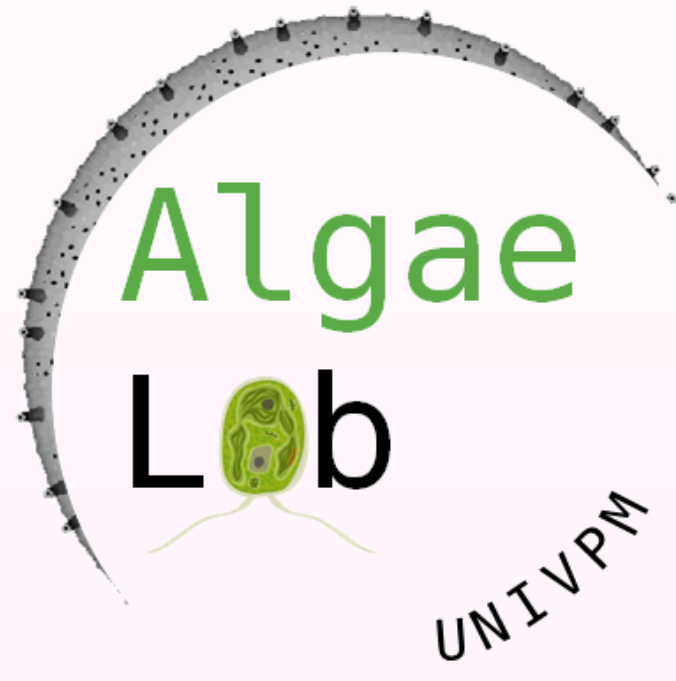




# An algal tale: the story and physiology of a microalgal consortium



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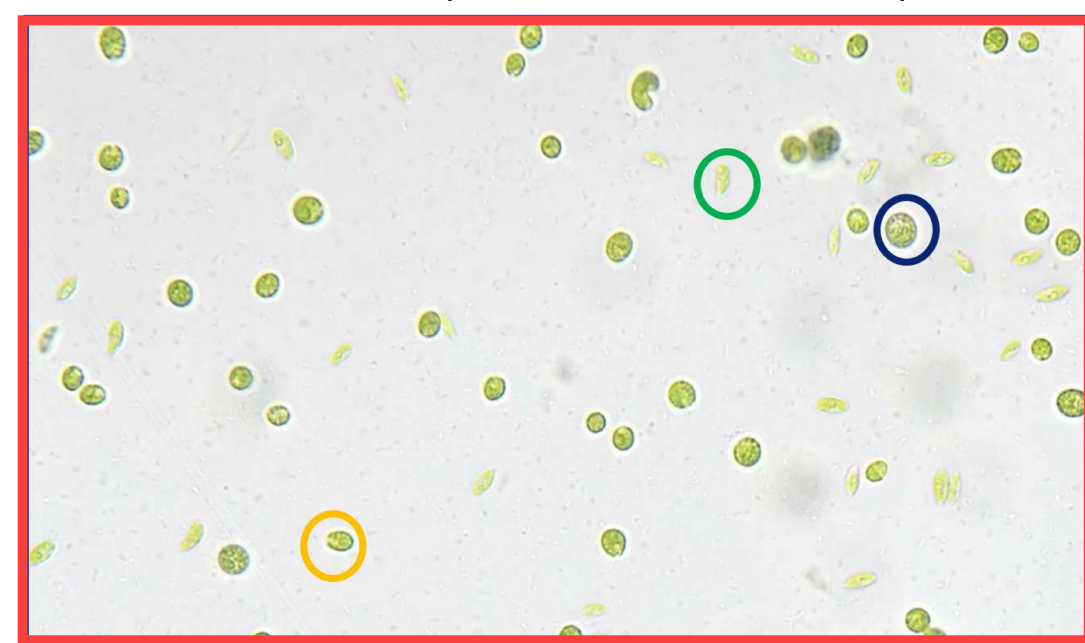
Tutor: Prof. Norici

