Observing Your Brine Shrimp

Background:

Brine shrimp are one of the few organisms which can live in the Great Salt Lake under normal conditions. They feed on algae, and are noticeable in the lake from about April to September. They hatch from tiny eggs (150 can fit on the head of a pin!) which float on the surface of the water. Eggs laid in the fall are dormant until conditions are right, usually in the spring. It appears that Great Salt Lake brine shrimp eggs need temperatures above 43 °F for hatching. Although the live shrimp in the lake die off in the colder months, winter eggs have been known to remain viable for more than 25 years. During the warmer months, the eggs are hatched within the females, who subsequently give birth to live brine shrimp called nauplii. Nauplii undergo several molts before they reach adulthood. They feed on algae and bacteria. The males possess large frontal appendages for grasping the female during mating. The females have an egg pouch located on the abdomen.

Brine shrimp in the lake can tolerate a fairly wide range of salinity, from near saturation to as low as 3%. They regulate their internal osmotic pressure (the amount of dissolved salts within their cells) by absorption and secretion through the gills. Although low salinities (5% or lower) have been used to raise brine shrimp in the laboratory, the shrimp don't do particularly well in the lake when the salinity is that low. According to research done by Dr. Orlando Cuellar of the University of Utah in 1982, the problem is not the ability of the shrimp themselves to tolerate low salinities. It appears to be changes in the algal community (the food source for the shrimp), resulting from the salinity changes, that have the greatest detrimental effect on the brine shrimp. At low salinities, predators of the brine shrimp do well, also impacting the shrimp population.

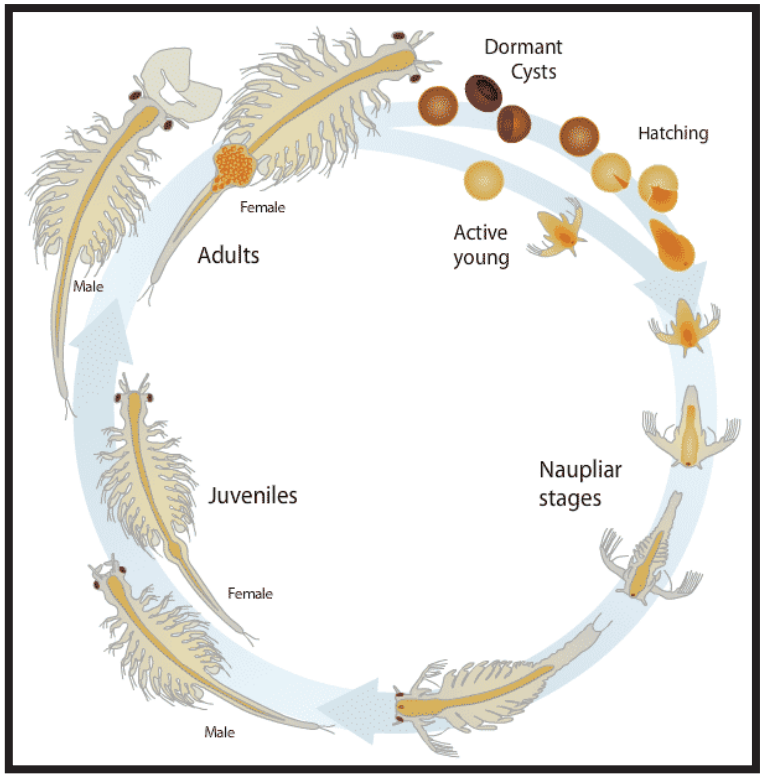
Brine shrimp are an important part of the Great Salt Lake ecosystem, providing food for millions of migrating birds. Each year, commercial shrimpers remove billions of brine shrimp eggs from the Great Salt Lake for use as fish and prawn food. Much of this harvest is sold to prawn farmers in the Orient and to pet stores, creating a multi-million dollar industry.

Protocol:

1. The salinity of the Great Salt Lake has varied from about 9% to 25%. Let students test the viability. of brine shrimp eggs in containers with differing salinity. Have them do further tests, varying other factors such as light and temperature. Which factors seem to be most critical to the hatching of the eggs? Which are most important to the survival of the shrimp after hatching?

2. Transfer hatched eggs to containers of water with differing salinities. What is the range of salinity that the shrimp can survive in?

3. Research adaptations of other animals to salty aquatic environments (e.g., crabs, seabirds, marine iguanas, fish, etc.)



Brine Shrimp Observation Sheet

Before Hatching the Eggs:

1. Examine the brine shrimp eggs with a magnifying glass. Sketch an egg in the box:

2. What Happened to the brine shrimp eggs when you placed them in the salty water?

3. During the next week, what do you think will happen to the eggs in the salty water?

4. What do you think will happen to the eggs in the water that has no salt

After the Eggs Have Hatched

1.Did the eggs in every container hatch? **YES** **NO**
If no, which ones did not hatch and why do you think they didn't?

2. Examine the newly hatched shrimp with a magnifying glass or microscope. Sketch one in the box:

3. Describe how they are moving through the water:

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When the Shrimp are About 1/4" Long:

1. Describe how the shrimp are moving through the water:

2. Use a pipette to remove a brine shrimp from the bottle. Place it on a slide to observe it under a microscope, or place it in a small, clear container and observe it with a hand lens. Draw a picture of the brine shrimp in the box below:

3. What do the brine shrimp in your container eat?

4. What do brine shrimp in the Great Salt Lake eat?

5. What animals like to eat brine shrimp?

6. Draw a food chain, including a brine shrimp.