

Erin Giese and Kristie Howe
Introduction Lesson
Fall 2003

Introduction to what's in the Great Salt Lake (GSL)

Abstract:

- ❖ Students will be given the opportunity to explore the living organisms found within the Great Salt Lake, particularly brine shrimp. Students will investigate the Great Salt Lake and create a microcosm of their own by collecting water samples from the Great Salt Lake. Students will also compare and contrast the basic characteristics and needs of living and nonliving things/objects.

Grade Level:

- ❖ Third Grade

Utah Core Curriculum Standards:

Standard 2

Science Benchmark

For any particular environment, some types of plants and animals survive well, some survive less well and some cannot survive at all. Organisms in an environment interact with their environment. Models can be used to investigate these interactions. Students will understand that organisms depend on living and nonliving things within their environment.

Objective 1

- ❖ Classify living and nonliving things in an environment.
- ❖ Identify characteristics of living things (i.e., growth, movement, reproduction).
- ❖ Identify characteristics of nonliving things.

In-class Instructional Time:

- ❖ Three 60 minute lessons

Terminology:

- ❖ Brine Shrimp (*Artemia salina*): Tiny aquatic animals that live in the Great Salt Lake and other hypersaline environments.
- ❖ Microcosm/Ecosystem: A "little world" made up of the interacting living and non-living components of a community.
- ❖ Cysts: Dormant brine shrimp babies.
- ❖ Baby Brine Shrimp (Nauplii): The first stage in the life cycle after they have hatched from cysts.
- ❖ Adult Brine Shrimp: The final stage in the life cycle of the brine shrimp.

Intended Learning Outcomes:

- ❖ Students will create microcosm of their own from the Great Salt Lake and will compare and contrast the characteristics of the living and nonliving things/objects found within their ecosystems.

Background:

Living and nonliving things are both present in the ecosystem. Each living organism has its own unique life cycle. Living and nonliving things have different characteristics and needs. Brine shrimp need salt water to survive as well as bacteria to off of which to live. Brine shrimp is a huge industry in Utah, as the Great Salt Lake has extremely high salinity. Brine shrimp is sold around the world mainly as fish food and also for entertainment purposes in “growing” sea monkeys! A “sea monkey” is an adult brine shrimp.

Day 1

Materials:

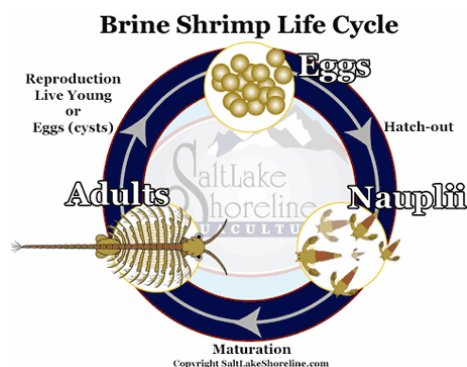
- ❖ Paper and drawing materials (markers, crayons, etc.)
- ❖ Brine shrimp cysts (Available at the Local Pet Store)
- ❖ Brine shrimp already hatched
- ❖ Dissecting microscopes
- ❖ Science Journals
- ❖ Parent Volunteers

Prior Knowledge Assessment:

- ❖ Ask students if they have ever heard of brine shrimp (sea monkeys). What do they know about them?
- ❖ Explain to students that all living things have life cycles. Do nonliving things have life cycles?
- ❖ Ask students: What is a life cycle with which you are familiar? What about your own life cycle? (3rd graders will only know the basic stages of the human life cycle: baby, toddler, child, young adult, adult, elderly).

Procedures:

1. Introduce students to brine shrimp. Brine shrimp is a large industry for Utah and is, therefore, important for students to learn about. Show pictures of brine shrimp in various stages of their life cycle in order to allow students to get a visual picture of each stage in the cycle and the cycle as a whole. Introduce the terms associated with the brine shrimp life cycle at this time. Have students compare the life cycle of the brine shrimp to that of the human life cycle with which they are already familiar. Discuss in a large group the similarities and differences between the two. i.e. Number of stages, both begin with



small organisms and evolve, etc.

2. Show students actual brine shrimp cysts and further explain the life cycle of brine shrimp.
3. Explain that today we are going to look at brine shrimp in dissecting microscopes and write or draw any observations in our science journals.
4. Have 3 centers set up. Each center should have 2 dissecting microscopes. (Have a parent helper at each center to assist students.)

Center 1: Dry Brine Shrimp Cysts—Students will observe under the microscope the characteristics of the cysts and write down and/or draw these observations in their journals.

Center 2: Nauplii—Students will observe the characteristics of the Nauplii (baby brine shrimp) under the microscope and write down and/or draw these observations in their journals.

