Once Upon a Pond

Summary

Students will learn about germs by learning about how easy it is to spread them and by looking at organisms in pond water.

Materials

Glo-Germ Liquid
Ultraviolet Light
Chart paper
- *Once Upon a Pond #1*
Various samples of pond water
Microlife Mix Dry Culture
Small containers for pond water
- *Using Your Microscope: Procedure to Make Wet-Mount Slide (Overhead)*
- Pond Life Identification
Microscopes
Pipettes
Cover slips
Microscopic slides
Diluted Iodine (10 droplets to one cup)
Powerpoint Presentation (created from pictures found in websites-site source)
- *Once Upon a Pond #2*
- Do Science With Your Family
- Family Activity Discussion Points
- Rubric for Science Journal
- Rubric for Microorganism Brochure

Additional Resources

Books

- *The Adventures of Micki Microbe*
, by Maurine Burnham Guymon; ISBN 0961865008
- *Bottle Biology*
, by Mrill Ingram; ISBN 084028601
- *Germ Killers--Fighting Disease*
, by Sally Morgan; ISBN 1588106993
- *Germs Make Me Sick!*
by Melvin Berger; ISBN 0060242507
- *Guide to Micro life*
, by Kenneth G. Rainis; ISBN 0531112667
- *Intimate Strangers--Unseen Life on Earth*
, by Needham, C; Hoagland, M; McPherson; Dobson, Bert; ISBN 1555811639
- *Kingfisher Knowledge- Microscopic Life*
, by Richard Walker; ISBN0753457784
- *Micro Monsters--Life Under the Microscope*
, by Christopher Maynard; ISBN 0789447568
- *Mysterious Microbes--Microscopic Monsters and Vile Monsters!*
by Steve Parker; 0811423441

- *The Smallest Life Around Us--Exploring The Invisible World of Microbes with Eight Easy At-Home Experiments*
  , by Lucia Anderson; ISBN 0517532271

Additional Media

Glo-Germ P.O. Box 189 Moab, Utah 84532 Phone: 800-842-6622 Fax: 435-259-5930
Microlife Mix Culture P.O. Box 22729, Rochester, NY 14692 Phone: 800-526-6689 Item#:E2-80-2001

Background for Teachers

Microorganisms thrive in every ecosystem on Earth. They range in complexity from simple to multi-cellular organisms. Microorganisms require food, water, air, ways to dispose of waste and an environment to thrive in. There is an abundance and variety of microscopic life found in pond water, even frozen pond water and geysers. A healthy pond may have from 500 to 1,000 different species of microscopic organisms. These organisms are essential to the balance of the pond ecosystem.
Pond water is an excellent place to investigate single cells that behave as independent organisms. These organisms seem relatively unchanged from ancient times. Yet, the environment of a pond is ever-changing and no two ponds are ever exactly alike. Some major types of organisms found in ponds are algae, amoebas, and paramecium.
Some students struggle to find these microorganisms in pond water. It is highly advisable to view your samples of pond water prior to the class. Pond water can be collected all year, but be sure to include soil, pond scum, and small plants to insure success. Iodine makes the microorganisms easier to identify. Within a cell, sugar is changed by a chemical process into starch. Dilute iodine stains the starch to a blue-black color.

Intended Learning Outcomes

1. Use Science Process and Thinking Skills.

Instructional Procedures

Invitation to Learn

Place a small amount of Glo-Germ on your hands and shake the hands of every student in the class as they enter. Important reminder: a small amount goes a long way. Variation: Pass out a small amount to each student and have them rub it their hands (e.g., fingernails, palms and tops of hands)
Have a piece of chart paper with the question written on it: When was the last time you washed your hands? What have you done since the last time? Have the students conduct a quick pair share conversation about hand washing for two minutes. Then, ask the class to share whole class some ideas. Record ideas.
Finally, pass around the ultraviolet light. Have the students look at your hands on what to their hands to see how germs were spread by simply shaking hands. Glo-Germ Products are made of tiny plastic particles that are only visible under an ultraviolet light. The fluorescent glowing particles are to simulate "germs." Discuss findings. Have the students think about what would remove more of the powder and what would be the most effective procedure for washing hands.
Critical Thinking Questions: How much time is needed for effective hand washing? How hand washing affects microbes? Can the microbes on your hands have a serious effect on your personal health? How will your hand washing habits change?
Share with class if it wasn't brought up in the discussion: Hand washing is the easiest way to prevent the spread of diseases and infections. Studies have found that only 68% of Americans wash their hands after using the restroom. There are millions of microbes on your hands. Many are harmless, but some are disease causing. Hand washing with plain soaps suspends the microbes and allows them to be rinsed off. Antibacterial soaps inhibit the growth of microbes. Many studies have found

that washing hands with soap and vigorous rubbing for as long as it takes you to sing Happy Birthday is the very effective in removing harmful bacteria.

Instructional Procedures

Two to three days prior to the lesson: Collect water from a pond in a wide-mouthed glass jar. Scoop up the scum and algae on top of the water. To insure success include a small bit of Microlife Mix Culture. It is a specially formulated mixture that contains a variety of microhabitat materials, including bacteria and nutrients to support microlife growth. It will help grow bacteria and other single-celled organisms in 24 hours and larger microinvertebrates will appear within a week. The Microlife Mix Culture can be safely stored for years without special handing.

