

# The Effect of Tire Wear Micro-Particles on The Photosynthetic Function and Morphology of *Chlorella Vulgaris*

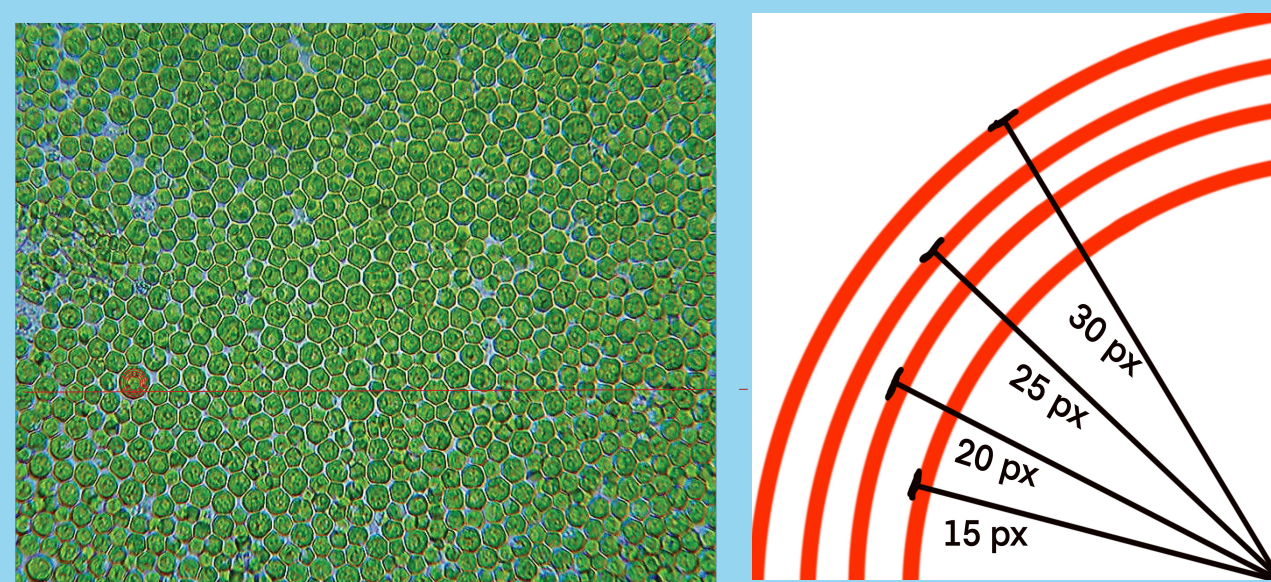
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## Project Statement

As the levels of microplastics (specifically tire wear particles -TWPs) in aquatic environments continue to increase, the question remains: how do these particles impact the ecosystem? The effects of microplastics on freshwater ecosystems are important because understanding the potential impacts TWPs have on algae will facilitate an understanding of how microplastics may impact humanity. This project will investigate how TWPs affect the photosynthetic rate of *C. vulgaris*. Specifically, measuring optical density and microscopic cell size will be used to evaluate the potential effects of TWPs. Concentrations of TWPs used will be consistent with those currently in the environment. If TWPs and algae interactions are similar to other microplastic interactions studied, we expect a decrease in photosynthetic function and an increase in cell size and damage.

