LIFEDROPS

A POND WATER STUDY

GRADES 3 - 5

SOUTHERN COMPANY

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LIFEDROPS–

SNC - Plant Farley

LESSON PLAN

A POND WATER STUDY

Lesson Title: Lifedrops– A Pond Water Study

Lesson Description: Students conduct experiments by observing pond water samples. They observe life forms in the pond water and then draw and classify them.

Grade Level: 3-5 (modify as needed for each grade level)

Subject Area(s): Biology, Environmental Science

Objectives: Students will:
- gain an understanding of the concept of microorganisms, especially protists.
- become cognizant of the diversity of microlife in aquatic environments.
- observe, draw, and attempt to classify aquatic microorganisms.
- gain an understanding of single celled plants and single celled protists.
- observe a variety of algae and protists.
- analyze data and communicate findings to others.
- use stereomicroscopes and compounds microscopes properly.

Materials:
- specimen bowls or Petri dishes
- small collection bottles or vials
- dropping pipettes
- protozoa slowing agent such as Protoslo or methyl cellulose
- microscope slides
- cover slips (plastic best)
- hand lenses, stereomicroscopes, and compound microscopes
- pencils
- reference books, illustrations on common protists
- optional: cultures of common protozoans/algae such as paramecium, volvox, spirogyra, blepharisma, stentor, vorticella, etc.
- activity sheets

Correlations (NSES):
- Content Standard A – Science as Inquiry
  - develop abilities to do scientific inquiry
  - develop understandings about scientific inquiry
- Content Standard C – Life Science
  - develop an understanding of the characteristics of organisms
  - develop an understanding of organisms and environments
- Content Standard E – Science and Technology
  - develop abilities technological design
  - develop understanding about science and technology
- Content Standard F – Science in Personal and Social Perspectives
  - develop understanding of types of resources

Curriculum Integration:

- Environmental Science
- Ecology

Process Skills:

- Observation
- Comparison
- Collection of data
- Measurement
- Research
- Inference
- Investigation/experimentation
- Interpretation of data
- Analysis of data
- Description of findings
- Communication of ideas

Background Information:

- Main ideas
  Principles related to cell structure such as:
  - nuclei
  - common external structures such as flagella and cilia
  - special properties such as movement, photosynthesis, etc.
  - various major organelles
  - diversity of cellular morphology (shape)
  Concept of diversity among microlife
  Basic concepts related to unicellularity vs. multicellularity
  Characteristics of protests
  Characteristics of algae
  Principles related to food acquisition
- Secondary ideas
  - Use of the microscope
  - Roles of protists in aquatic ecosystems
  - Difficulties in classifying unicellular life forms (i.e. protists vs. algae)

Teacher Activities:

- Assemble/organize all materials needed for activity. Set up the microscopes ahead of time and make sure that they work properly. If you have ordered special protozoal or algal cultures with specific organisms, make sure that you have them divided into several containers accessible to the students.
- Check cultures to make sure they have adequate numbers and varieties of specimens.
- Obtain several references so that students will have pictures/illustrations of life forms they are likely to encounter.
- Present background material to students.
- Issue instructions on how to use a microscope. This activity requires that students already be familiar with the use of microscopes. It should not be used as the initial lesson on the microscope. It is, however, an excellent activity to do after students have become familiar with the use of the microscope.
- Review care of the microscopes.
- Depending on the size of the class, the teacher may wish to divide the class into teams of 2-3 students. Each student in the group should have a specific task in the exercise.
- Show students how to prepare a wet-mount slide using a coverslip.
- Issue instructions to students regarding activity.
- Distribute Activity Sheets to students and give instructions on how to complete them.
- Discuss safety issues. Stress importance of avoiding cuts from sharp edges on coverslips and microslides. Also caution students regarding heat from the microscope lamps.
- Monitor/assist students as needed during exercises.

Teacher Activities (continued):

- After students complete exercises and assemble back into a group, allow students to show their work and describe their observations. After students have shared their work, engage students in post-activity discussion. Stress main points of lesson during discussion.
- Display student drawings in your classroom.

Student Activities:

- Listen to background information given by teacher.
- Obtain all materials needed to complete the exercise (refer to Activity Sheet).
- Observe pond water first with hand lenses, then stereomicroscopes, then compound microscopes.

Evaluation:

- Activity sheets
- Direct observation
- Oral reports from students

Extension/Enrichment:

- Have students utilize samples from different ponds.
- Have students attempt to identify new specimens as to whether they are plant or protist.
- Take a field trip to a local wetlands or pond and collect new samples to examine.
- Have students complete reports on algae or protozoa.
- Invite a biologist/limnologist to speak to the class.
- Conduct a “protozoan hunt” on the Internet/WWW.
- Have the students make models of specimens they observed by using clay, play dough or other materials.

