

The Effects of Pollutants (zinc, lead, and aluminum) on *Nerita Melanotragus* and Water Quality

Lab Notebook



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## Procedure

1. 3 1-gallon fishbowls, snail food, and snails were purchased
2. Each bowl was 3/4 filled with filtered water at [add specific temperature according on snail natural habitat]
3. Hands were washed before handling pennies; see [CDC Handwashing Protocol](#)
4. In the 1<sup>st</sup> bowl 50 pennies were added to the water  
Hands were washed before handling foil see CDC hand washing protocol  
<https://www.cdc.gov/handwashing/when-how-handwashing.html>
6. In the 2<sup>nd</sup> bowl 90 sheets (ripped up) were added to the water
7. The 3<sup>rd</sup> bowl was left with just water
8. Hands were washed when handling the snails. See [CDC Handwashing Protocol](#)
9. All snails were left in the 3<sup>rd</sup> bowl for a week to adapt to living conditions
10. The snails were divided evenly between the 3 bowls
11. The snails in the penny bowl were colored with red, black, and white nail polish
12. The snails in the foil bowl were colored blue, purple, and pink nail polish
13. The snails in the water bowl were colored yellow, green, and orange nail polish
14. The snails were placed into their corresponding bowls
15. Hands were washed when handling snail food. See [CDC Handwashing Protocol](#)
16. Each snail was observed, and fed (place how much food here) each day
17. At the end of each week data of water quality was taken and recorded
18. The water of each bowl was tested according to the WQI using [Bebapanda Water Test Strips](#)
  - a. The water strips tested the following, - pH - Hardness - Lead - Iron - Chromium/Cr(VI) - Bromine - Nitrate - Nitrite - Fluoride - VC - Calcium - Free Chlorine - Total Chlorine - Carbonate Root- Cyanuric acid
19. The strips were dipped into the water for 2 seconds
20. The strip was removed and held horizontally for 1 minute
21. Data was collected based of the results of the strips
22. The process of steps 12-14 was continued for [4] weeks
23. The data was organized into tables shown below

### Materials

- 6 freshwater snails *Nerita Melanotragus*: put snails in water, feed snails everyday (Top Fin sinking algae thins)
- 30 pennies: all placed in one bowl
- 3 ft<sup>2</sup> sheet of foil: cut up, place into another bowl
- 3 fishtanks: fill 1/2 (4¼ cups) with water, put 2 snails in each bowl, but coins in one bowl and foil in another, leave the third bowl with just water
- Aqua Culture: Aquarium Gravel
- Snail food: feed to snails (Top Fin sinking algae thins)
- Water test (WQI): take samples of water and test according to the WQI ([Bebapanda Water Test Strips](#))
- Notebook: record observations of snails



## Data Analysis

Data was collected each day for the snails and each week for the water. The water went through various tests of parameters shown in tables 3-6. Snails went under daily observation with notes being recorded to then be added to tables 1-2. Snail behavior like eating habits, movement, and whether or not they were in their shell was focused on in their analysis.

## Data Tables

The 3<sup>rd</sup> WQI parameters table 5

	Water Tank	Foil Tank	Penny Tank
copper	0	0.5	10+
hardness	50	50	120
pH	8.2	6.8	9
ammonium chloride	250	250	250
carbonate	120	40	240
total alkalinity	180	40	240
cyanuric acid	10	10	10
residual chlorine	0.5	0	0
lead	0	0	200

The 2<sup>nd</sup> WQI parameters table 4

	Water Tank	Foil Tank	Penny Tank
copper	0	0.5	3
hardness	50	50	250
pH	7.6	7.2	8.2
ammonium chloride	250	150	150
carbonate	80	120	240
total alkalinity	120	120	240
cyanuric acid	10	10	10
residual chlorine	0.5	0	0
lead	0	0	20

The 1<sup>st</sup> WQI parameters table 3

	Water Tank	Foil Tank	Penny Tank
copper	0	0	1
hardness	50	25	50
pH	7.2	7.6	7.2
ammonium chloride	250	250	250
carbonate	80	80	80
total alkalinity	80	80	120
cyanuric acid	0	10	10
residual chlorine	0.5	0	0
lead	0	0	0

Snail behavior table 2

Week 1

	Water Tank	Foil Tank	Penny Tank
Location	varies	mid level	half way out of water
eating habits	eats most of the palet	eats some of palet	eat some of palet
moving habits	move almost constantly	move along the walls	stay in one spot

Week 2

	Water Tank	Foil Tank	Penny Tank
Location	2-3 .	2-3.	level 0 (dead)
eating habits	eats some of the palet	eats some of palet	no eating (dead)
moving habits	move daily	move daily	stay in one spot (dead)

Week 3

	Water Tank	Foil Tank	Penny Tank
Location	level 0 (dead)	2-3.	level 0 (dead)
eating habits	no eating (dead)	eats some of palet	no eating (dead)
moving habits	no movement (dead)	barely move from day to day	stay in one spot (dead)

## Observations



- Snail behavior
- Looks
- Stuff to put in tables
- Notes
- Etc.

