Brine shrimps - the lowdown

Brine shrimps (*Artemia*) are amazing little salt lake creatures that can light up a classroom and provide, with little maintenance, an opportunity for live animals to be kept in schools.

At SSERC we started our brine shrimp population when we received the Wellcome Trust *Survival Rivals* free experiment box *Brine Date* [1]. Our shrimps flourished and we ran workshops to try and help teachers and technicians to get the most out of the practical in the classroom. Through the workshops and also feedback from teachers on other courses we found out that some schools were having trouble maintaining their brine shrimps or had not yet been able to set up a tank.

This article offers some suggestions and information for technicians and teachers to maximise the populations of brine shrimps in school. Although the basic information given in the Brine Date box is very useful and the set up information is easy to follow, we present a few extra hints and tips to ensure the brine shrimp tank is kept in prime condition.

Maintain a food source for your brine shrimps

Dunaliella salina is the algae used in this kit and it can be grown up simply on the window sill. You will need a starter culture of the algae, available from Sciento www.sciento.co.uk, (*A115 Dunaliella salina* from £6.85 plus p+p) or you can get replacement algae from Philip Harris www.philipharris.co.uk (Product Code *B8R03075* £12.95 plus VAT and p+p). We found that the algae grow best in *Marine Algae* culture media, also available from Sciento (*K13 Marine Algae Medium* £6.20 plus p+p). Using this you can be flexible in the feeding regime, grow up algae continuously, then subculture and retain for future use. We found the algae grew best on the window sill and lasted around a month or so before needing to be sub-cultured on to new media (40 cm^3 algae to 200 cm^3 marine algae media). The brine shrimps should be fed around 40 cm^3 algae per week. As a rough guide, only add algae until a light green tinge appears in the tank (Figure 1). If too much is added you may get an algal bloom which can kill the shrimps. You can easily take samples from your tank to check quality and quantity of algae under the microscope. We have also used another algae *Tetraselmis suecica*, available from Sciento (*A324* £6.85 plus p+p) to feed the brine shrimps which grew well under the conditions described above. If you do not have the resources or time to maintain algal cultures you could feed the brine shrimps solid food such as Mikrozell (follow feeding instructions carefully).

Figure 1 *- Brine shrimp tank with a hint of algae growing.*

Stir tank at least once a week

Stirring the tank helps re-circulate nutrients which fall to the bottom, dislodge algae which have settled on the sides and bottom and helps to aerate the tank. The tank looks a bit murky after this but soon clears after the feeding frenzy.

Keep a constant temperature under a light-bank to ensure population growth

The brine shrimps prefer a constant temperature and this can be easily maintained by placing the tank under a light-bank (Figure 2). The optimum temperature is around 22-30°C which allows the brine shrimp population to flourish. By keeping the temperature above 25°C you can ensure fast life cycles and maximum populations [2]. The distance between the lamp and the tank can be easily adjusted to increase or decrease the temperature. Our tank is at 23°C in the winter and 26°C at other times and the brine shrimps have been very productive at these temperatures.

Figure 2 *- Tank under a light bank*

Put a lid on the tank

A clear lid (Figure 3) will prevent evaporation under the warm light-bank and stops unwanted visitors getting into your tank. An A3 laminating sheet put through the laminator makes a very simple but effective lid. If the tank has no lid there will be a considerable amount of evaporation, which will affect temperature and salinity. Do not top up with new sea water as this will increase the salinity. In the case of water lost through evaporation just add distilled or chlorine free water to the tank as the salt is still dissolved in the remaining water.

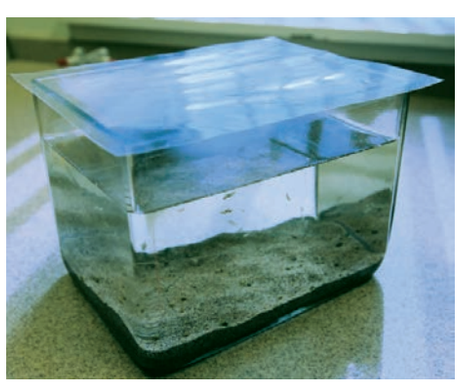


Figure 3 *- Use a lid on the tank.*

Brine shrimps - the lowdown

Making the most of Brilliant Brine Shrimps in the classroom

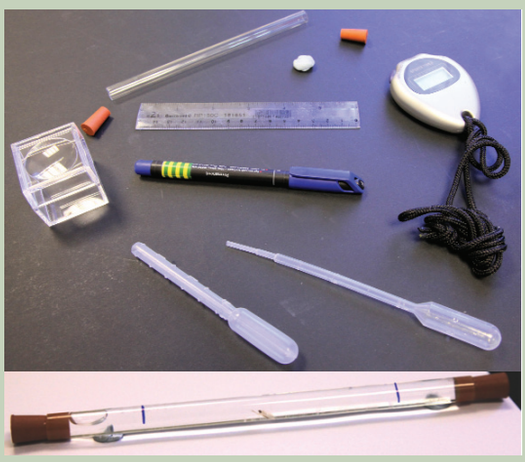
Brine Date - sexual selection in action	Brine shrimp Bottle Ecosystem	Speedy shrimps - how fast can they go?
		