## CHAPTER 1: THE BIRTH OF THE ALGAL CONSORTIUM

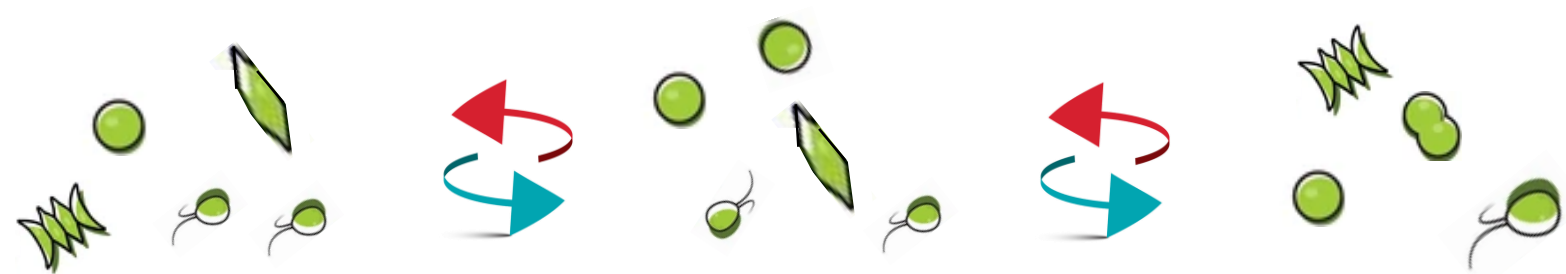
Once upon a time

there were three chlorophyta: *Tetrademus obliquus*, *Chlamydomonas reinhardtii* and *Auxenochlorella protothecoides*.

These three microalgae were selected because of their renowned remediation capacities and growth performances. When grown in a synthetic digestate (rich in N-NH<sub>4</sub> & P-PO<sub>4</sub>) monocultures showed lush growth and high remediation. But was there a way to even improve these results? And so, the algal consortium was born!