Borrow or check out microscopes for your class from your school or district media center. It is optimal for each pair of students to have a microscope.

Begin Lesson: It works best to have the student move the desks into groups of four and organize materials prior to beginning the lesson. This will lessen the chances of pond water being spilled or microscopes being knocked over.

Pass out *Once Upon a Pond Worksheet #1* . Discuss what the worksheet is asking the students to do.

OPTION: Use the prepared worksheets or have the students record in their science journals. Use the Worksheets as guidelines to what needs to be in the science journal. Make the worksheets into overheads. Some students do better with freedom to express their findings.

After working for two minutes by themselves, stop them and ask for a table discussion about what is in the pond water. Give them two minutes to discuss as a group. Then, have the students resume working individually or in partners (whatever is your comfort level).

Give the students five to seven minutes to complete the activity worksheet, *Once Upon a Pond Worksheet #1.*

Have a short class discussion about findings. Chart predictions and post.

Have a short discussion and display the Utah State Standard, we are trying to achieve. Give an overview of what students will be doing and show the rubric of what is expected of the students.

Review over lab rules.

Model the procedure for making a wet mount slide prior to the students experimenting. Model for the students how to make a wet mound slide. Refer to *Using Your Microscope: Procedure to Make Wet-Mount Slide* Overhead. Important note: Wait until after modeling, to pass out materials or students might be distracted by materials on desk and have a hard time focusing on the discussion.

Place a microscope at each group. Then, have one student gather the materials (paper towels, pipettes, slides, cover slips, small container of diluted iodine, *Once Upon a Pond Worksheet #2* , and a *Pond Life Identification* chart). HINT: It is easiest to place a note card of how many each partner group will need.

This is a large portion of the lab. Each class will take varying amounts of time. Some students may become frustrated with locating microorganisms in the microscopes. It is important to be actively monitoring the students to assist as needed. Have students record their findings on *Once Upon a Pond Worksheet #2* or in their science journal. Important Note: Students may find cool things and want to share with other students. Have a set procedure for viewing others student's microscopes.

After ten minutes, stop the students and show them a Powerpoint presentation of varying pond organisms. They are amazing pictures on the Internet that can be used in the classroom, see references. This will help focus students on their findings.

After other 10-15 minutes, reconvene as a class. Have the students discuss their most interesting, weird, or important findings.

Pair students in partners and have them choose a microorganism to study. The topic choices will be the major groups of organisms: bacteria, fungi, or viruses. Students will do research to find out about the microorganism's requirements, (e.g., food, water, air, waste disposal, temperature of environment, reproduction). They will create a mini-microorganism brochure about their organism. Give the students one week to complete the project.

Extensions

Curriculum Extensions/Adaptations/Integration

Language Arts: Read about amazing world microorganisms, see additional resources for materials.
Writing: Work on descriptive writing and improve vocabulary to describe microorganisms.
Complete the writer's workshop on their microorganism report.
Create a decomposition chamber. Read *Bottle Biology*, by Mrill Ingram; ISBN 084028601.
Develop a pond ecosystem in the classroom in an aquarium, add snails and other organisms.

Family Connections

Bring samples of pond water, or other water found at home or with their parents to view under the microscope.
At Home Project, *Do Science With Your Family: The Making Of A Windgradski Column*
Work on microorganism brochure with the family.
Share with family their findings from the hand washing experiment.

Assessment Plan

Pre-assessment - Monitoring students and discussing their predictions of what might be found in pond water.
Completing all the activities: Keeping a detailed record of the science experiment in their science journal. Use rubric, *Rubric for Science Journal* for grading.
Here are some journal prompts for journal writing: The most interesting part of the experiment was; Today, I experimented with…, Today I observed…, My hypothesis was…, I concluded that…., My next experiment will be…, Today, I learned about..., Another question that I have is…
Informal assessment: Recorded correctly how to make a wet-mount slide in science journal and is able to demonstrate how to make a wet-mount slide with materials.
Completed Brochure: Student evaluated rubric, *Rubric for Microorganism Brochure* .

Bibliography

Harlen, Wynne. (2001). Research in primary science education. *Journal of Biological Education*, 35 (2), Pages 61-5.
Brain research on learning has provided the strongest arguments for including hands-on science in the primary curriculum. Science instruction can take many forms, but the key components need to include: hands-on experimentation, higher order questioning, and inquiry. Children have many misconceptions on scientific topics, researchers found that formulated key questions were able to clarify misconceptions and expand knowledge during and after a lesson.
Huber, Richard A. (2001). A model for extending hands-on science to be inquiry based. *School Science and Mathematics*, 101.1 pp. 32-42.
Discrepant events are excellent springboards to engaging students and promoting full inquiry investigations in the class. Many teachers felt overwhelmed trying to create hands-on lessons. The researchers found the situation was improved when the entire school bought into the idea, time was made for grade level collaboration, and teacher training was made available. Simple strategies were used that dramatically improved the learning, i.e., brainstorming as a class on inquiry ideas.

Authors

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