Center 3: Adult Brine Shrimp—Students will observe the characteristics of the adult brine shrimp under the microscope and write down and/or draw these observations in their journals.

5. Have students rotate around the centers in small, cooperative groups in 10-minute intervals. Students should take turns looking in the microscopes and write or draw any observations in science journals. Ex: What do they look like? Are they active? Etc.

Assessment

At the end of class, have students remain in their small groups and draw a pictorial representation of the brine shrimp life cycle to hang on the board. Each student within the group has their own color of marker so the teacher is able to assess each individual's participation and therefore verify that all of the students have an understanding of the concept being taught.

Day 2

Materials:

- ❖ Science Journals
- ❖ Baby food jars
- ❖ Lids to jars with holes poked in the top
- ❖ Boots
- ❖ Parent Volunteers
- ❖ Bus!

Prior Knowledge Assessment:

- ❖ Ask students if they have ever been to the Great Salt Lake. What animals/organisms did they see there? What's different about the Great Salt Lake than other lakes?

Procedures:

1. Explain to students what a microcosm is. Based on the prior knowledge assessment, have students brainstorm a list of what will be included in a microcosm of the Great Salt Lake.
2. Prior to leaving for the Great Salt Lake, explain to students that we are going to be making our own microcosms by taking a sample of water and possibly the living and nonliving objects found within the Great Salt Lake.
3. Take the bus to the Great Salt Lake!
4. Have the students put on boots and fill their jar full of water from the lake. Have students write their names on the jar lids.
5. Ask students to look at their microcosms. Ask students what they see in their microcosms. Do they see any brine shrimp or cysts like we looked at in class a couple of days before? Do they see any brine shrimp in other stages of their life cycle?
6. Tell students that while they are at the GSL, they should draw one thing that they see. They can draw anything they choose (organisms, plants, landscape, etc.). Have students write whether their drawings are of a living or nonliving thing and how they came to this conclusion.
7. Leave the Great Salt Lake on the bus.

Assessment

- In class, have students record how many living things and how many nonliving things they identify in their individual microcosms. Have students explore the characteristics of living things and nonliving things. What makes them decide if an object is living or nonliving?
- Make a graph on the board of how many living versus nonliving things were identified in each student's microcosm.

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Experimental Lesson
Fall 2003

Does Light Effect the Hatching of Brine Shrimp Cysts?

Abstract:

- ❖ Students will be construct an experiment to see if light effects the hatching of brine shrimp. Students will also compare and contrast characteristics of living and nonliving things.

Grade Level:

- ❖ Third Grade

Utah Core Curriculum Standards:

Standard 2

Science Benchmark

For any particular environment, some types of plants and animals survive well, some survive less well and some cannot survive at all. Organisms in an environment interact with their environment. Models can be used to investigate these interactions. Students will understand that organisms depend on living and nonliving things within their environment.

Objective 1

- ❖ Identify characteristics of living things (i.e., growth, movement, reproduction).
- ❖ Identify characteristics of nonliving things.

In-class Instructional Time:

- ❖ Two 60 minute lessons

Terminology:

- ❖ Brine Shrimp (*Artemia salina*): Tiny aquatic animals that live in the Great Salt Lake and other hypersaline environments.
- ❖ Cysts: Dormant brine shrimp babies.

Intended Learning Outcomes:

- ❖ Students will observe the hatching of brine shrimp cysts and compare those in a dark environment versus those in a lighted environment in order to see if light has an affect on brine shrimp hatching.

Background:

Brine shrimp live in environments with extremely high salinity, such as the Great Salt Lake. Brine shrimp's main purpose in life is to feed other fish and birds. Brine shrimp feed on microorganisms and help rid the Great Salt Lake of contaminants. In order for a proper ecosystem containing brine shrimp to flourish, they need pH oxygen, salinity in the water, algae or other bacteria (food), and possibly a light source. This investigation will focus on whether or not light actually is a factor in the hatching of brine shrimp cysts.