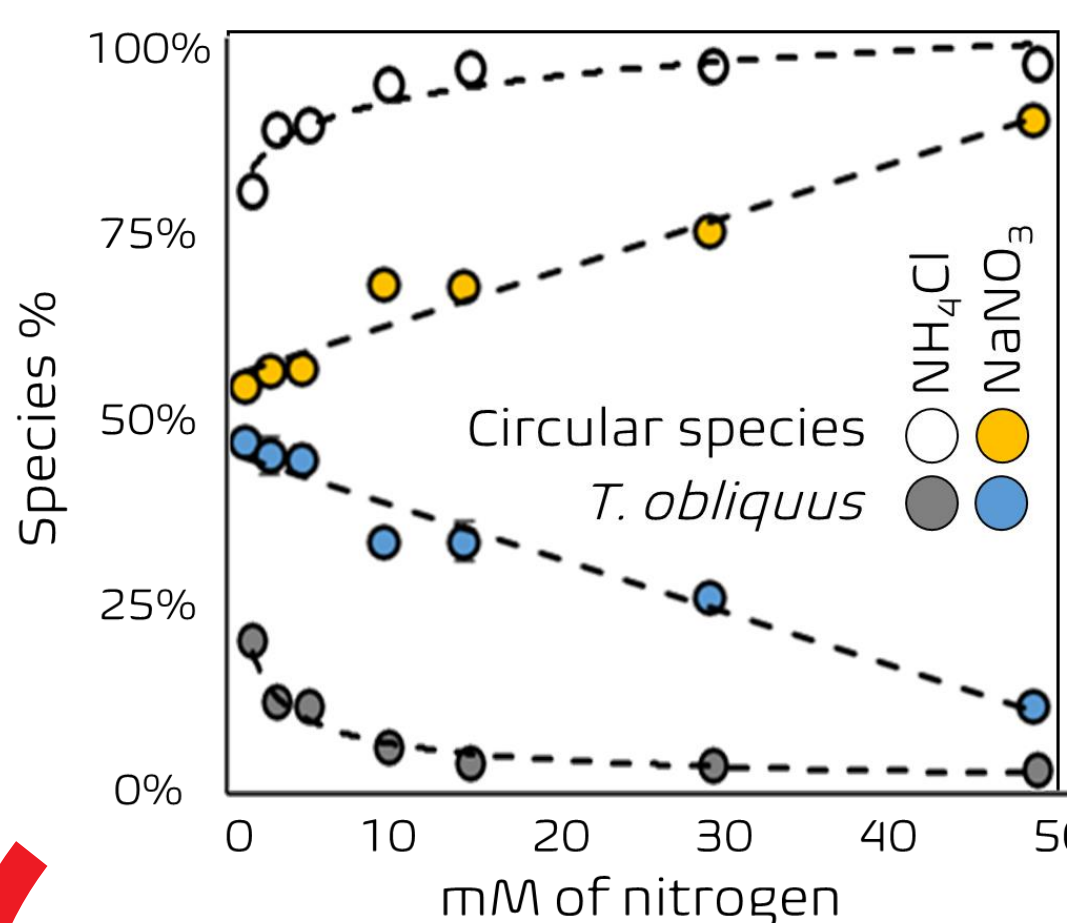


The consortium

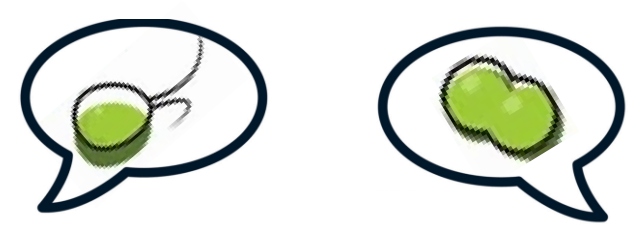


## CHAPTER 3: A FLEXIBLE CONSORTIUM

Can the consortium overcome challenges and stresses? The love triangle was put to the test: with increasing N-concentration same productivity was achieved, but species abundances changed. Weaknesses were balanced among the species without compromising the performances of the consortium.

