SUBMARINER

Sustainable Uses of Baltic Marine Resources

Production of omega-3 fatty acids by Baltic Sea algae

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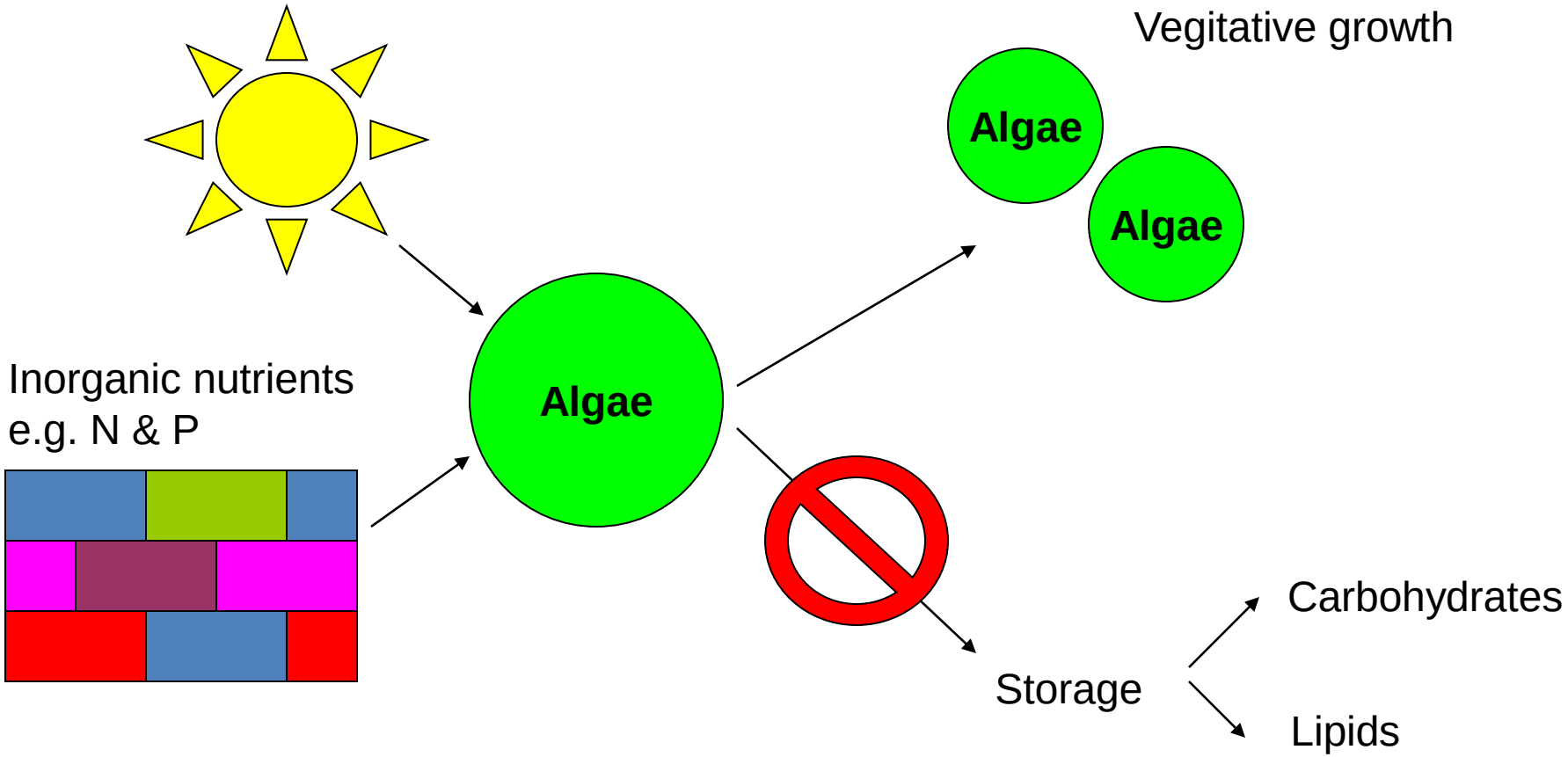
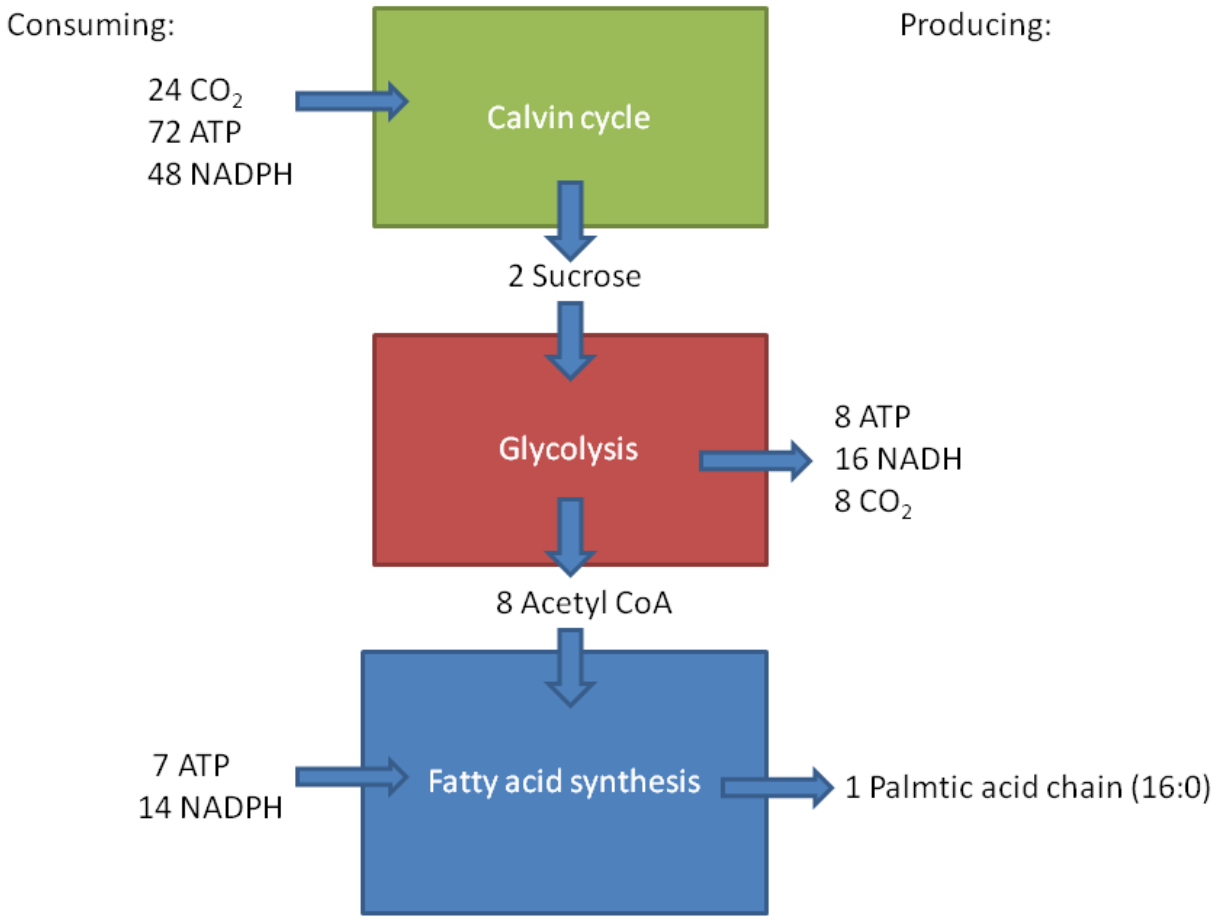
Why omega 3-fatty acids

