🧂 =Brine shrimp or no brine shrimp

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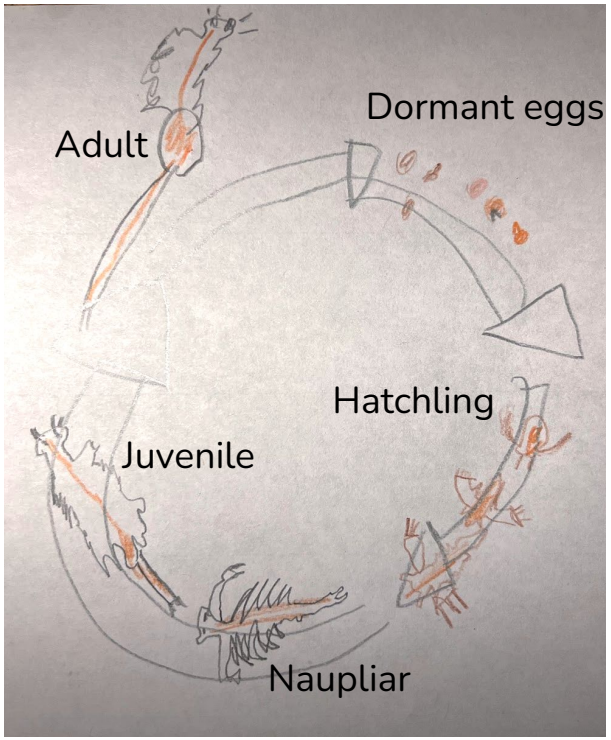
Background and Bibliography



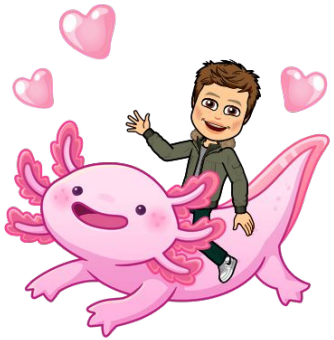
Brine Shrimp Life Cycle

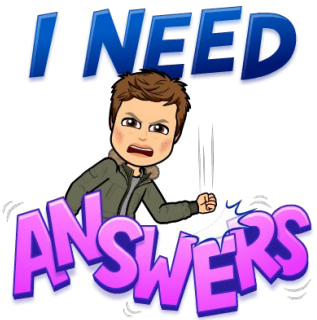
- Brine shrimp are crustaceans that live in saltwater like the ocean or the Great Salt Lake.
- The life cycle of a Brine shrimp is simple, they start as eggs and if the living conditions are right they will hatch within 18-36 hours (If not they will go dormant)
- Then they (After 12 hours) will molt then they will molt several more times and become an adult, this can happen in less than 8 days!
- Brine shrimp are commonly used as fish food. Sometimes they are sold as pets called sea monkeys. Since the eggs can be dormant, they can be shipped and stored.
- Over 2000 metric tons of brine shrimp eggs are sold every year!

1. https://www.education.com/science-fair/article/salt-concentration-hatching-shrimp-eggs/
2. https://www.weather.gov/jetstream/seawater
3. https://wildlife.utah.gov/gslep/about.html
4. Lifecycle picture based on: https://wildaboututah.org/the-brine-shrimp-of-great-salt-lake/

Motivation and Testable Question

I selected this project because I am interested in starting an aquarium with a betta fish or an axolotl. They eat brine shrimp, so I would need to raise them. People who hatch brine shrimp should know the ideal conditions so they don't waste their money on too much salt or eggs that don't hatch. Also, I am visiting Salt Lake City this summer and want to know more about the ecosystem of the Great Salt Lake.





What is the ideal salinity of water for brine shrimp eggs to hatch?

Potential risks/Safety plan

Potential risks

- Salt in my eyes.
- Harming animals.
- Getting water on the device.

Safety Precautions

- I will wear safety goggles to protect my eyes when I am mixing chemicals.
- I will not be harming any brine shrimp (animals) because the eggs won't hatch if the conditions aren't right for them. None will die. I will use a range of salt that is within their natural habitats. When I am done with my experiment I hope to feed them to my new Betta fish and Axolotl!
- I will keep my device away from the water.