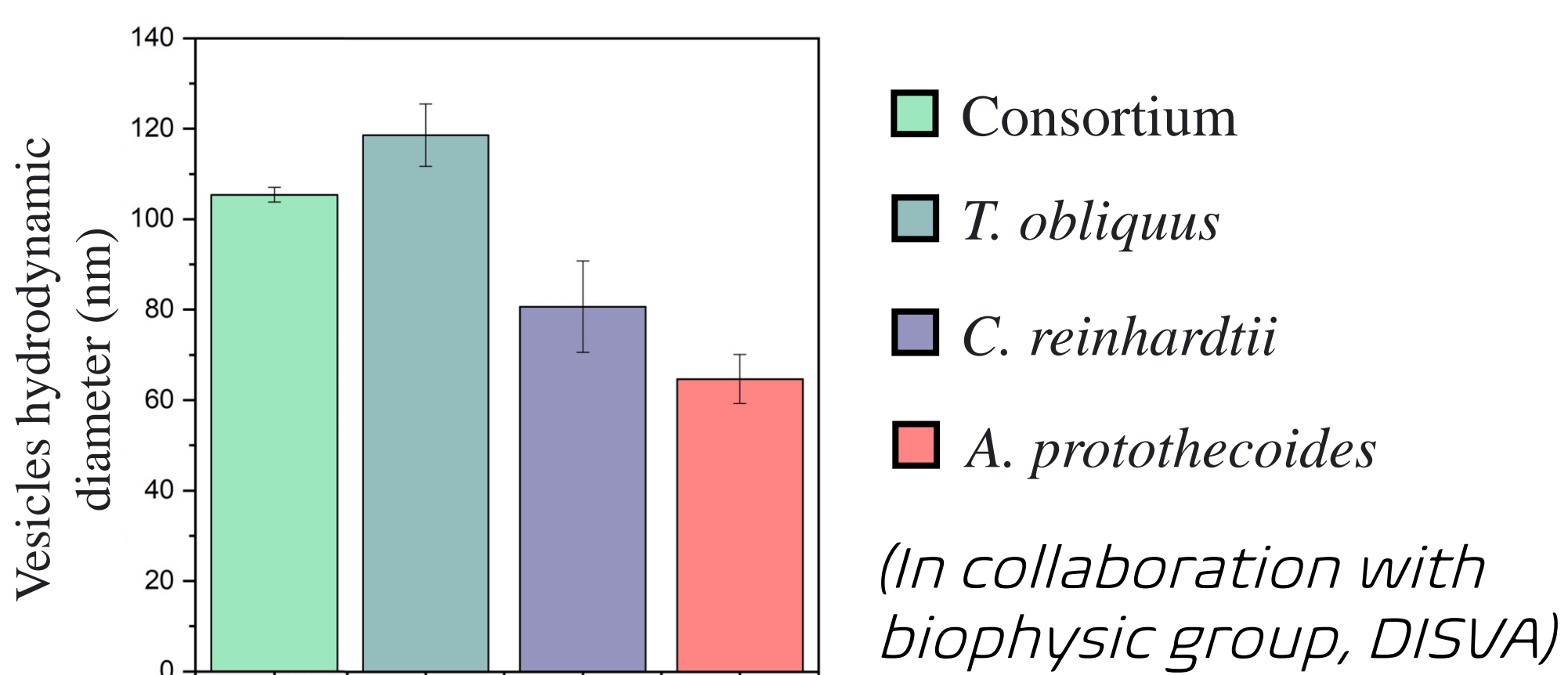


Was that love or were they just flaskmates? So far, we can't be sure, but the whole was greater than the sum of the parts. Protein and C content was much higher than the one of mono-cultures!



