

# Seeds or Eggs?

## OBJECTIVES

Students examine unidentified objects (brine shrimp eggs) and set up an experiment to see what sort of organisms they will develop into. After discovering that brine shrimp hatch from the eggs, they discuss the differences between plants and animals.

### The students

- ▶ examine unidentified brine shrimp eggs
- ▶ set up an experiment to see if the mystery objects will grow in salt water or in fresh water
- ▶ observe and discuss the growth and development of brine shrimp
- ▶ discuss the differences between plants and animals

## SCHEDULE

**Session I** About 40 minutes, with continuing observation sessions every day for 2 or 3 days

**Session II** About 30 minutes, 2 or 3 days after Session I, or when the brine shrimp begin to hatch, with continuing observation sessions every day for about a week

## VOCABULARY

brine shrimp  
egg  
fresh water  
predict  
salt water  
seed

## MATERIALS

### For each student

- 1 Activity Sheet 1

### For each team of two

- 1 magnifier
- 1 marker, felt-tip\*
- 1 vial holder

### For the class

- 1 vial brine shrimp eggs
- 1 chart, Plant or Animal?
- 4 containers, 1-L\*
- 4 droppers
- 1 marker, felt-tip\*
- paper towels\*
- 1 bag salt, non-iodized
- 1 spoon, large\*
- 1 roll tape, masking
- 32 vials, with caps
- 1 gal water, spring\*

\*provided by the teacher

## PREPARATION

### Session I

- 1 Make a copy of Activity Sheet 1 for each student.
- 2 Label two of the containers *Fresh Water* and two containers *Salt Water*. Place 1 L of spring water into each of the two fresh-water containers.
- 3 Make a salt-water solution by filling a vial with non-iodized salt and adding it to 2 L of spring water. (Iodized salt and most tap water will kill the brine shrimp.) Stir this

mixture well, and divide the salt water between the two salt-water containers.

- 4 Set up two distribution stations, each with a salt-water and a fresh-water container and two droppers for distributing the water. Have paper towels handy to mop up spills.
- 5 Place enough brine shrimp eggs into thirty-two vials to just cover the bottom of each vial, and place the caps firmly on the vials.
- 6 Cut three pieces of masking tape 3 cm (about 1.2 in.) long for each team of two.
- 7 Choose an area of the classroom in which to store the vials for a couple of weeks. This should be a spot away from any heat source and out of direct sunlight for the entire day.

## Session II

- 1 Decide on a place to hang the Plant or Animal? chart later where everyone in the class will be able to see it.
- 2 Each student will need his or her copy of Activity Sheet 1. Each team of two will need their vial holder with vials and a magnifier.

## BACKGROUND INFORMATION

Brine shrimp are tiny marine animals that usually live in very salty water. (The term **brine** refers to salt water.) Their eggs remain viable (capable of hatching) even if they have been removed from the water and dried out. This capability allows a brine shrimp population to survive periods of drought that dry up the salt lakes in which they are naturally found.

Brine shrimp eggs will hatch if placed in salt water, but they will not hatch in fresh water. They usually hatch 2 or 3 days after they are placed in water. When brine shrimp

first hatch, they are extremely small and orange in color, but they can be seen swimming around in a vial held up to the light.

Students at this age are probably familiar with the basic differences between plants and animals, but they can benefit from attempting to list other characteristic differences. For example, animals are capable of moving around on their own, while plants are not; animals must eat food in order to survive, while plants make their own food from carbon dioxide and water in the presence of light; most animals make sounds, while scarcely any plants do; and although plant and animal shapes vary, most animals have heads, bodies, and legs, while most plants have leaves, stems, and roots.

### ▼ Activity Sheet 1

#### Mystery Objects

##### Session I

1. Describe the mystery objects. They are small, round, and brown.
2. Today's date is \_\_\_\_\_
3. Describe your setup. Draw it on the back of this sheet.  
We put some mystery objects in a vial with fresh water. We put others in a vial with salt water. We are waiting a few days to see what happens. Drawings should resemble Figure 1-1.
4. **Predict:** Do you think the mystery objects are eggs that will become animals or seeds that will become plants?  
Answers will vary.  
Do you think they will grow in salt water or in fresh water?  
Answers will vary.