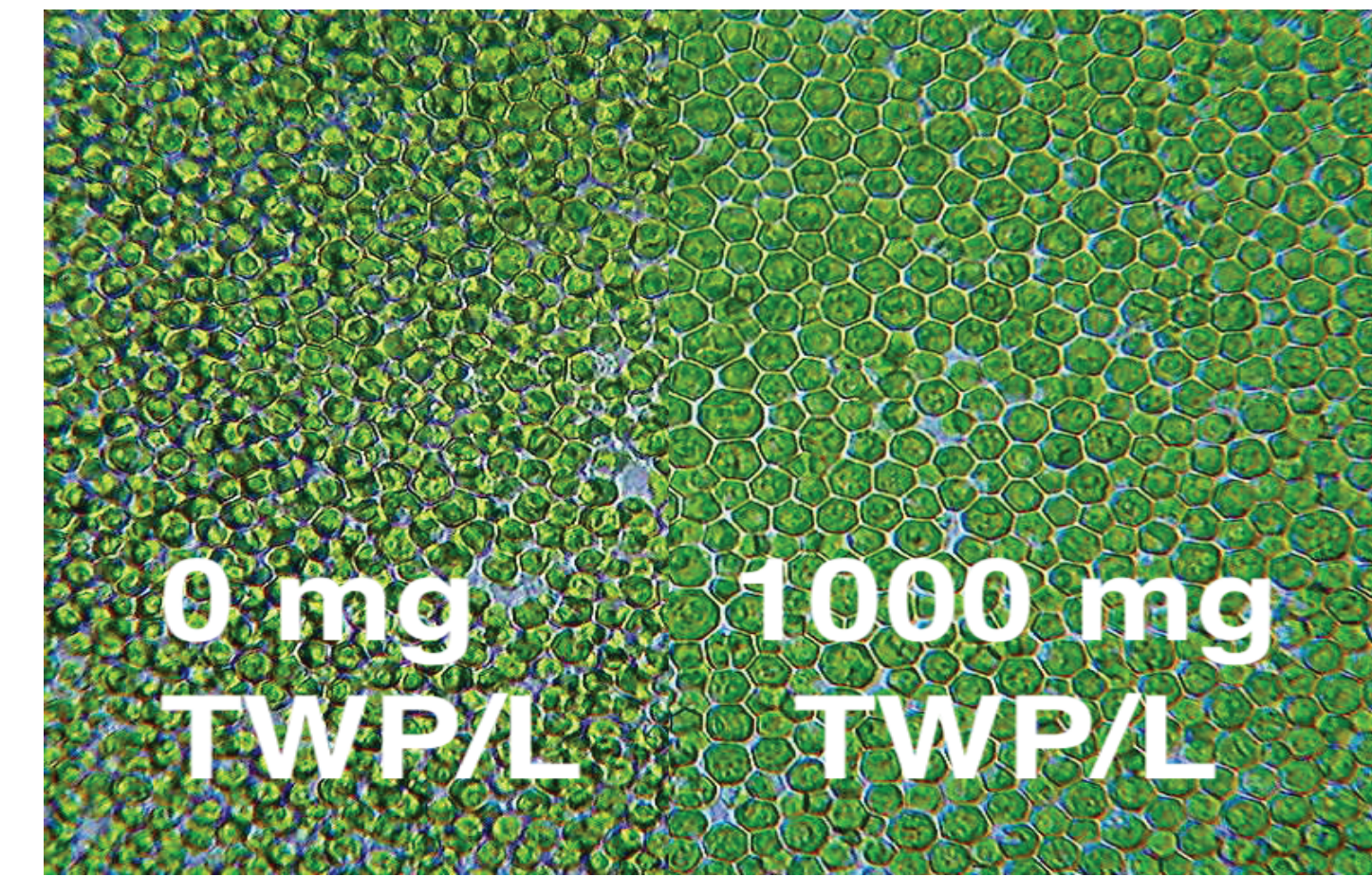