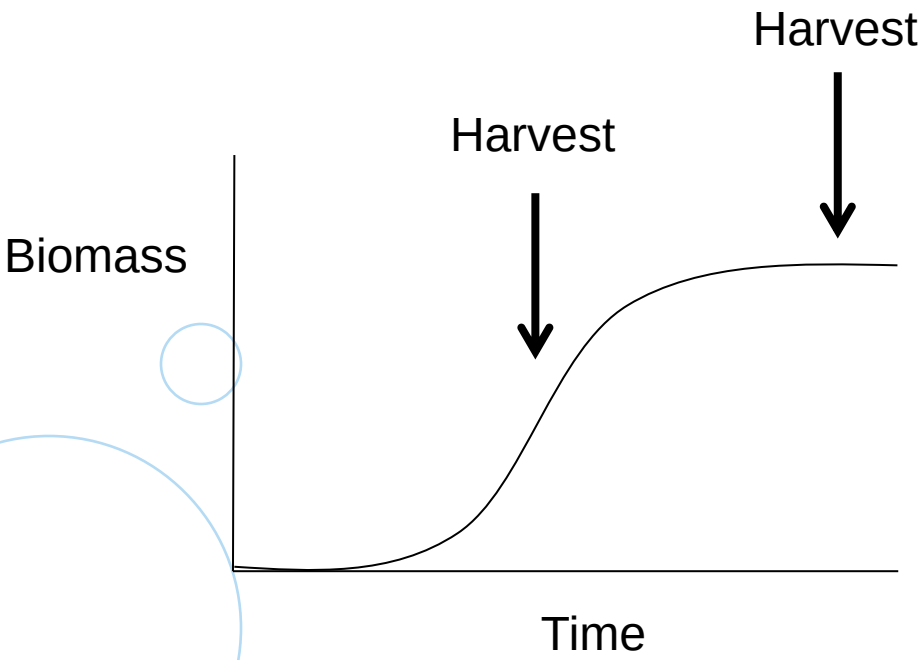
- Algae are able to synthesize fatty acids that is not produced in most higher organisms
- Poly unsaturated fatty acids (PUFAs) are essential in many cellular processes
- In particular omega-3 has received a lot of attention as a healthy fat
- Eicosapentaenoic acid (EPA) 20:5n3
- Docosahexaenoic acid (DHA) 22:6n3