##### Session II

5. Describe the mystery objects after several days.  
In the fresh water: Nothing happened.  
In the salt water: Tiny animals are swimming around.
6. Circle the correct answer.  
The mystery objects are plants, animals.
7. Describe the mystery objects now.  
They are tiny animals with little legs and feelers. They move fast in the water.

## Guiding the Activity

### Session I

- 1 Write *seed* and *egg* on the board. Ask students, **What is the difference between a seed and an egg?**

Tell students that you will be giving them some mystery objects to observe. Explain that they will be trying to discover whether these mystery objects are the seeds of a plant or the eggs of an animal.

Give a copy of **Activity Sheet 1** to each student. Distribute two vials with eggs, a vial holder, and a magnifier to each team of two. Explain that they will use their magnifiers to view the contents of the vials.

Demonstrate how to use the magnifier, if necessary.

Tell students to examine the mystery objects through the magnifying lenses and then describe them in step 1 on the activity sheet.

- 2 When all the students have had time to observe the mystery objects, have them place the vials in the vial holder and set them aside. Remind them that these objects are either seeds or eggs, and ask, **Can you tell by looking at them which they are?**

### Additional Information

*Most students should be able to say that **eggs** grow into animals, while **seeds** grow into plants. Review with students the various animals that hatch from eggs.*

*Tell students not to open the vials.*

*Demonstration procedure: Hold your thumb about 20 cm (8 in.) away from your eyes. Looking at your thumb through the largest lens, move the magnifier slowly back and forth until your thumb is in focus. Explain and demonstrate to students that to focus the image through the smaller lenses, you must move your thumb closer to your eyes.*

*In the course of their observation, students may hold the vials up to the light and tilt them in order to see how the objects move. Be sure the caps are on tight, and remind students not to remove them.*

*Students will probably say no. However, if the word egg evokes an image of a bird's egg in some students' minds, they may say the objects are too small to be eggs. You may need to tell them that some animals have very tiny eggs.*

## Guiding the Activity

Explain that it is not always possible to determine whether such tiny objects are seeds or eggs simply by looking at them. Ask, **How might you be able to find out whether these are seeds or eggs?**

Lead students to understand that many kinds of eggs and seeds will grow if placed in water for a few days.

Tell students they will now perform an experiment to try to find out what these objects are.

3

Write *fresh water* and *salt water* on the board. Ask students, **Which kind of water would you find in the ocean? Which kind of water would you find in a stream?**

Explain that water from most lakes and wells and from all rivers, streams, brooks, and creeks does not have salt in it and is therefore called **fresh water**, while water from the oceans and a few inland lakes has salt and other minerals in it and is known as **salt water**. Tell students that some living things prefer fresh water and others prefer salt water.

Ask, **What do you think you could do to try to grow these mystery objects?**

Distribute three pieces of masking tape and a felt-tip marker to each team and have students label one vial *fresh*, the other vial *salt*, and their vial holder with their team members' names. Write today's date on the board and tell them to write it on each vial label.

Tell students to remove the caps from the vials carefully so the mystery objects do not spill out, and then have them fill one of the vials three-quarters full of salt water and the other vial three-quarters full of fresh water.

## Additional Information

*Answers will vary, but students may suggest letting the mystery objects grow and seeing what they become.*

*Most students will know that ocean water is salty and water in brooks and streams is not, though the term fresh water may be new to some.*

*Students may suggest placing some of the objects in fresh water and some in salt water and watching to see what happens. Be sure students understand that they need to experiment with both kinds of water.*

*The caps should still be on the vials at this point.*

*Have students record the date in step 2 of the activity sheet as well.*

*Depending on your class, you may want to*

- *have students obtain the water themselves at the distribution stations*
- *distribute the water yourself*
- *have any available adults, or capable student volunteers, fill the vials with the water at the distribution stations*

## Guiding the Activity

Demonstrate how to place the caps back on the vials securely, and check that the caps are firmly down all the way around the vials.

Have students put their labeled vials in their vial holders and set them aside on their desks. See Figure 1-1 for the completed setup.