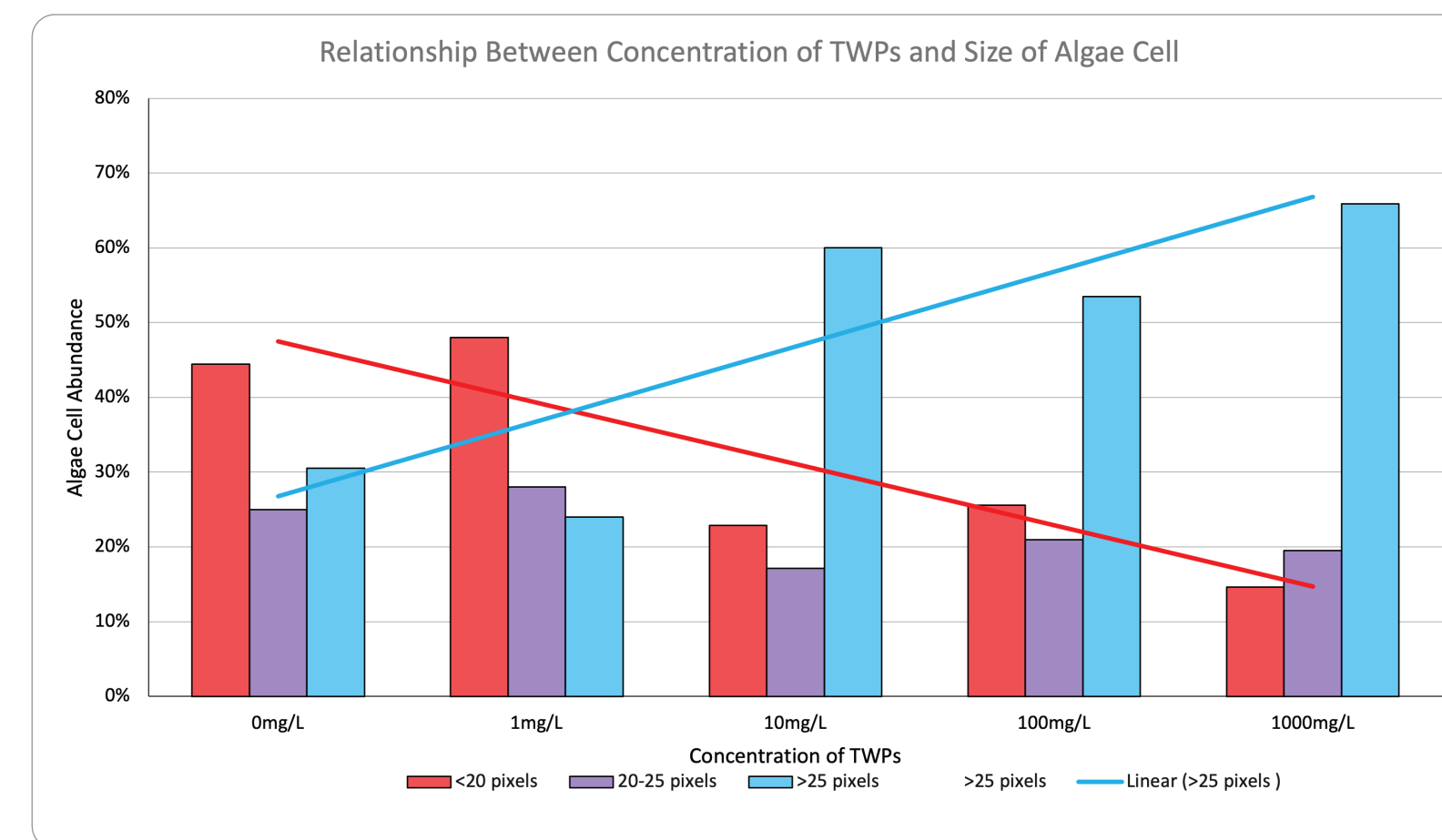
## Methods