## CHAPTER 4: ALGAL COMMUNICATION

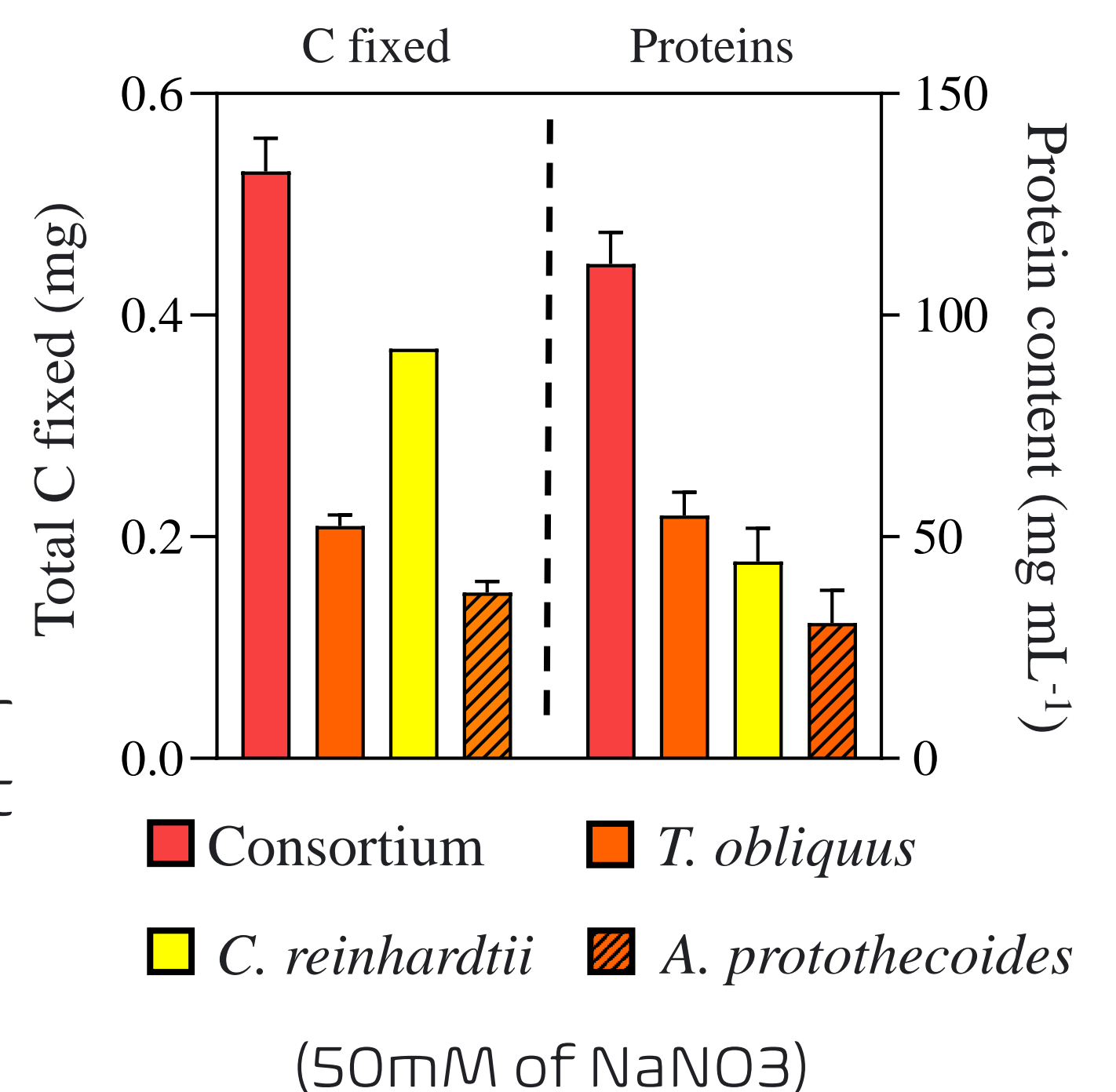
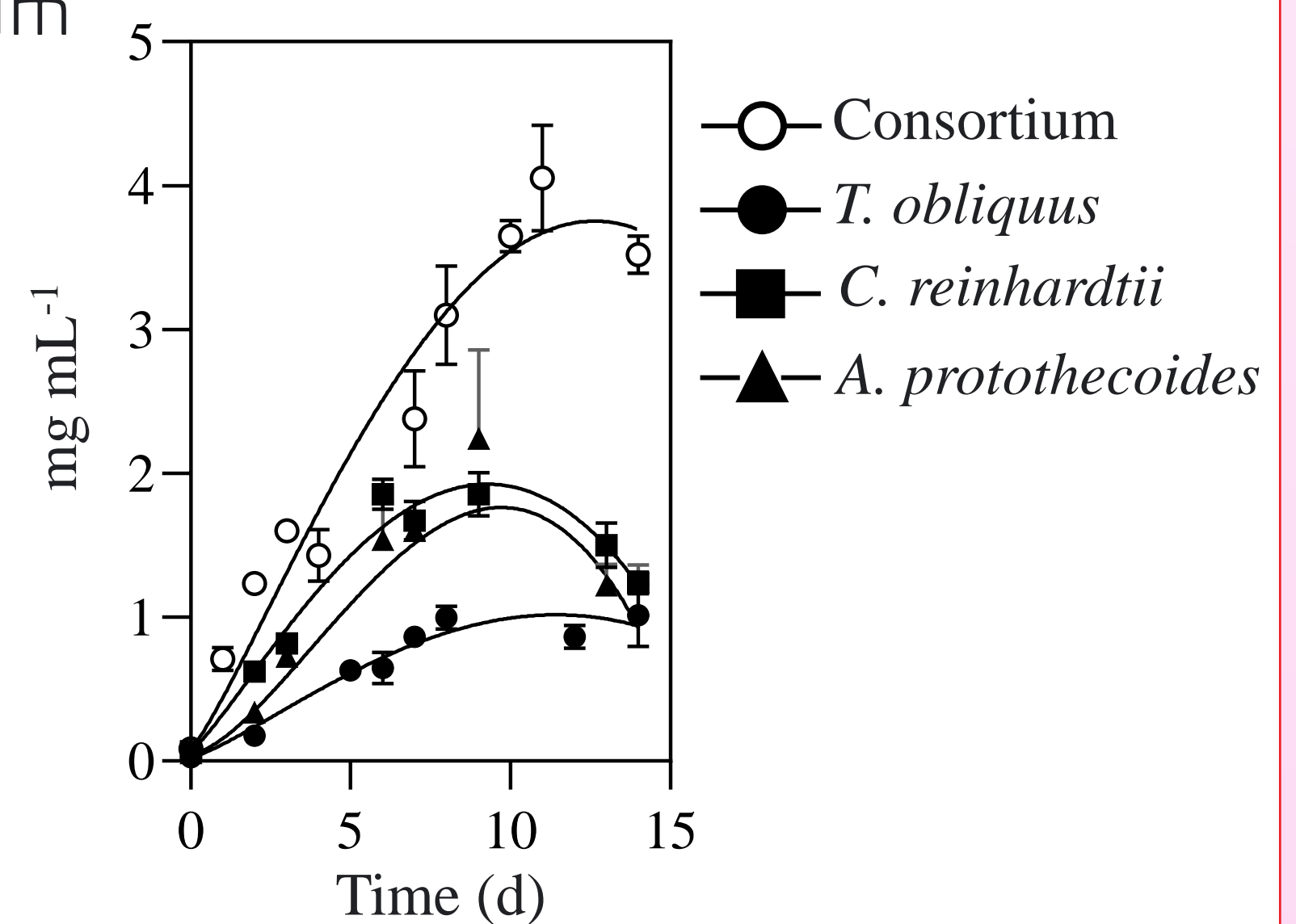
Communication is important in a relationship, even more so in a love triangle! But how do these algae communicate? Why not via vesicles? Algosomes were found in the supernatant of algal cultures, both in monocultures and consortium cultures. The addition of the vesicles-containing supernatant to mono and poly-cultures increased both algal density and growth rate. Even biomass quality changed meaning that communication had a significant effect!



