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Identifying and Characterising Microalgal Strains that Overproduce Triacylglycerol as Potential Sources of Biodiesel **Part B – Results and Discussion**

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E-Futures

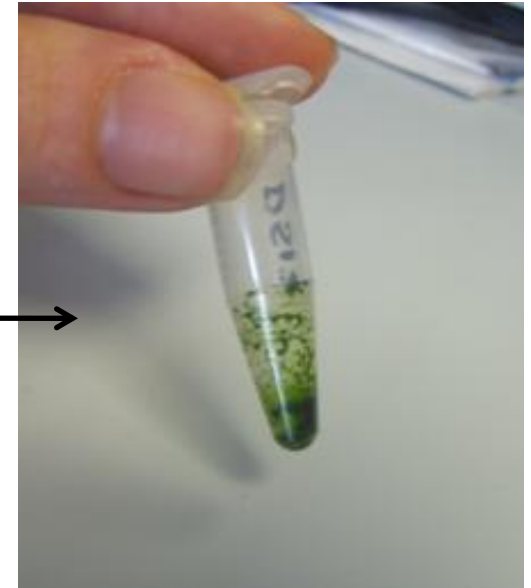
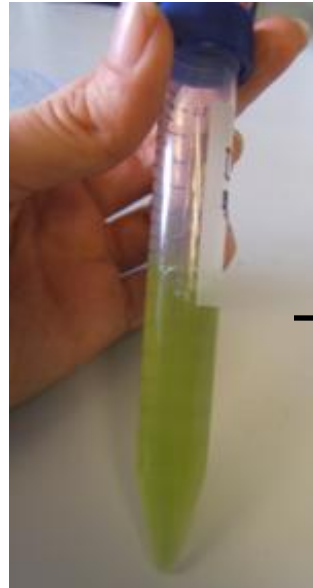
Main questions

- Given that salt stress induces lipid production in algae, what is the optimum salinity of a growth medium?
- Which species shows the best promise for biofuel production?
- How does this relate to the bigger picture of solving the liquid fuel crisis?