The experiment method comprised growing algae in a nutrient media under controlled conditions, while tire wear particles were collected using a rotational wire brush. These particles were then introduced into the algae cultures at varying concentrations. Optical density measurements, pH measurements and dissolved oxygen measurements, and microscopic images of algae cell size and shape were taken for the experimental results. Throughout the procedure, sterile technique was used to mitigate contamination risks.



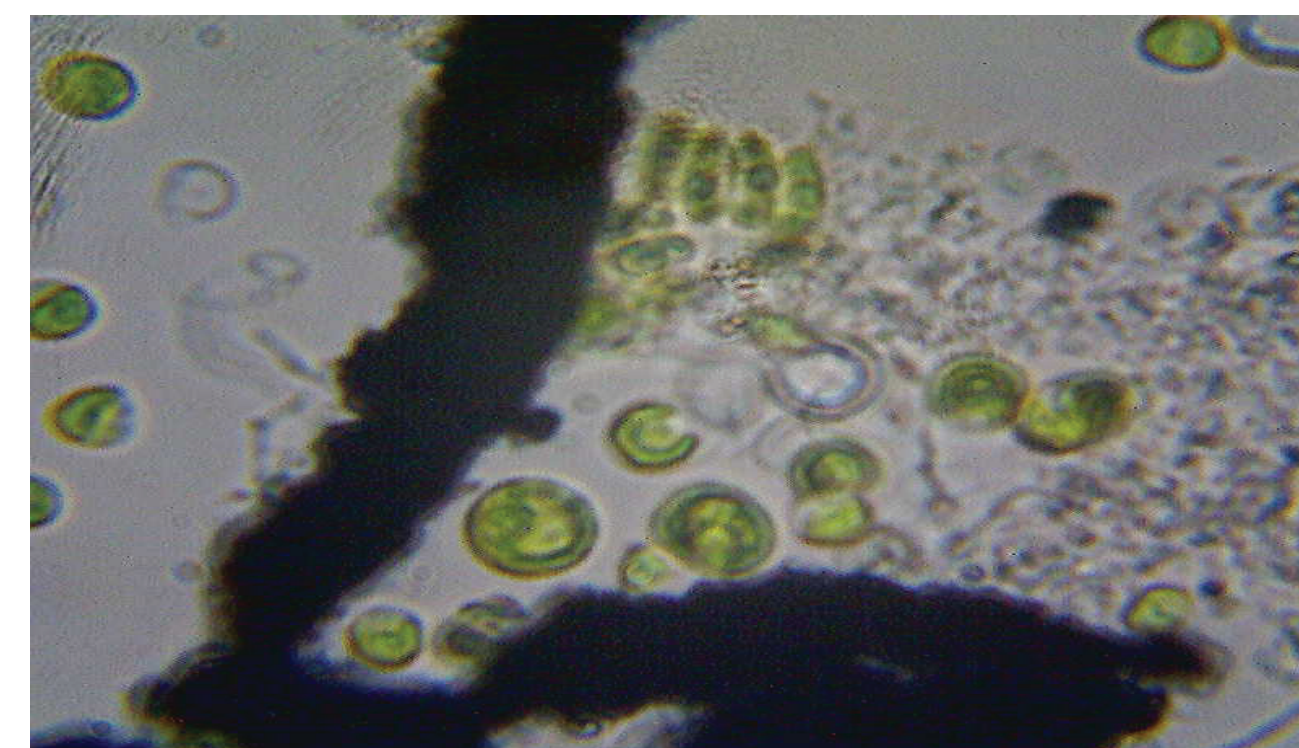
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## Tire Wear Microplastics Negatively Affect Algae Cell size



Algae cells expand and swell when exposed to high concentrations of TWP.