Safety Considerations:

- Use caution with glass microscope slides and coverslips. They have sharp edges and will inflict cuts.
- Light sources on microscopes can get very hot. Caution students about touching hot parts of the microscopes.
- Students with cuts or open sores on their hands/fingers should wear gloves when handling pond water.
- Insist that students wash their hands after this exercise.

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ACTIVITY SHEET ONE

A POND WATER STUDY

(READ THIS ENTIRE SHEET BEFORE BEGINNING THE EXERCISE)

Introduction

Did you know that there are many thousands of teeny tiny creatures and plants that we cannot see with our eyes? We will use magnifying lenses and microscopes to look at some of them today.

You teacher has talked to you about what algae and protists are and told you about their shapes and how they grow. Follow the directions on this Activity Sheet to look at some examples of these tiny life forms.

Procedure

- Obtain all materials needed as directed by your teacher.
- Listen to your teacher carefully as she tells you how to start the lab activity.
- Use the medicine dropper to place several drops of pond water into a small dish. Use the magnifying lens to look for any small creatures or plants in the sample.
- Answer question number 1 on Activity Sheet 2.
- Now take the same small dish containing the pond water and examine it using the stereomicroscope. Your teacher can help you if you need help.
- Answer question number 2 on Activity Sheet 2.
- Now get a microscope slide and a coverslip. Be VERY CAREFUL because they have sharp edges and can cut you. Use the medicine dropper to put one or two drops of pond water on the middle of the slide. Then put the coverslip on top of the pond water. Look at Figures 1 and 2 on the next page. If you need help, ask your teacher.
- Observe the slide you made using the compound microscope. Answer question number 3 on Activity Sheet 2. If you need help using the microscope, ask your teacher.
- Make drawings of what you see. Answer all other questions.

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ACTIVITY SHEET TWO

A POND WATER STUDY

(READ THIS ENTIRE SHEET BEFORE BEGINNING THE EXERCISE)

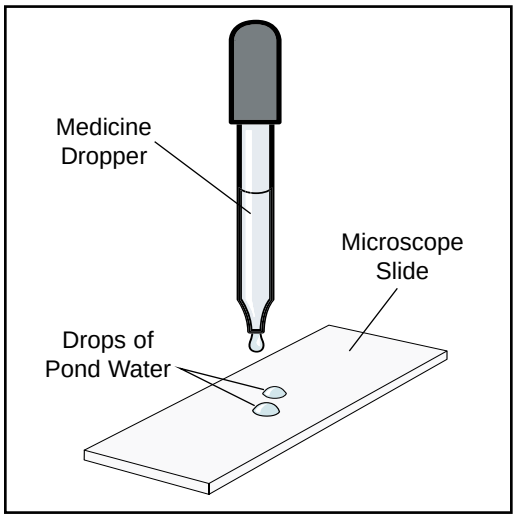

Figure 1. Making a Wet-Mount Slide

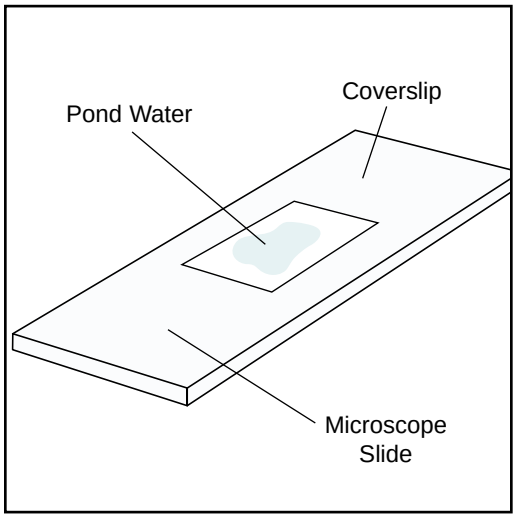

Figure 2. Wet-Mount Slide

Do you see anything moving in your sample using just your eyes? Do you see anything moving in your sample when you use the magnifying lens? Describe what you see.

After looking at the sample under the stereomicroscope, describe what you see. Can you tell if any of the cells are plants or protists? How can you tell?

Use the compound microscope to observe the pond water. Describe all the life forms you see. Then pick out your favorites and draw them in the boxes on the next page.

Use this page to draw your favorite specimens you see in the pond water.