This experiment was inspired by Darwin and developed by Wellcome to celebrate Darwin 200.	Create a complete mini-ecosystem in a bottle and investigate food chains, population cycles and nutrient cycling.	A novel way to learn about measuring speed and developing investigation skills, while finding out if all shrimps are equal?
Free, downloadable resources: www.survivalrivals.org (includes instructions)	Free, downloadable resources: www.science3-18.org (search for "brine shrimps")	Free, downloadable resources: www.science3-18.org (search for "speedy shrimps")

Table 1 *- Brine shrimps can be used for many excellent practical activities. Follow the links for more details. Each practical is referenced to CfE experiences and outcomes.*

Clean out the tank

We have only had to completely clean out the tank once so far (after six months of operation) as the brine shrimps were feeding on the sludge that had built up at the base of the tank. The sludge was getting caught between their legs this was stopping them from feeding and moving, and it caused their eventual demise. Overfeeding and lack of attention had caused this, so beware of this happening to you. To clean the tank, remove some of the tank water and put it in a large beaker. Rescue all the remaining shrimps by using a fine tea strainer and place them in the beaker, strain the rest of tank water and remove debris. Wash the shell and sand thoroughly before re-introducing water and the surviving shrimps. If necessary add some freshly-made seawater to top up the tank.

If your school does not have the Survival Rivals Brine Date kit, there are plenty of options available to start up a brine shrimp tank from scratch. Eggs and marine salt can be bought from a local aquarium shop and Sciento stock a Brine Shrimp Kit (*ZK19 Biobred Brine Shrimp Culture Kit* for £22.60 plus p+p [3]). This Biobred kit comes with comprehensive instructions and everything you need (apart from a tank) to get your brine shrimps going.

The method is slightly different from the Brine Date instructions, but this is a great kit for the money. Also, if you need an instant supply of brine shrimps Sciento sell them in a tub with enough algae to feed them for a week (*Z175 Artemia salina* adult brine shrimps ca. 100 for £10.85 plus p+p). This population could also be used to start off a long term population.

Rock Salt Solution

Finally a tip from an expert whom we have worked with closely over the years - John Watson from Strathclyde University's Faculty of Education, who has developed working protocols for Brine Shrimp cultures. He has been working with Saxa "Rock Salt" as an alternative to the expensive synthetic sea salts and found that his populations are thriving in this 'additive-free' salt water. To read John's full protocol see our www.science3-18.org website (search for "brine shrimps protocol"). Thanks to John for all his help and support with brine shrimp cultures and sharing his ideas with us.

Sources of brine shrimps and equipment

All information on "Brine Date" downloadable from www.survivalrivals.org, well worth looking at.

"Brine Date" Kit available from Philip Harris www.philipharris.co.uk (product code B8R02980 £49.95 plus VAT and p+p)

Brine Shrimp Kit, algae and media available from www.sciento.co.uk.

Antioxidants: Tastes good, good for you?

Introduction

Our bodies contain billions of molecular cells that are joined together by bonds. When these bonds are broken the cells transform into harmful free radicals. Although this happens naturally in our metabolic systems it is thought that environmental factors such as pollution, stress and lack of sleep can increase the concentration of free radicals in our bodies.

These free radicals are unstable and will attack healthy molecular cells which will in turn produce even more free radicals. This chain reaction is known as oxidative stress and is thought to contribute to arthritis, premature aging, hardening of the arteries and increase the risk of cancer.

Antioxidants help to stop this chain reaction by donating their electrons to free radicals without themselves being converted into more free radicals. This is known as the oxygen radical absorbance capacity (ORAC) test. Foods can be placed in order of their ORAC rating. The larger the number the more able the antioxidants is to stop the oxidative stress of the molecular cells. [1]

This would indicate eating more of these foods would improve our health and well being and it has been reported some 40% of women and 30% of men are taking these supplements and spending over £333 million per year on them. However studies involving 230,000 women and men in 67 cases have shown that there is no convincing proof that antioxidants can make you healthier. [2]

The following practical investigation can engage pupils in the research and discussion of media items with regard to the so called “superfoods" in healthy diets and their subsequent impact on modern life.

It can be linked to the following experiences and outcomes from The Sciences in a Curriculum for Excellence : -

Local aquariums will stock brine shrimp eggs, Mikrozell, aquarium tanks and pumps and marine salt or are available online from reputable stores.

Light banks can be purchased from www.progrow.co.uk T5 Light Wave 54 W Four Tube (20000 lumen, L = 1200 mm, W = 350 mm, D = 60 mm) Ref. 4265 - £125.01 plus VAT and p+p), and www.blades-bio.co.uk Plant Grow Lighting System 55 W Four Double Tube (L = 600 mm W = 320 mm D = 100 mm, product code ACS300 £140 plus VAT and p+p).

Local DIY superstores and IKEA will stock desk lamps for illumination and clear plastic boxes which could be used as tanks.

Top tips on maintaining your populations

- Feed regularly - as described above. Maintain water temperature between 25°C - 30°C - maximises population, preferably under a light bank.
- Stir tank regularly to help circulate the nutrients and aerate the tank.
- In general, it is a case of setting up your brine shrimp system following these guidelines, but it may take a little trial and error to get a system that suits your particular school and resources available. Please get in touch with us if you have any problems with setting up your brine shrimp system.

For further information contact gordon.moore@sserc.org.uk

‘Brine shrimp bottle ecosystem’ and *‘Speedy shrimps’* are adapted from the book *Brine Shrimp Ecology* by Michael Dockery and Stephen Tomkins.

This book is full of excellent ideas for brine shrimp practicals and can be downloaded free. [4]

References

1] - www.survivalrivals.org

[2] - Brine Shrimp Ecology (2000) Dockery, M., Tomkins, S, published by the British Ecological Society. This is free to download from - http://www.britishecologicalsociety.org/educational/brine_shrimp/index.php

[3] - http://www.sciento.co.uk/catalog/item/515/

[4] - http://www.britishecologicalsociety.org/educational/brine_shrimp/index.php