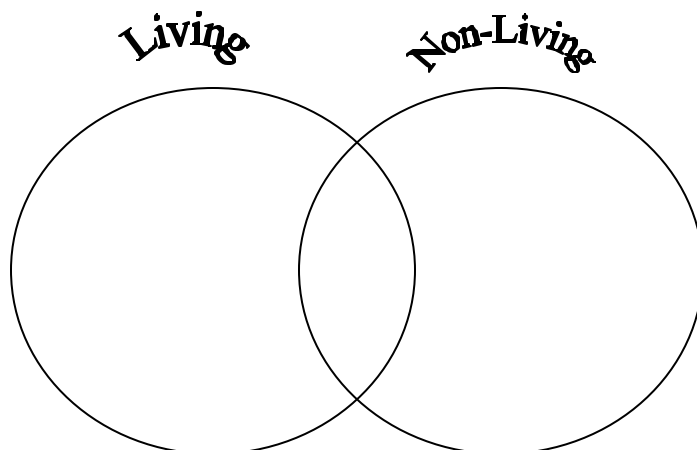
Experimental Lesson Part I

Materials

- ❖ Science Journals
- ❖ Venn Diagram Handouts
- ❖ Students' ecosystems from the previous lesson
- ❖ 6 plastic jars or cups with lids to prevent spilling
- ❖ 2 aquariums (one with a light that does not produce heat and one with a dark cloth covering it)
- ❖ Dried Brine Shrimp Cysts (Available at your local pet store)
- ❖ Instant Ocean (Available at your local pet store)
- ❖ Water
- ❖ Measuring supplies (cups and teaspoons)
- ❖ Post-it notes

Prior Knowledge Assessment:

- ❖ Create a Venn diagram comparing and contrasting the characteristics of the living and nonliving things found within their ecosystems in small, cooperative groups.



Procedures:

1. Ask students what the living things need that the nonliving things do not need? What do living things need to survive? Students will probably mention that living things need light and that nonliving things do not. If students do not bring this up, lead them to bring it up in discussion by asking guided questions. Relate this lesson to the first lesson by reviewing that brine shrimp need salt water. Review with the students why learning about brine shrimp is important (It's a large industry for Utah).
2. Tell students that you are very curious about this. Do brine shrimp need light to hatch? Can they hatch in the dark? Brine shrimp cysts hatch on the surface of water. Is this because they need the light, or is it because the salt in the GSL makes them float? Where exactly do brine shrimp hatch? Do they hatch near rocks or do they hatch in the middle of the lake? Get students curious and asking questions.
3. Explain to students that we are going to set up an experiment in which we hatch our own brine shrimp cysts, some in the dark and some in the light. This way we will be able to see if light is a factor in the hatching of brine shrimp cysts.
4. Have students create a hypothesis concerning the factor light plays. Where will more shrimp hatch? Why? Have them write their hypotheses in their journals in a formal

experiment write up which should include the following: question, prediction or hypothesis, results, conclusions.

5. Give each student a post-it note. Create a graph on the board for students to inform us of their hypotheses.

Light Affects Hatching	(have students place their post it notes here if they think that light affects hatching)
Light Does Not Affect Hatching	(have students place their post it notes here if they think that light does not affect hatching)

6. Set up the experiment.
 - ❖ Create “Instant Ocean Water.” Put 3 teaspoons of solution to one cup of water to create 10% salinity. Make 6 jars of this salt water, each containing one cup.
 - ❖ Put a pinch of dried brine shrimp cysts in each jar of salt water.
 - ❖ Put 3 jars in one aquarium with a light source that does not produce heat. Put the remaining 3 jars in a separate aquarium with a dark cloth over it so that no light is present.
 - ❖ Check each day to record observations and findings. Record in science journals.
 - ❖ At the end of one week, bring the jars back into the classroom and count how many cysts hatched in the light vs. how many cysts hatched in the dark. This will allow the students to see if brine shrimp really do need light to hatch and live.

Experimental Lesson Part II

Materials

- ❖ Science Journals
- ❖ Six Pipets with milliliter measurements
- ❖ Six Petri dishes
- ❖ Graph from Experimental Lesson #1

Procedures:

1. Divide students into 6 small, cooperative groups. 3 groups will be working with the 3 jars that were in the light, and the other 3 groups will work with the 3 jars that were in the dark.
2. Have each group gather 1 ml of water from their jar with a pipet and put it in the Petri dish.
3. Count how many brine shrimp are in the Petri dish. Multiply this amount by 250 (because there are 250 ml in 1 cup—which is how much water is in each jar).
4. Have the students share their results with the class. Write the results in their experiment write up.
5. Compare original graph from the first lesson with the concluding results. Come to a conclusion as to whether or not their hypotheses were supported or not and why. Record in experiment write up.
6. Come up with future experiments they may want to do. Record in science journal.
7. Review with students characteristics and needs of living vs. nonliving organisms. Do brine shrimp need light to survive? Do they think other organisms need light? Do non-living objects need light? Draw conclusions and record in lab notebook.

Assessment:

- ❖ Turn in science journals. These journals have been a running record of the students' thoughts, observations, conclusions, questions, understanding, etc. throughout the entire lesson. Therefore, these journals will be a great tool for assessment. The journal should include the following criteria:

	Excellent Work	Almost There	Needs Work
Shows the correct scientific method write-up.			
Shows evidence of understanding through providing clear explanations.			
Thoughtful hypotheses with supportive reasons.			
It is obvious that thought went into ideas for future experiments.			