## CHAPTER 2: AN INCREASED PRODUCTIVITY

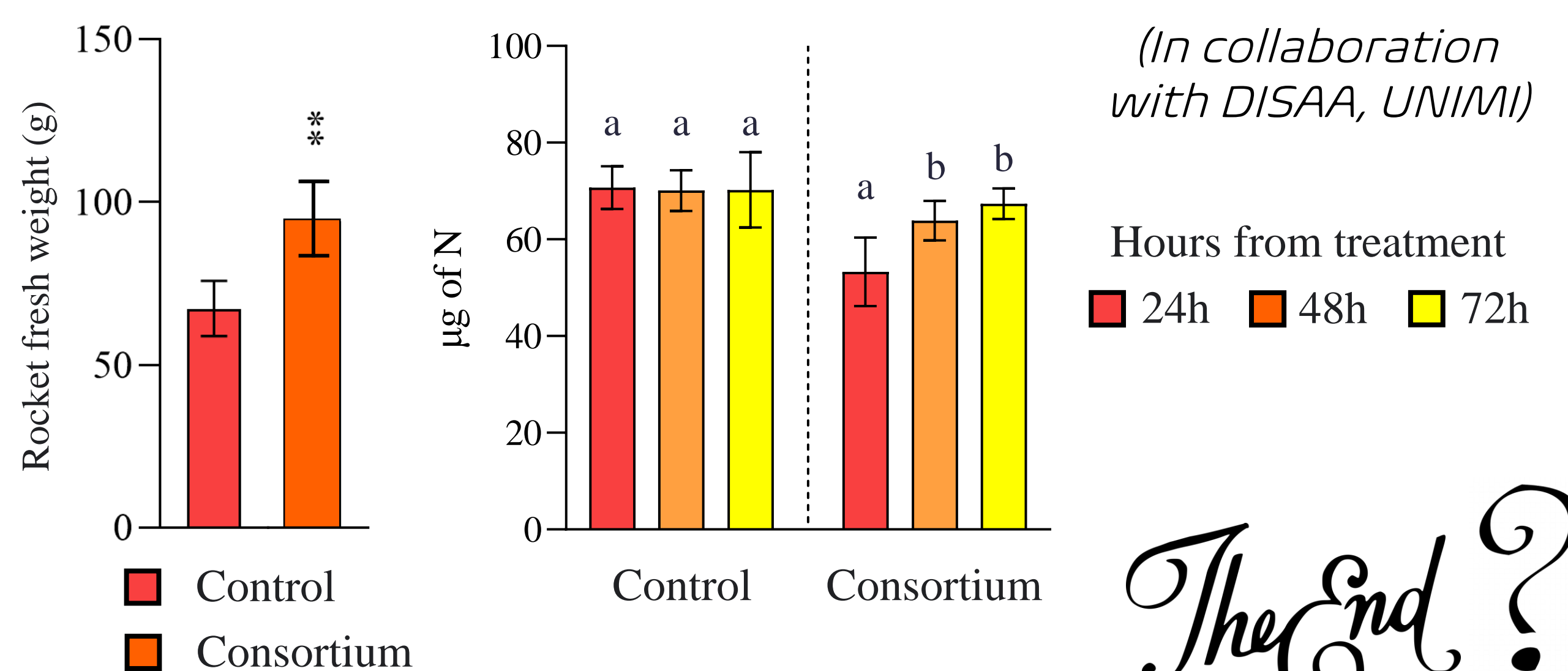
The newborn consortium was propagated in a standard medium until stability among each species was reached and a polyamorous relationship was established!

The stable consortium was grown in the synthetic digestate and results were great! Similar remediation yield but higher productivity than monocultures! What an incredible result!



## CHAPTER 5: THE CONSORTIUM AS BIOSTIMULANT

Algae had green fingers and their common passion for plants led to the biostimulation of rocket plants by foliar-spraying. Higher growth and higher nitrogen uptake from the soil were observed in stimulated plants compared to control plants. The power of Love!



The End?