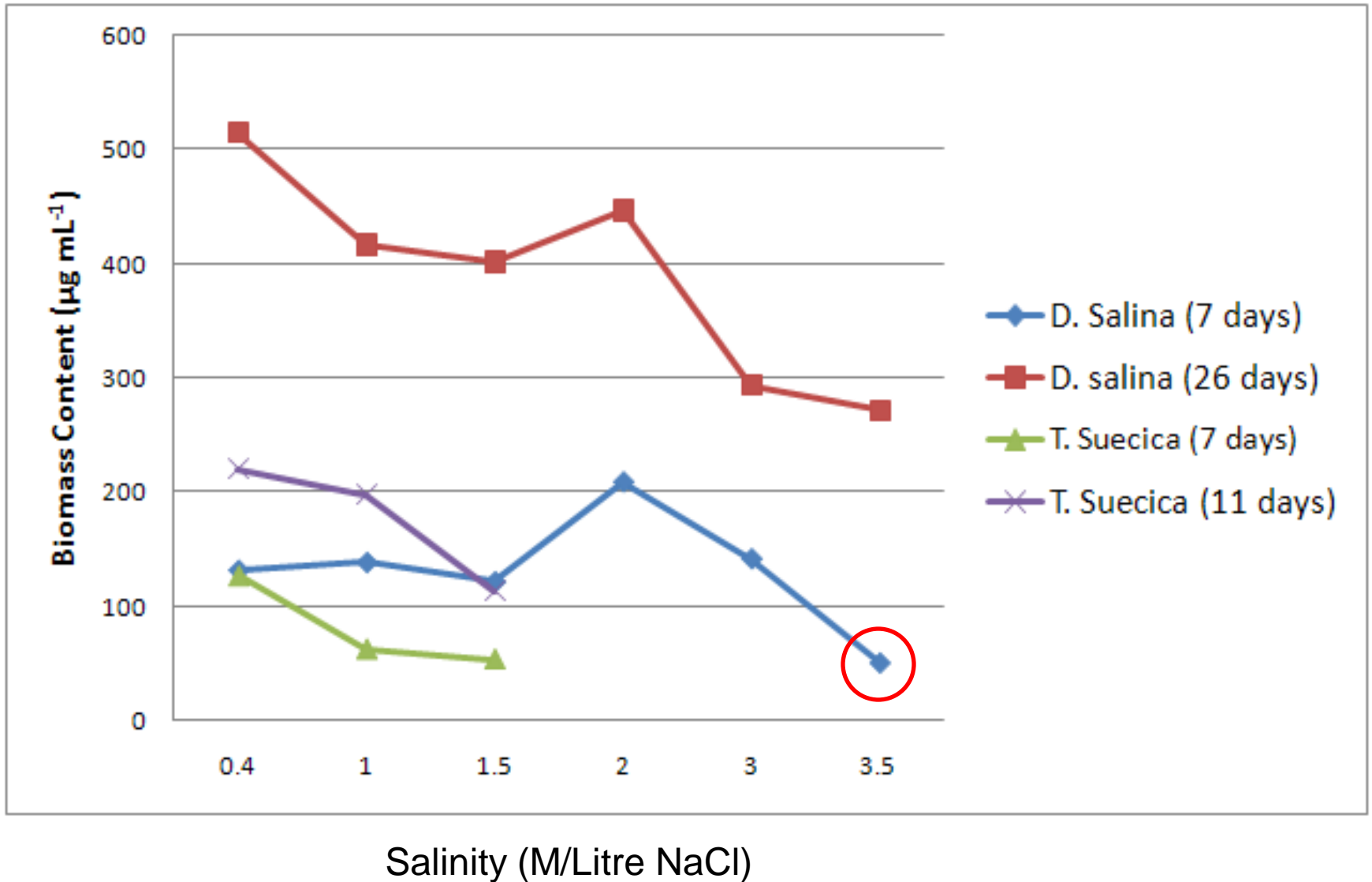
Methods and cultivation



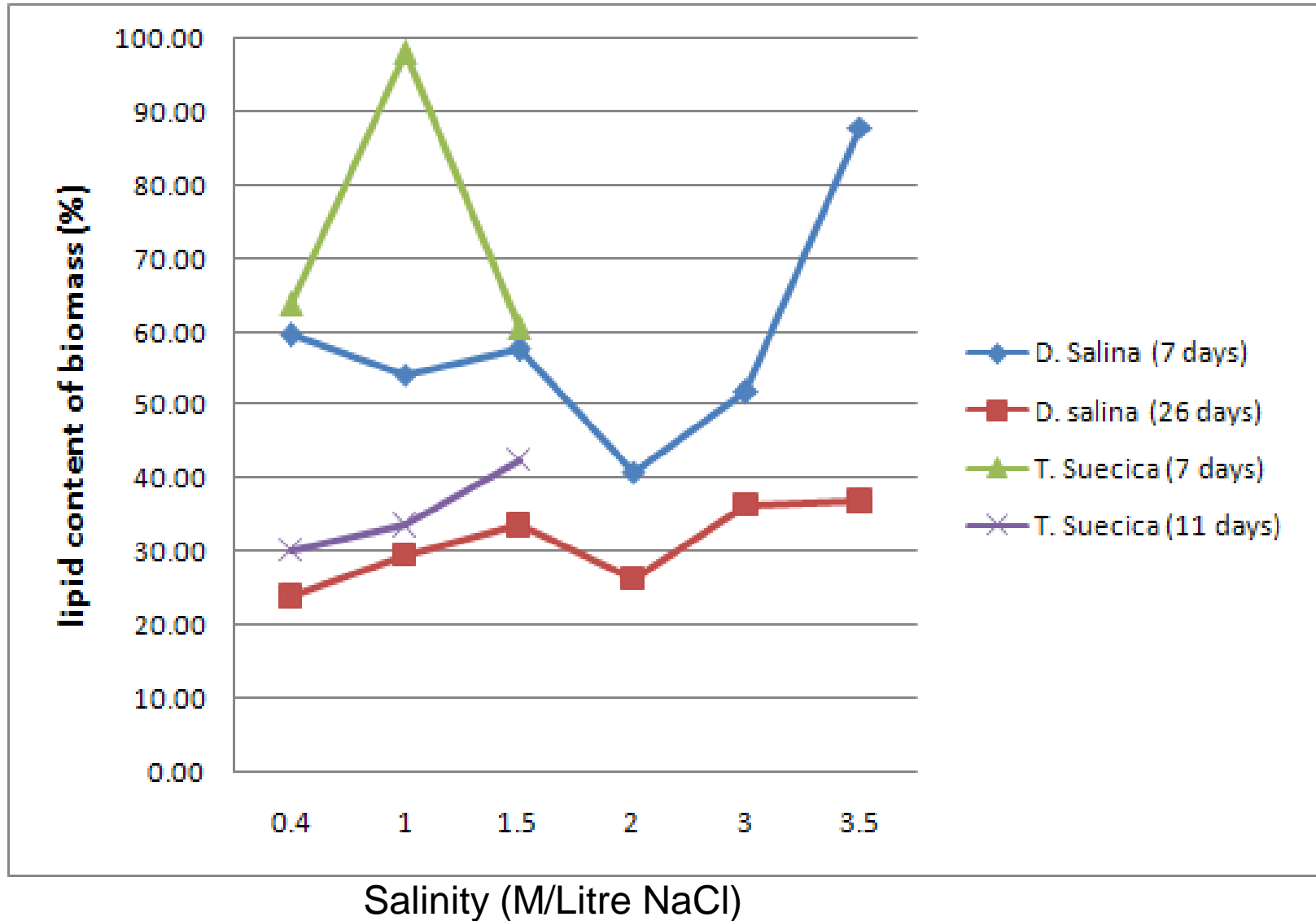