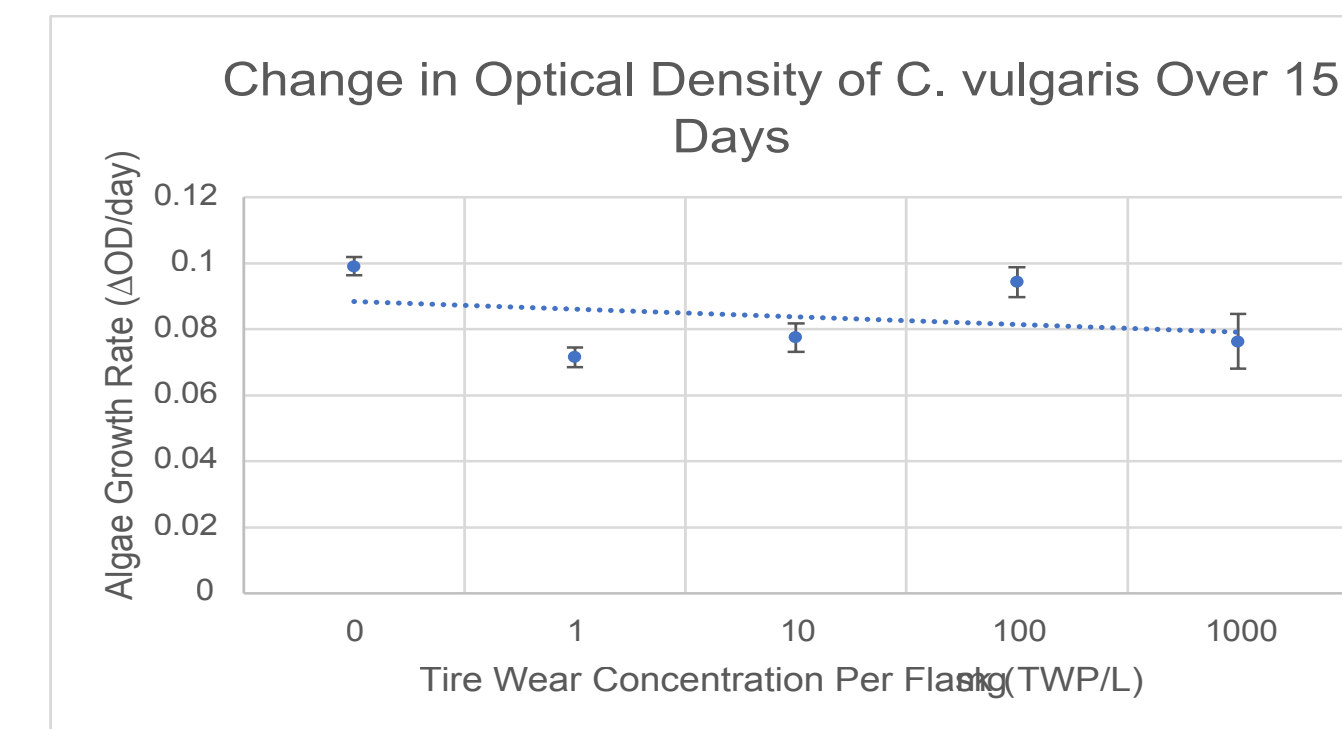
## Cell morphology



Algae with 1000mg/L of TWP microscopic images show abnormal cell shapes, enlarged vacuoles due to the toxic environment, and ruptured cells.

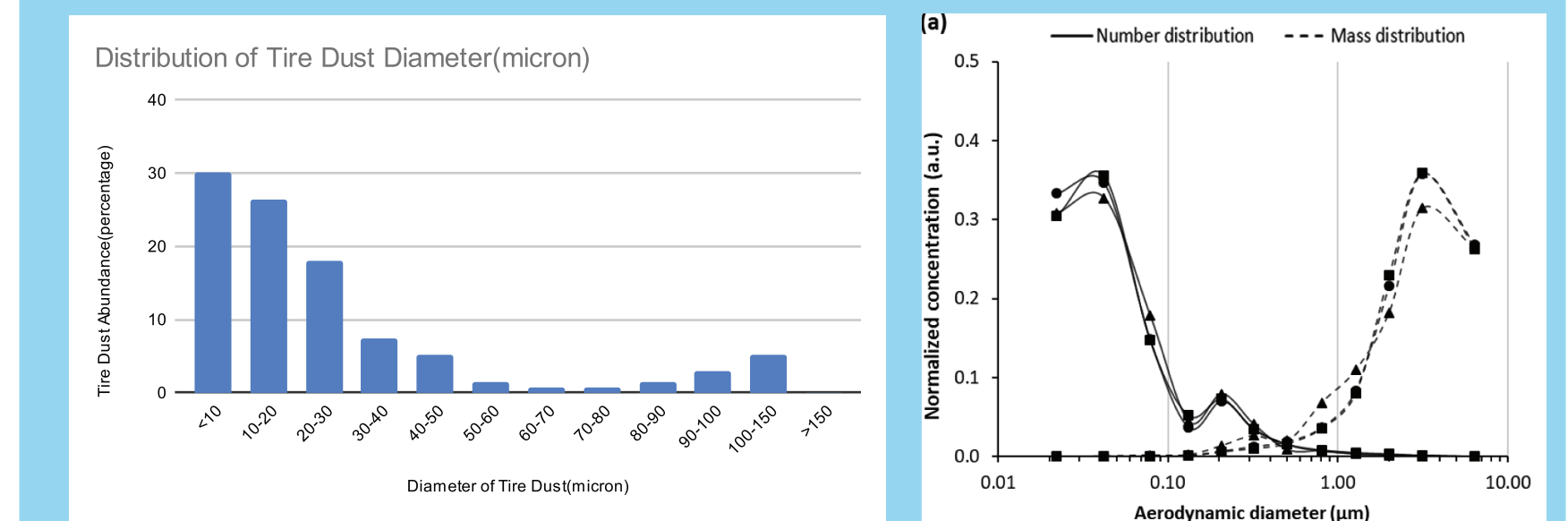
The results show at high concentrations of TWP, the algae cell size expanded, there were abnormal cell shapes and cell damage, and an overall slower growth rate, which all contribute to the conclusion that TWP negatively impact *C. vulgaris* algae cells.