- 4 Write *predict* on the board, and explain that to **predict** means to guess, based on previous experience, what will probably happen in a certain situation.

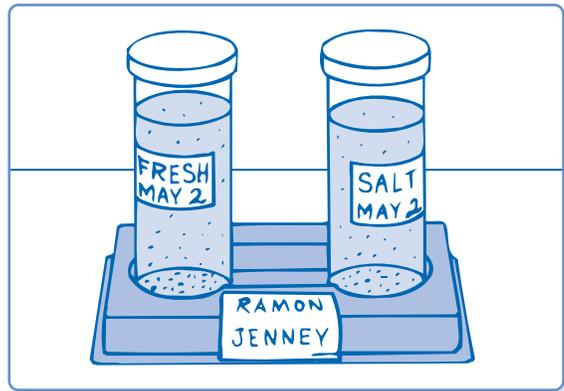
Have students describe and draw their experiment setup in step 3 on the activity sheet. Then they can make their predictions by answering the two questions in step 4 on the activity sheet.

- 5 Allow time for students to complete the Session I portion of the activity sheets, and then collect them for later use in Session II. Have students place their vial holders in the area of the classroom you have previously selected where the vials will be protected from direct sunlight and intense heat.

Collect the magnifiers and return them to the kit along with the roll of masking tape and the bag of salt. Rinse and air dry the droppers before returning them to the kit. Discard the extra salt water and fresh water.

- 6 Announce that at a certain time each day during the next several days you will distribute the magnifiers and ask students to observe the objects in their vials closely.

## Additional Information



▲ Figure 1-1. Setting up the experiment.

*Some students may be overly concerned about making the wrong predictions. Assure them that scientists always make predictions without knowing whether they will be right or wrong and that it does not matter if they turn out to be wrong.*

*If desired, set up a classroom culture of brine shrimp in your container of salt water by sprinkling in some of the extra eggs.*

## Guiding the Activity

When students have begun to notice brine shrimp swimming in the salt water, schedule Session II.

### Session II

- 7 Give students their activity sheets and distribute to each team of two their vial holder with vials and a magnifier.

Have students observe the vials closely, using the smallest lens on the magnifier (see Figure 1-2), and have them complete their activity sheets.

- 8 Ask, **Do you see plants or animals in the water? How can you tell which they are?**

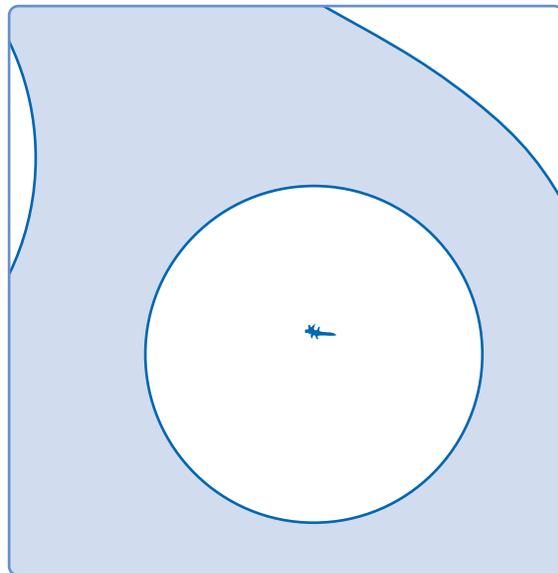
Ask, **Were the mystery objects seeds or eggs?**

Write *brine shrimp* on the board and tell students that **brine shrimp** is the name of these animals. Explain that the animals are actually tiny relatives of the shrimp that people eat.

Ask, **Did the brine shrimp eggs hatch in the fresh water or in the salt water?**

## Additional Information

*Since the brine shrimp are tiny, some students will miss them at first. Encourage them to hold the vials up to the light or against a piece of white paper and look closely for anything new and different in the water. Coach students, as necessary, in how to use the strongest magnifying lens.*



▲ Figure 1-2. A magnified brine shrimp.

*Since the brine shrimp are swimming around, most students will probably say that they must be animals.*

*Since they turned into animals, they must have been eggs.*

*The brine shrimp eggs hatched only in the salt water.*

## Guiding the Activity

Explain that the term *brine* refers to salt water. Ask, **What do we know now about the mystery objects?**

When all students have had a chance to observe the brine shrimp, have them place their vials in the vial holders and set them aside.