Methods and cultivation



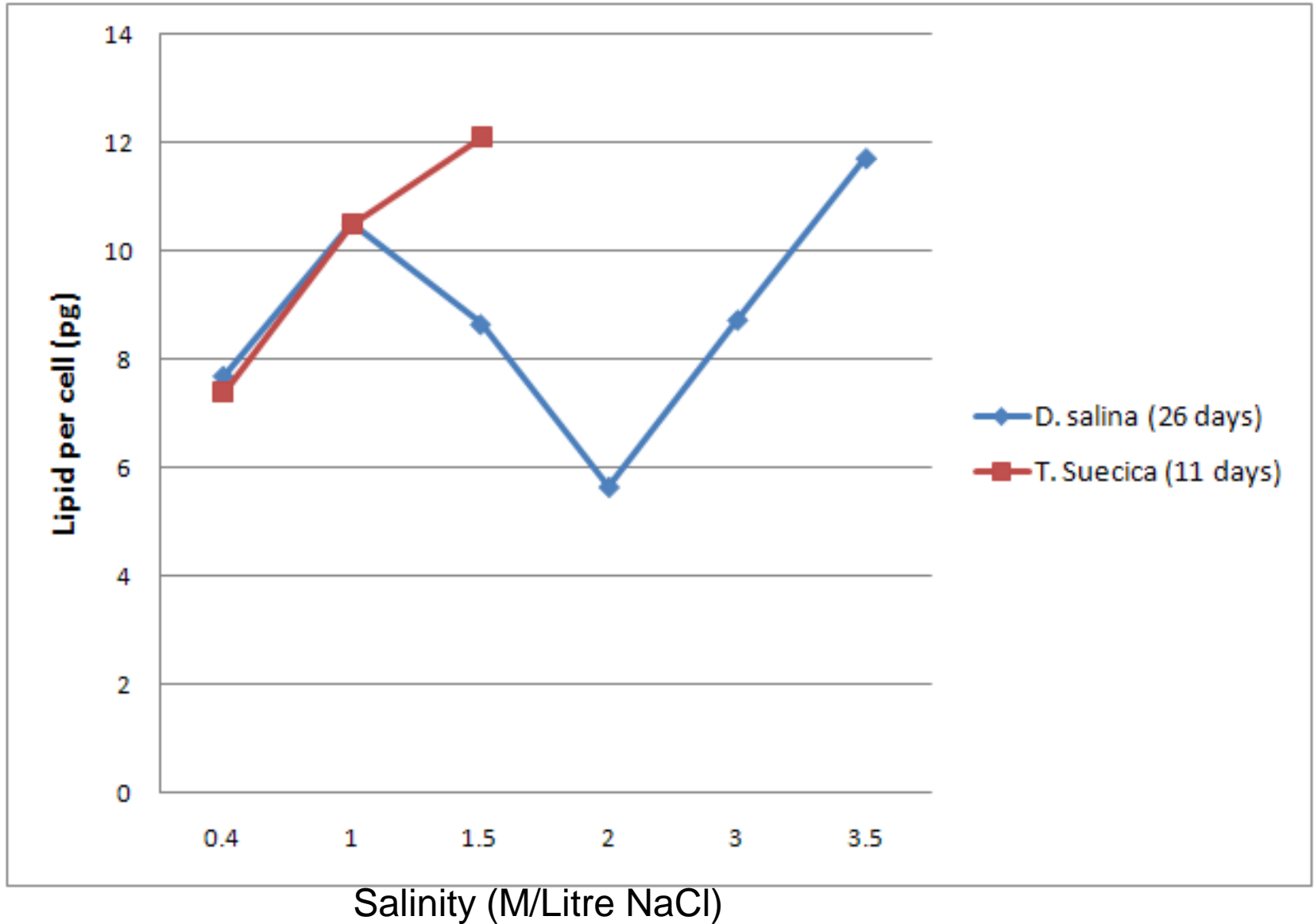
Biomass production ($\mu\text{g per ml}$)