Vegitative growth
Algae
Algae
Algae
Inorganic nutrients
e.g. N & P
Storage
Carbohydrates
Lipids

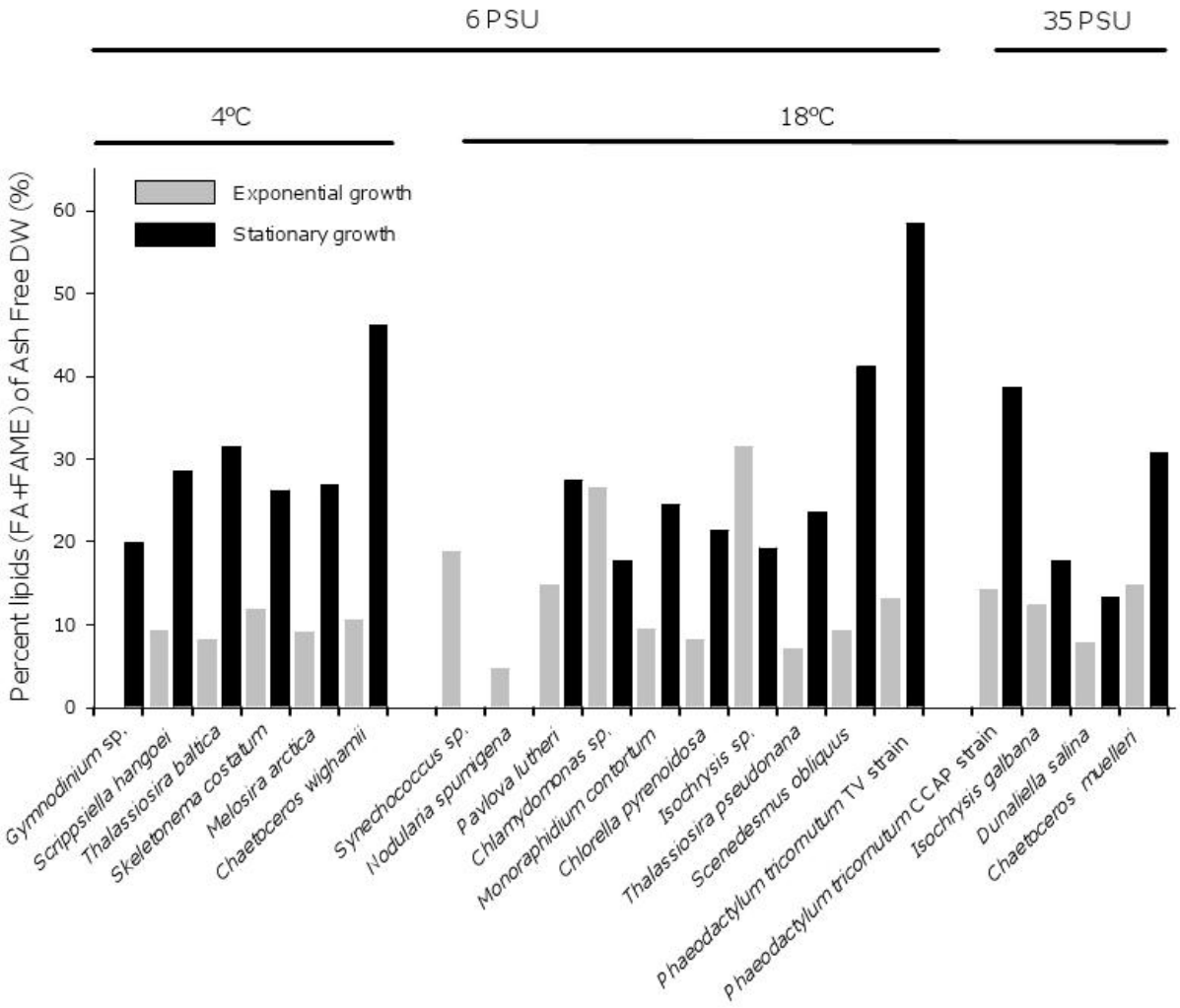
Lipids are costly to make