Prediction

The Great Salt Lake where brine shrimp live has around 50‰* salinity in the spring when the eggs hatch, so I think that is ideal for them. I will also try the average salinity of the ocean (35‰) and what the package of eggs suggests (20‰)

**Sea water salinity is measured in grams of salt per liter. 1 mL of water has 1g of mass, so 1L has 1000g. Scientists use this sign: ‰ which you read "per mille" and means out of 1000 (instead of %, which is out of 100)*

Variables

<u>Independent variable</u>
Salinity of the water

<u>Dependent variable</u>
Number of eggs that hatch

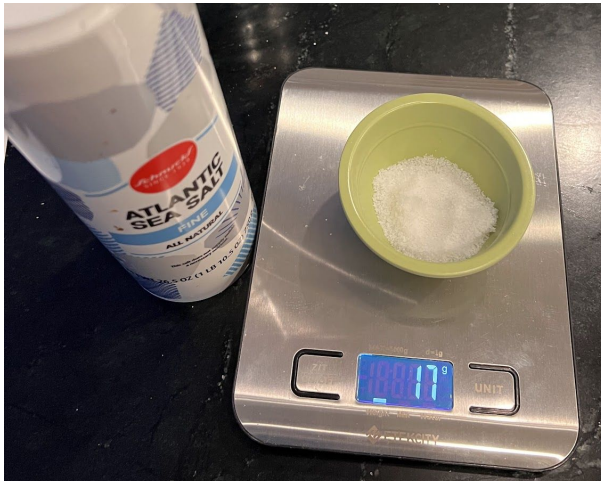
<u>Constant Conditions</u>

- Water source
- Amount of water per jar
- Mass of eggs (and food) per jar
- Jar material (glass) and shape
- Temperature and sunlight

Procedure

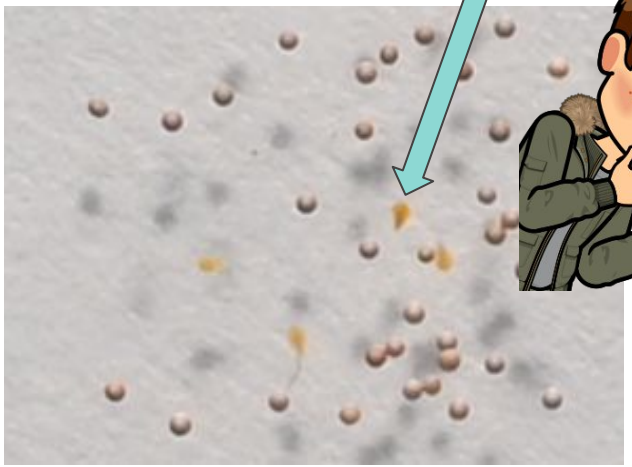
1. Place 500mL tap water in each jar.
2. Add enough salt for each salinity AND LABEL THE JARS:
    a. 20‰ salinity (10g/500mL)
    b. 35‰ salinity (ocean water, 17g/500mL)
    c. 50‰ salinity (Great Salt Lake, 25g/500mL)
3. Let the jars rest for 24 hours with the lids off to dechlorinate and come to the same temperature
4. Aerate water by agitating with spoon

5. Mix packet of eggs and food thoroughly and add 2 g per jar
    Count hatched eggs at 12, 24, 36, and 48 hours (3 samples for each jar at each time point)
    a. Stir each jar before sampling
    b. Draw 10 mL sample from each jar and place into each petri dish
    c. Using magnifying glass, count the number of hatched brine shrimp and record in data table
    d. Return sample back to source jar
    e. Wash all equipment and dry before next sample time
6. At the end of the experiment, adjust water/salt levels to the ideal salinity so all of the eggs can hatch



Samples

12 hours - dormant eggs (cysts)