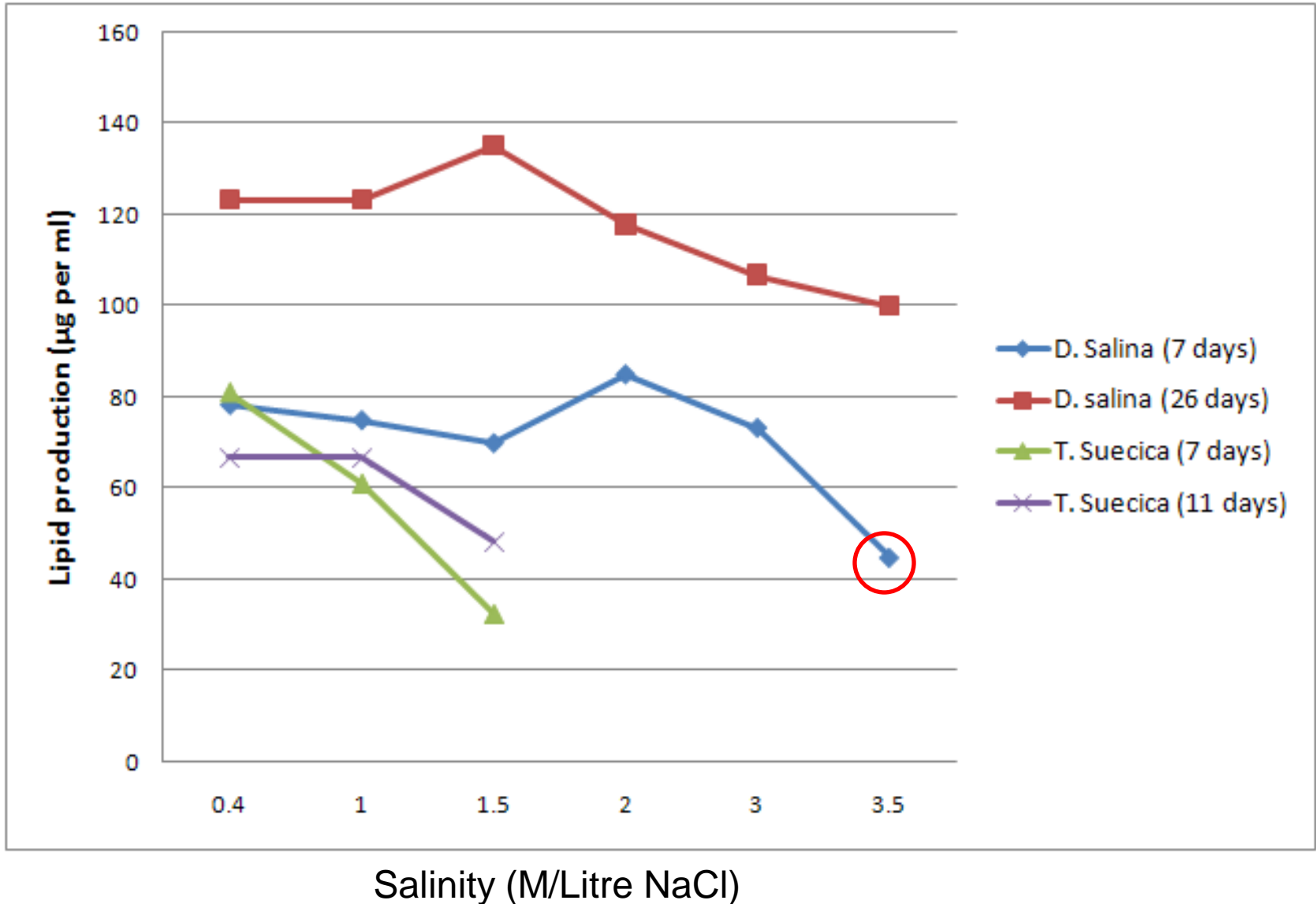
Lipid percentage of total biomass