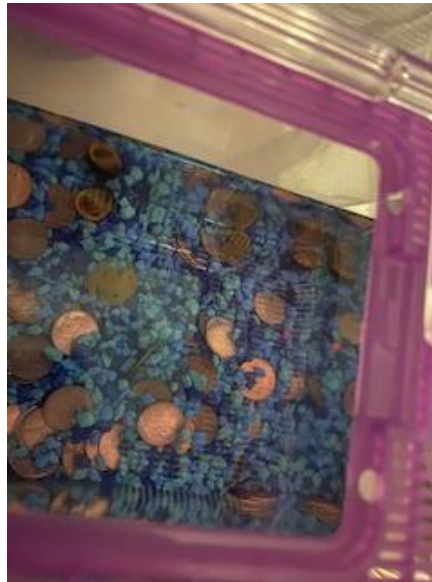
Week #1

- Day 1:
  - snails are slow,
  - adjusting to new environment.
  - Feed 1 tablet in the morning.
- Day 2:
  - more of the same.
  - Don't ever eat the whole pallet of food.
  - More movement around the tank in varying levels the same behavior among all tanks
- Day 3:
  - more movement.
  - Still not eating all the food, a lot left over.
    - Should I skip a day of feeding? Same behavior still.
- Day 4:
  - Levels still vary among all snail tanks
  - Less movement but still change location by the end on the day
  - Water is becoming a little murky for all tanks
  - Still left-over food
    - From the beginning of the week?
- Day 5:
  - In the coin tank 1 snail was on level 3.5 (halfway out of water)
  - Still left-over food
  - Coin tank is showing rapid results in terms of snail behavior
    - Pollutants from coins can cause faster "killing" harm to sea creatures
  - More permanent location among all tanks
    - Change comes day to day now
- Day 6:
  - Both coin snails are on level 3.5
  - The rest of the snails are in different locations each
    - On occasion I can see foil snails close together, almost on top of each other
  - Still left-over food
  - Murky water remains
    - Getting more noticeable
- Day 7:
  - At 12:14 am one of the snails in the coin tank was found dead.
    - Flipped on its back



- Under side shows colors of red, looks shrunk
- Murky water is concerning among all tanks (including plain water)
  - Too much water for 2 snails to clean?
- All snails are in the upper levels of tank (2.5 and up)
- Water test was taken
  - The pollutants don't seem to be affecting pH, alkaline, or free chlorine as they were all the same
- At 7:14 am the last snail of the coin tank was found dead

No more data can be collected from the coin tank except water tests which will continue



week #2

- day 1:
  - levels:
    - water: 1&3
    - foil: 3
- day 2:
  - levels:
  - water: 2&3
  - foil: 3
- day 3:
  - levels:
    - water: 3
    - foil: 3
- day 4:
  - levels:
    - water: 3
    - foil: 3
- day 5:
  - levels
    - water 2.5 &3
    - foil 3
  - notes:
    - water level seems to be going down. Why?
    - Water is murkier still and beginning to show muck (in both tanks)
- Day 6:
  - Levels:
    - Water: 3
    - Foil: 3
  - notes
    - I cant change the water for that will ruin the purpose of the experiment however I fear that the snails wont survive in still water with their own filth accumulating before any results can be found in the foil tank
- Day 7:
  - Levels
    - Water 2
    - Foil 3
  - notes

- The foil tank is noticeably murkier than the water tank and I take it as good news.,

### Week 3:

- Day 1:
  - Levels:
    - Water: 3
    - Foil: 3
  - Notes:
    - Both the water and foil tank snails were nearly on top of each other. Not the first time but still a rare occurrence. I wonder what that means.
- Day 2:
  - Levels:
    - Water: 2 and 2.5
    - Foil: 2 and 2.5
- Day 3:
  - Levels:
    - Water: 0
    - Foil: 3 and 2
  - Notes:
    - At 7:01am the first water snail (tinker bell) was found dead
    - At 7:21 am the second (and last) water snail (turbo) was also found dead
    - Their deaths were very different than the penny snails: instead of the red and small underside of the penny snails, the water snails under side looks white and bloated this is how it looked minutes before death as well (while they were sticking to the wall of the tank). Their last recorded levels were 3 and 2 which is very different than the copper snails' levels before death.
    - The water snails' death poses many questions
      - How did they die in comparison to the penny snails?
      - My prediction to their deaths is starvation. They wouldn't eat prior to death.
- Day 4:
  - Levels:
    - Foil: 3 and 1
  - Notes:
    - The levels of the remaining scales have been very out of character for these snails. Last week they were glued to the 3<sup>rd</sup> level
- Day 5:
  - Levels:
    - Foil: 3 and 2
  - Notes:
    - Water is still murky.
    - The snails are in one corner of the tank and have been for past days

- They barely move and I wonder if this has anything to do with their health
- Why do they stay in one corner and nearly on top of each other?
  - This is similar to the position of the water snails at the time of their death.
  - Why is this different from the death of penny snails.
- Day 6:
  - Levels:
    - Foil 3 and 2
- Day 7:
  - Levels:
    - Foil: 3

#### Week 4:

- Day 1:
  - Levels:
    - Foil: 3
- Day 2:
  - Levels:
    - Foil: 3
  - Notes:
    - Movement across tank today