36 hours - eggs and hatchlings

48 hours - hatchlings

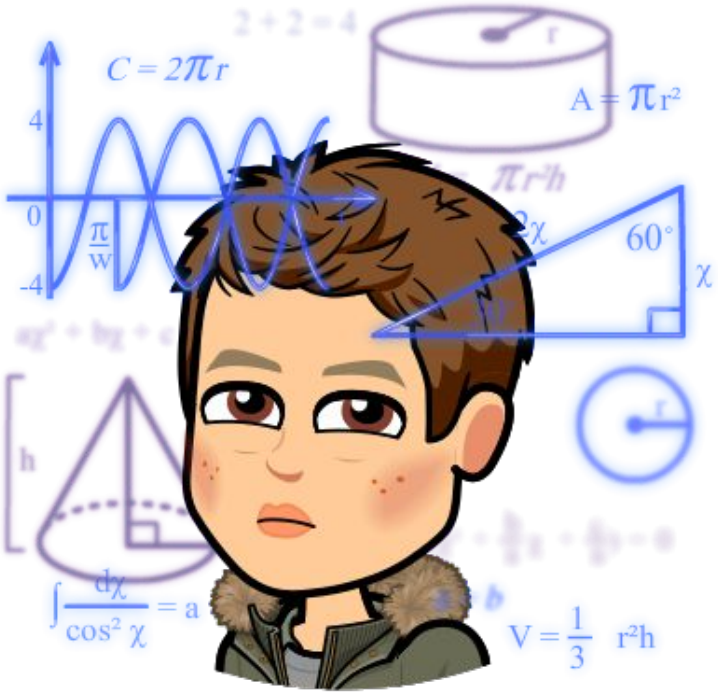
Data table

Average count of hatched eggs at each time

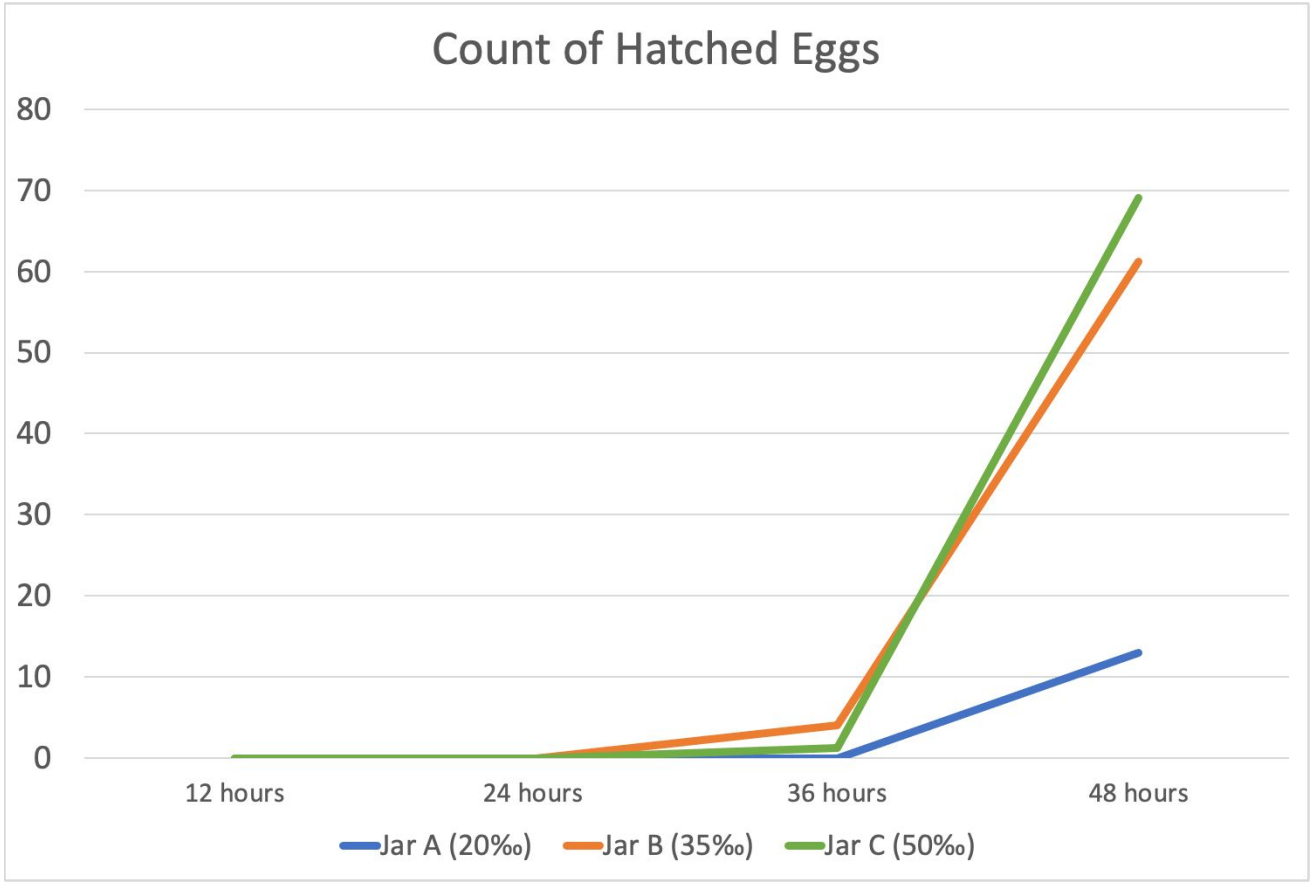
(3 samples were taken at each time point, raw data are in the log book)

	12 hours (Sat 8a)	24 hours (Sat 8p)	36 hours (Sun 8a)	48 hours (Sun 8p)
Jar A (20‰)	0	0	0	13
Jar B (35‰)	0	0	4	61.2
Jar C (50‰)	0	0	1.3	69

Most brine shrimp count



Data Graph


Count of Hatched Eggs
80
70
60
50
40
30
20
10
0
12 hours
24 hours
36 hours
48 hours
Jar A (20‰)
Jar B (35‰)
Jar C (50‰)

Conclusion and reflection

- So, now we know that 50‰ is the ideal salinity for brine shrimp hatching, but 35‰ is also pretty good
- Something I thought we could do better was that we could put in fewer eggs in to make it easier to count
- I was surprised that the baby shrimp moved so fast
- Maybe we should notify the company so they can change the recommended amount of salt! I am surprised that they do not use the salinity of the brine shrimps' natural habitat.