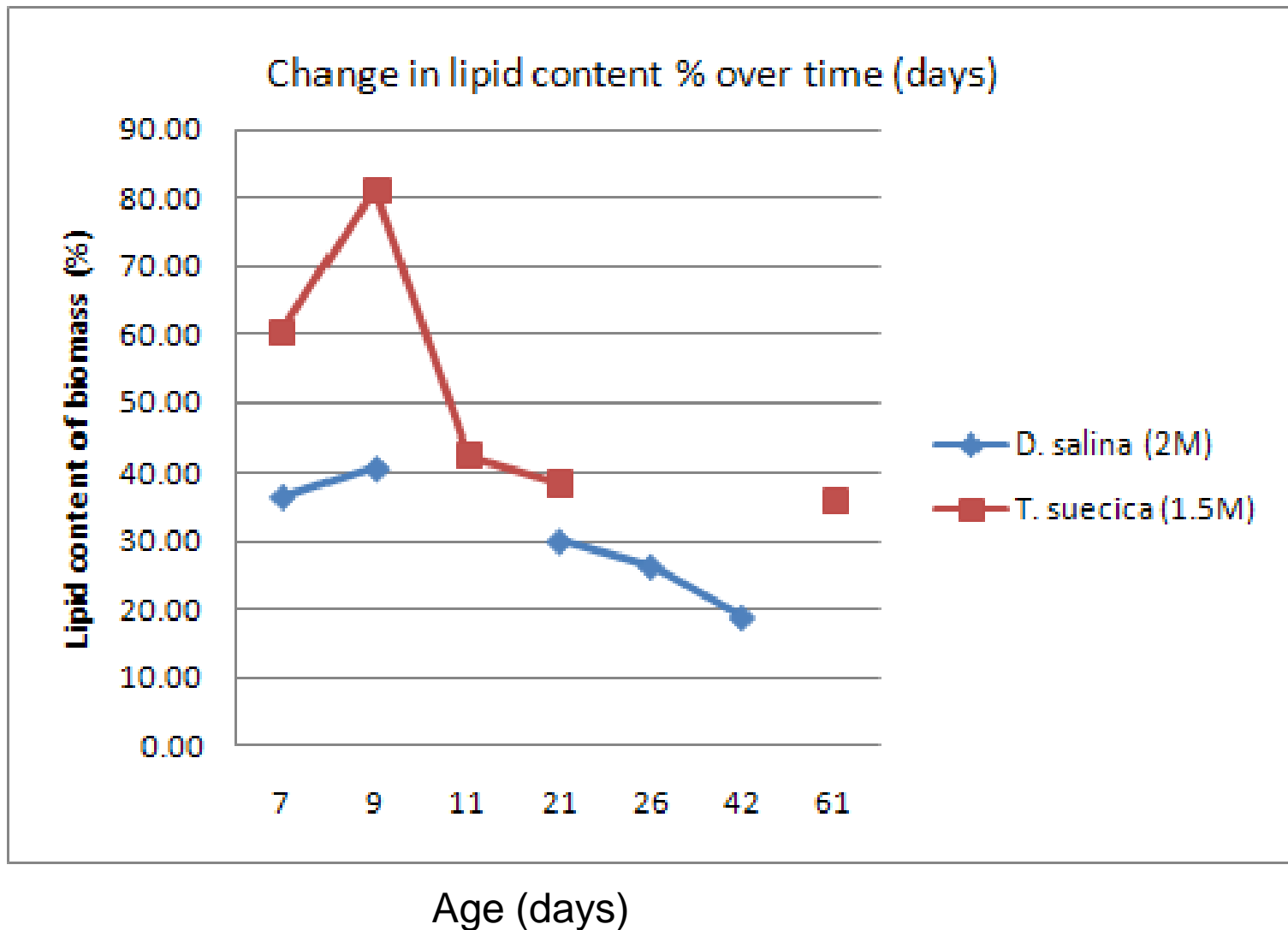
Lipid content per cell (pg)



