that substance. A molecule is made up of more than one atom.

nitrogen A colorless, odorless gas that makes up about four-fifths of Earth's air.

nutrients Something needed by people, animals, and plants to stay strong and healthy. Proteins, minerals, and vitamins are all nutrients.

phosphorus A chemical element that glows in the dark. It is used in making matches, fertilizers, glass, and steel.

photosynthesis A chemical process by which green plants make their food. Plants use energy from the sun to turn water and carbon dioxide into food, and give off oxygen as a byproduct.

tadpole A frog or toad larva. It lives in water, breathes through gills, and has a long tail but no legs.