- 9** Post the Plant or Animal? chart where everyone can see it and ask, **How many differences between plants and animals can you think of?** As students suggest characteristics of plants and animals, write them on the chart, as shown in Figure 1-3.

- 10** Have students observe the brine shrimp every day for a week as they grow.

## Additional Information

*The mystery objects were eggs that hatched in about 2 or 3 days into animals called **brine shrimp**. Brine shrimp eggs hatch in salt water but not in fresh water.*

*Ask questions to elicit responses, if necessary. Accept any suggestions students may offer but allow disagreement and encourage discussion among students to correct any errors.*

Plants	Animals
do not move around by themselves	move around on their own
make their own food	eat food
are green	are many different colors
(usually) have leaves, stems, and roots	have heads, bodies, and (usually) legs
never make noises on their own	sometimes make noises on their own

▲ *Figure 1-3. Possible student responses.*

*As the shrimp get larger, students will be able to see their body parts more clearly.*

## REINFORCEMENT

On a bulletin board, have students post pictures that illustrate the contrasting characteristics of plants and animals.

## SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

## CLEANUP

Leave the Plant or Animal? chart up. Have students remove and discard the labels from the vials and holders. Empty, wash, air dry, and return the vials and caps to the kit. Replace the vial holders and magnifiers in the kit.

## Connections

### Science Challenge

Give each team a small paper cup containing 2 spoonfuls of dry yeast; do not tell students what the material is. Have them examine the material with a magnifier and describe what they see. (*Safety Note:* Emphasize that they should not taste this or any other unknown material.) What do they think the material might be? Eggs, like the brine shrimp eggs? Plant seeds? A nonliving material, like sand? Ask students to suggest a way to find out. They might suggest putting some of the material in fresh water and some in salt water to see if it will hatch, as the brine shrimp eggs did, and planting some in soil to see if it will grow, like a plant. Suggest another possibility: put some in a solution of sugar and water. Guide teams through these tests. Students will discover that the material does not sprout in soil and does not hatch in fresh or salt water. However, in a sugar solution, the material produces foam. Then explain that the material is yeast, which is made of tiny living things that begin to grow when they are mixed with water and sugar. As they grow, they produce a gas that makes foam.

### Science Extension

Help students set up experiments to test the effect of various conditions on the hatching or longevity of brine shrimp. First guide students in identifying the conditions that could be tested: the amount of salt in the water, the temperature of the vials, the amount of light the vials receive, and the number of brine shrimp eggs put into each vial, for example. Then lead students to describe a possible procedure for each experiment, and write the procedures on the board. To test the effect of temperature, for example, students could put one vial in a cold place, one in a very warm place, and the third in the “normal” location. Monitor students as they work to make sure each team keeps all other conditions (variables) the same for all its vials. Let each team report its procedure

and results to the rest of the class. Guide the class in identifying the “best” conditions for brine shrimp hatching and growth.

### Science and the Arts

Ask students to find a picture they like in any book with full-color photographs. Tell them to look very closely at the colors and shapes in the picture. Then invite them to reexamine the picture with a magnifier. They will discover that the picture is made of hundreds of tiny dots of different colors and that different-colored dots are combined to produce other colors. A bright goldenrod yellow area, for example, has red dots in it as well as yellow dots. Without the magnifier, our eyes see the combined colors.

### Science and Social Studies

Ask each student or team to list as many kinds of seeds as they can think of that people eat, either whole or processed to make different products. In a follow-up class discussion, let students share their lists. If students did not recognize some foods as seeds (rice, for example), point these out to them.

### Science, Technology, and Society

- ▶ Provide magnifiers of different sizes, shapes, and magnification powers, and let students use them to examine newsprint and various objects, including granular materials such as sand and salt. You also might want to provide a microscope, a pair of binoculars, and a telescope for them to try.
- ▶ As appropriate, encourage supervised use of the Internet for research projects related to plant and animal life cycles and populations. A list of related websites is provided in the References and Resources section.