## Cell growth



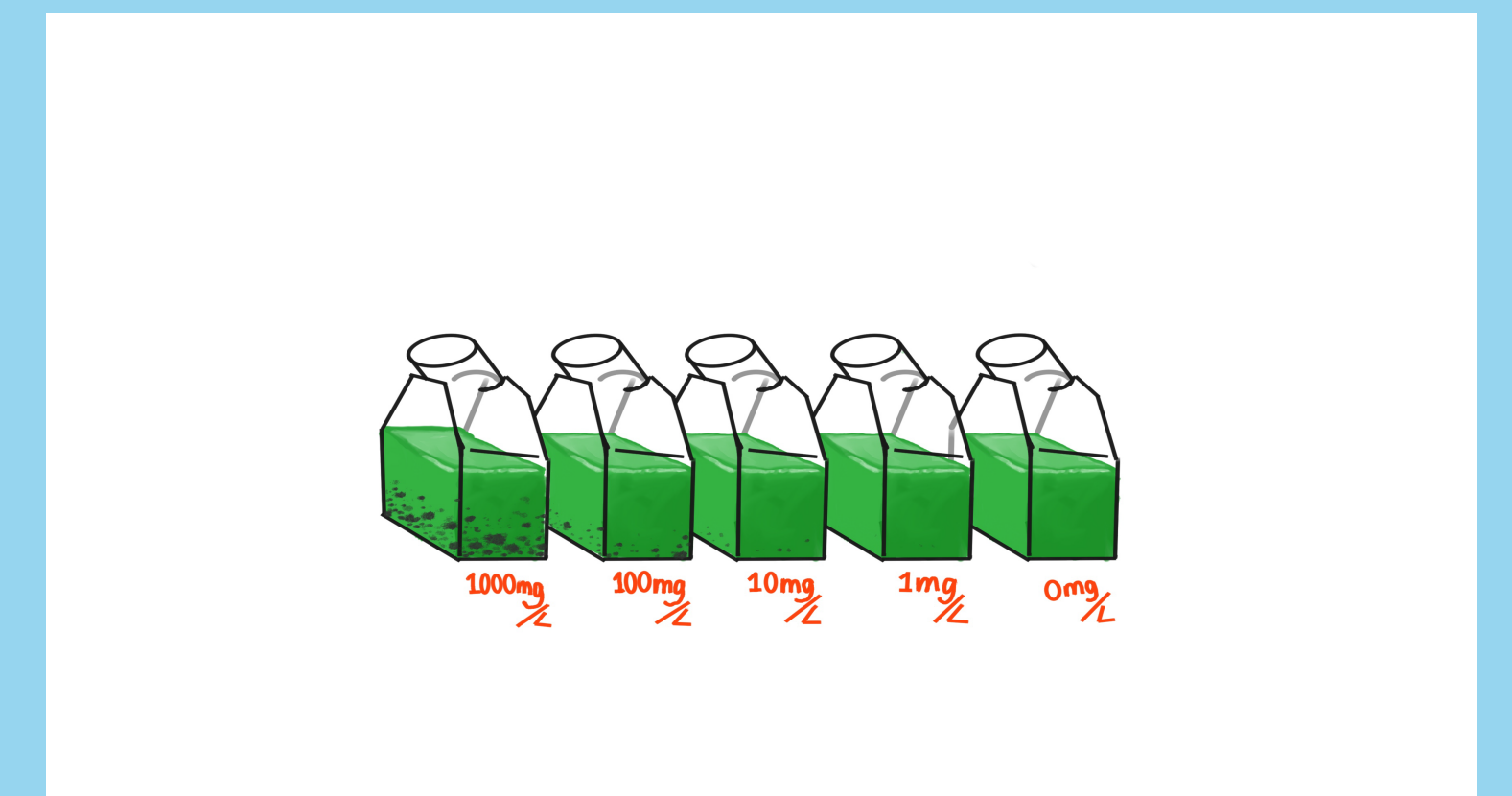
High concentrations of TWP decreased the growth rate of the algae, which is shown through the decreased growth slope.

## TWP Size Classification



(A. Beji et al., 2020)

## Experimental Design



## Acknowledgements

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## Selected References

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