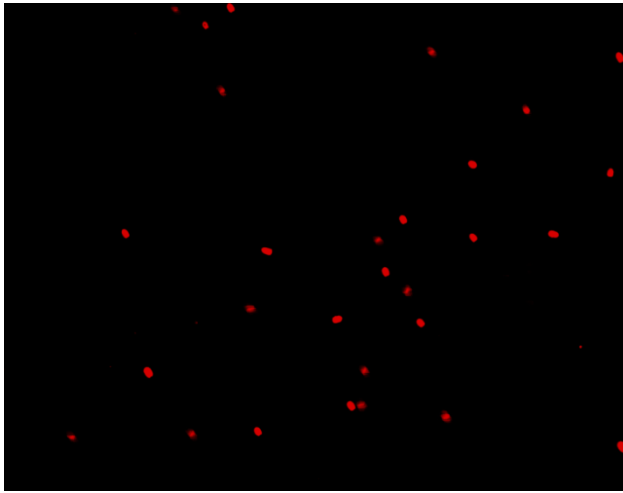
Lipid production ($\mu\text{g per ml}$)



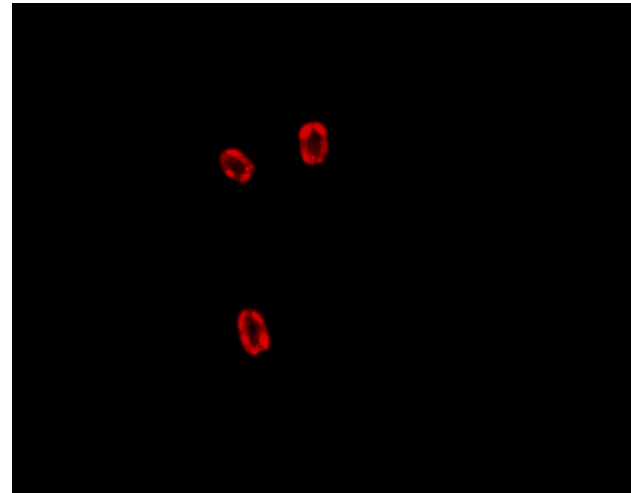
Change in lipid content (%) over time



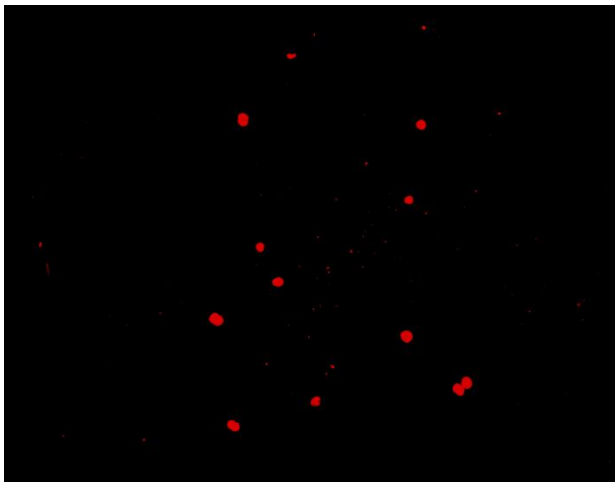
Nile red staining of *T. suecica*



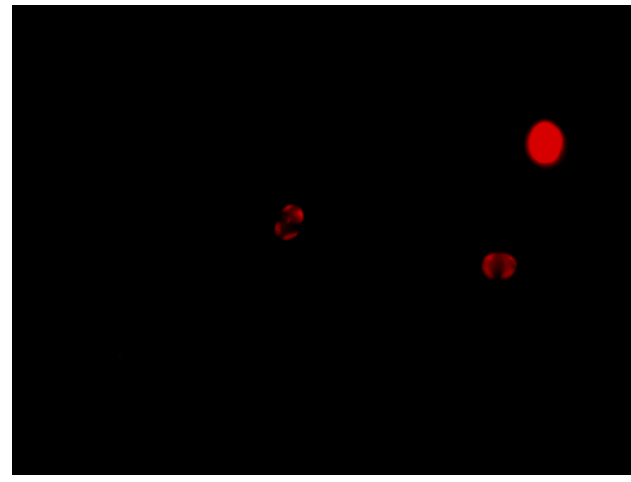
0.4 Molar solution, x20 magnification



0.4 Molar solution, x100 magnification

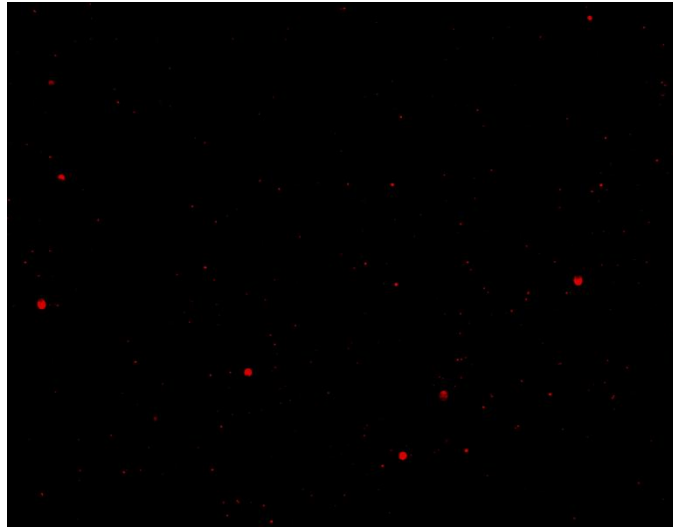


1.5 Molar solution, x20 magnification



1.5 Molar solution, x100 magnification

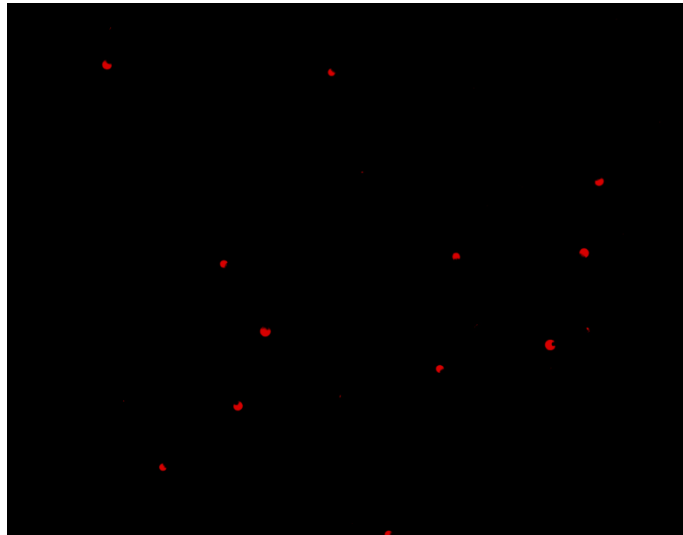
Nile red staining of *D. salina*



3 Molar solution, x20 magnification



3 Molar solution, x100 magnification



1 Molar solution, x20 magnification

