BIO LAB:
Dead or Alive

TEACHER

LEVEL: Year 7 | TOPIC: Classification | TIME REQUIREMENT: 50 mins

CURRICULUM ALIGNMENT

- *Identify, research and construct questions for investigation; propose hypotheses; and predict possible outcomes (ACSBL030)*
- *Conduct investigations, including microscopy techniques, real or virtual dissections and chemical analysis, safely, competently and methodically for the collection of valid and reliable data (ACSBL032)*

BACKGROUND

Classification is a method of organisation that allows us to group things based on their attributes and defining characteristics. Organisms can be grouped in this way based on similarities, differences and evolutionary origins. By classifying organisms, we are able to better understand them in relation to one another. Prior to classifying something, it is paramount to first determine if that thing is dead or alive. Some organisms can be very deceptive and give all appearances of not being alive at all. This dormancy allows plants and animals to conserve energy until better environmental and weather conditions allow them to grow again. Commonly referred to as Sea Monkeys, Artemia belong to the phylum Arthropoda Class Crustacea and thrive in saline environments. They are able to avoid predators, such as fish by living in waters with an extremely high saline concentration. The large feathery gills they possess allow them to effectively pump excess salt and carbon dioxide out of their bodies. Artemia excrete highly concentrated urine through their maxillary glands. Artemia egg production comes in two forms. Artemia usually produce thin shelled eggs which develop steadily and then hatches. During inhospitable conditions Artemia produce thick-shelled eggs. In this method of egg production, the embryo development halts at a key stage and can survive for years before environmental conditions induce further development and hatching.

In this practical, students have the opportunity to study the hatching of dormant Brine Shrimp eggs. Students are tasked with preparing a suitable environment for the Artemia and conducting observation on their development. Viewing the cysts and Artemia under the microscope, students have the chance to practice basic observational skills. Artemia hatching is perfect for introducing classification and cryptobiosis into the classroom.

METHOD - STUDENT PRACTICAL

Observing the Cysts

1. Place a single cyst on a cavity microscope slide.
2. Place a coverslip on top and examine the specimen closely under the microscope.
3. Observe their appearance. Draw what you see.
4. Note whether the cysts move.
5. Shine a torch light on the cyst and observe whether it moves.
6. Examine the specimen closely and inspect for any evidence of reproduction.

Observing the Hatched Eggs (Artemia)

1. Create a saline solution by stirring coarse salt into tap water with a ratio of 20g salt to every 600ml of water. Make enough solution to fill your aquarium tank.
2. Attach the aquarium tubing to the air pump.
3. Attach an air stone to the open end of the tubing.

MATERIALS

- Aquarium Tank (or similar)
- Air Pump, Aquarium Tubing and Air Stone
- Salt
- Brine Shrimp Eggs
- Light Source
- Pipettes
- Fine Mesh Net
- Stereo Microscope
- Microscope Cavity Slides

TEACHER TIP

To make the concept of dormancy more relatable, ask students if they have ever wondered how specific flowers are always abundant during special holidays. Plants are often made artificially dormant through chilling to ensure they flower on relevant holidays, such as Valentine's Day.

SAFETY PRECAUTIONS

- Wear appropriate personal protective equipment (PPE).
- Wash your hands thoroughly before and after working with any organisms.
- Know and follow all regulatory guidelines for the disposal of laboratory wastes.

SOUTHERN Biological

4. Turn on the aquarium pump. With the aid of the air stone, bubble air into the water until all the salt has dissolved.
5. While aerating, gently pour up to 1.5g of Brine Shrimp eggs into the solution.
6. Position a lamp over the tank. Hatching will occur within 24-36 hours at 27°C. Alternatively, the eggs will hatch within 48 hours at room temperature (21°C).
7. After 30 minutes of the eggs hatching, use a clean spoon to push down floating eggs or any that have attached to the lip or sides of the tank.
8. To remove the Artemia, remove the air stone and tilt the solution at an angle. The live Artemia will naturally fall to the bottom of the container separating from the egg shells that float to the surface. Collect the live Artemia with a pipette or fine net.
9. Using a pipette, place a few Artemia on a cavity microscope slide. Place a coverslip on top and examine the specimen closely under the microscope.
    - Observe their appearance. Draw what you see.
    - Note whether the Artemia move.
    - Shine torch light on the Artemia and observe whether it moves.
    - Examine the specimen closely and inspect for any evidence of reproduction.

OBSERVATION AND RESULTS

Student drawings of the Artemia under the microscope should appear like the image below.

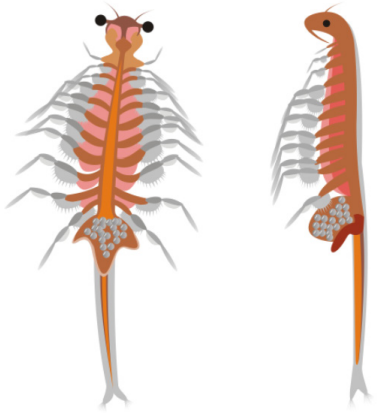

Figure 1: Artemia Carrying Eggs

- The cysts are small and brown in colour with a chorion coating. Hatched Artemia bodies are divided into head, thorax, and abdomen and are covered by a thin, flexible exoskeleton of chitin. They are a primitive arthropod that has a segmented body with broad leaf-like appendages. The total length is approximately 8–10 millimetres.
- The unhatched eggs will not move, but once hatched, the shrimp will swim.
- Cysts will not respond to light; however, If you expose Brine Shrimp to light they will swim toward it (Phototaxis).
- Males have whiskers under their chins; females don't. You can often see males locked together, fighting for the attention of female shrimp. If two Brine Shrimp are locked together and one of them doesn't have whiskers, then the Brine Shrimp are likely to be mating. Females will develop a pouch when they're pregnant, but they don't need to mate to become pregnant. They can fertilize their own eggs via a process known as parthenogenesis.

INVESTIGATIONS

- Discuss Cryptobiosis (suspended animation) and how this has been illustrated through the activity.
- Commence a discussion regarding the life cycle of Artemia salina, their anatomy and how this relates to other Crustaceans.
- Ask students to identify characteristics that are required for organisms to cope in high saline environments.
- A key learning of this practical is to understand suspended animation and dormancy.
- Task students to investigate other organisms that can appear dead.