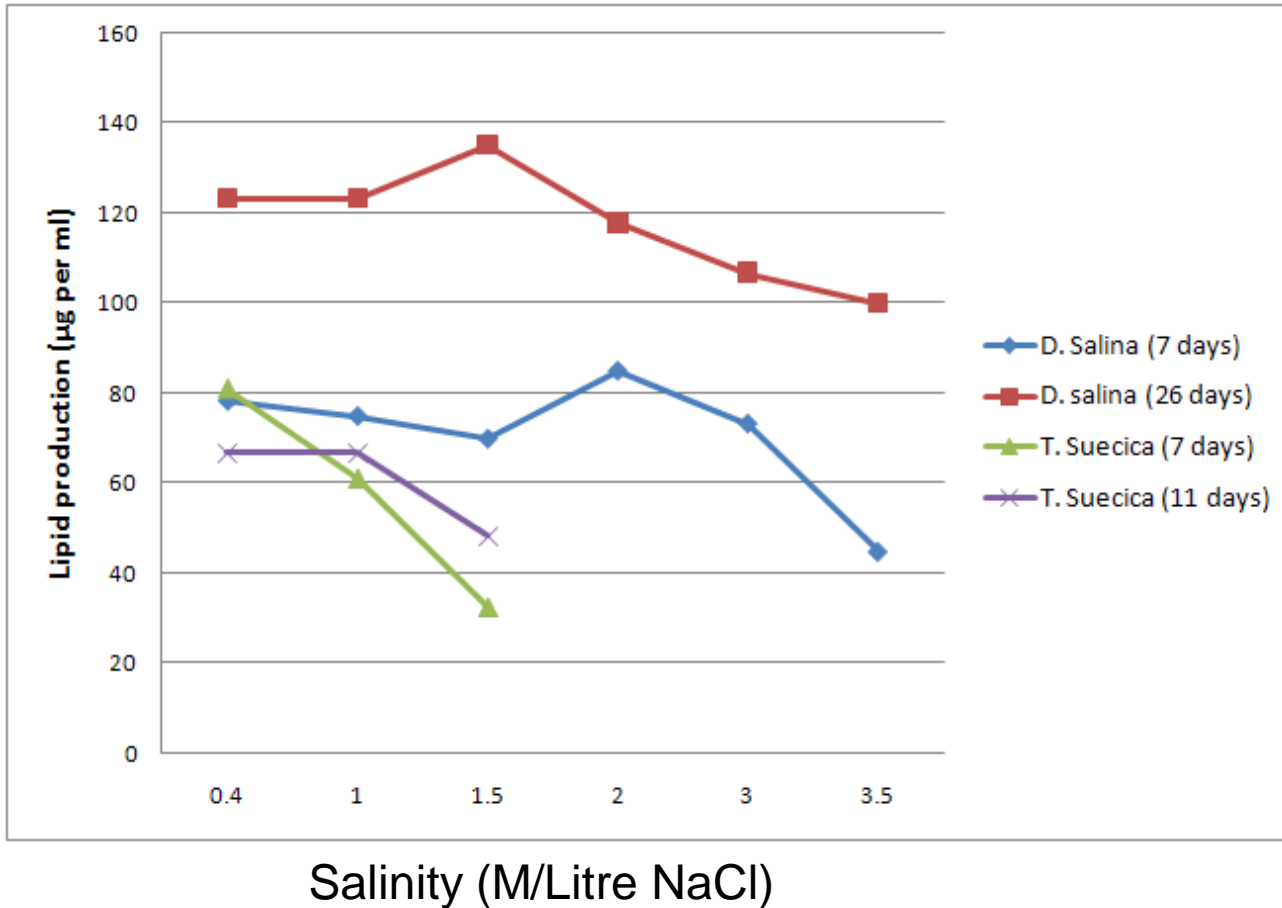


1 Molar solution, x100 magnification

What are the optimal conditions for cultivation of algae for lipid production?

- Best lipid yield per volume of culture
 - *D. salina*: 1.5M medium after 26 days, (or 2M after 7 days).
 - *T. suecica*: 0.4M medium after 7 days.
- Which species is better?.....

Lipid production ($\mu\text{g per ml}$)



- Yields are comparable
- *T. suecica* needs less salt
- *D. salina* has no cell wall
- Higher salinity may provide better species dominance

Main conclusions and Future work

- In our research:
 - Biomass yields go down with salinity
 - Lipid content (% of biomass) goes up with salinity
- Which species is better depends on net energy gain from the process – LCA needed
- Further investigation into lipid content to age relationship – why does percentage lipid go down over time?

How does this relate to the bigger picture?

- A raceway pond may up be 30000 litres in volume. For this much volume:
 - *D. salina* (2 M, 7 days) : 2.6001 Kg dry lipid
 - *T. suecica* (0.4 M, 8 days) : 2.436 Kg dry lipid
- Net energy inputs and outputs:
 - Use waste salt from solar powered desalinisation plant?
 - Use waste products from waste water treatment?

Thank you for listening.
Any questions?

Many thanks to Dr Jim Gilmour



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