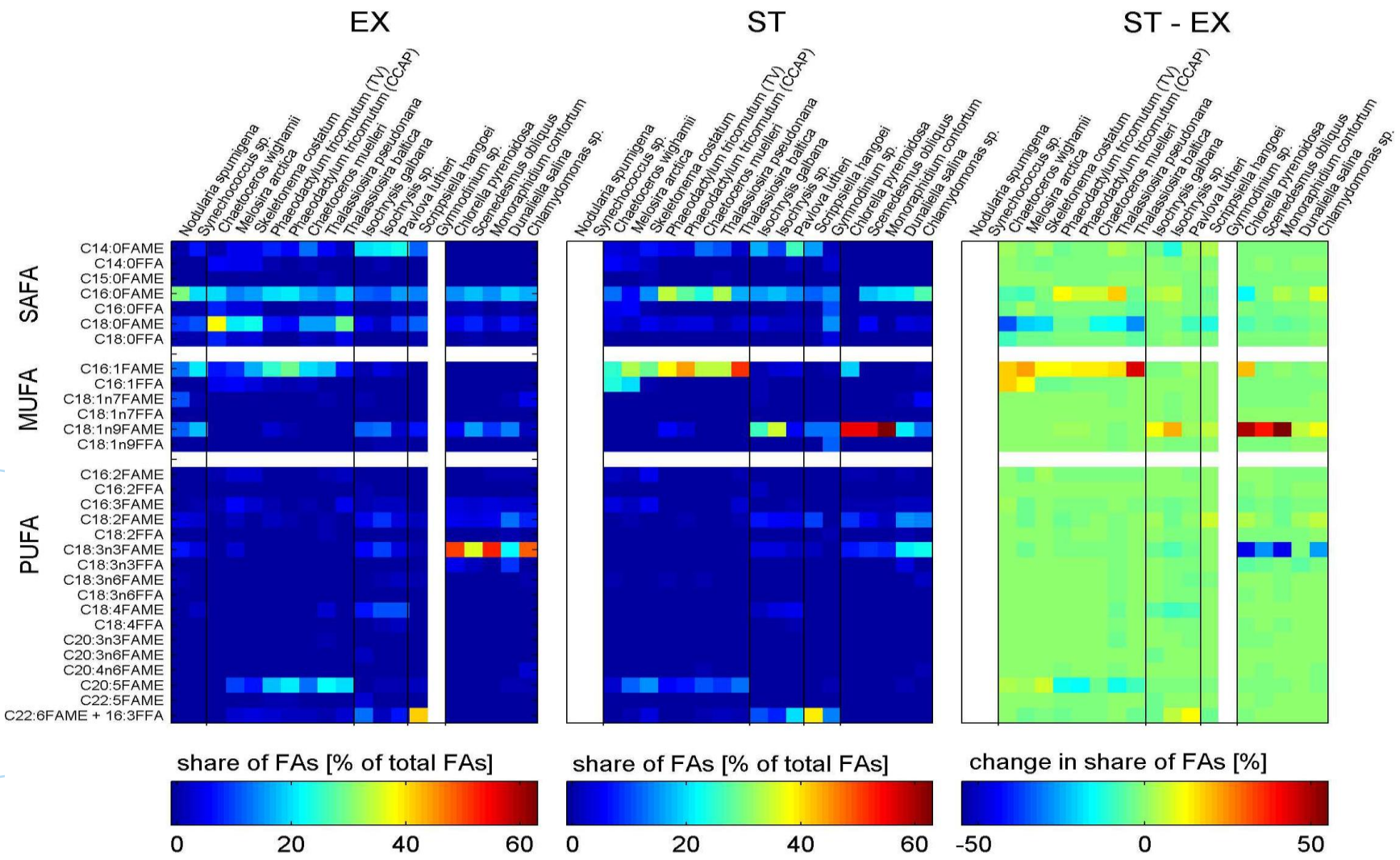
Experiment set-up



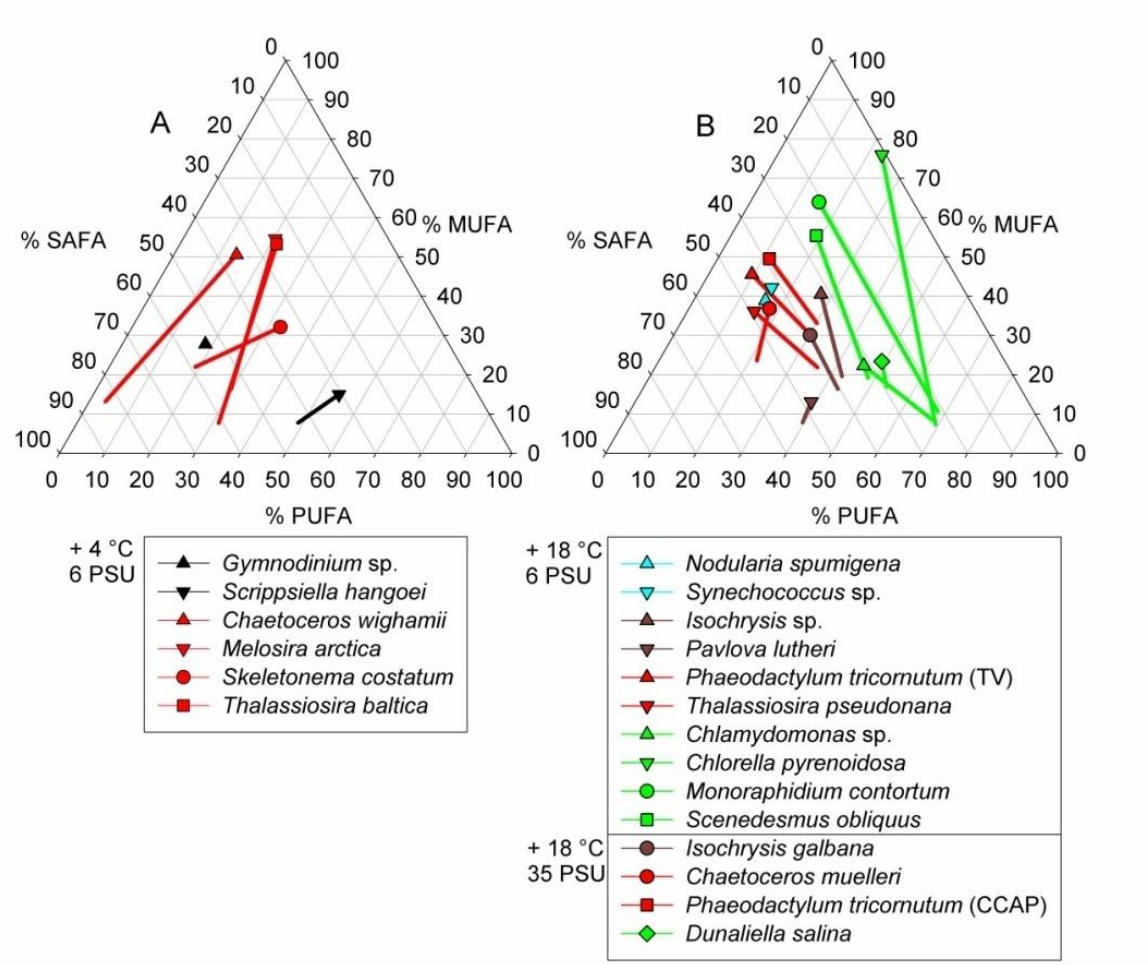
Screening Baltic Sea microalgae



Individual fatty acids



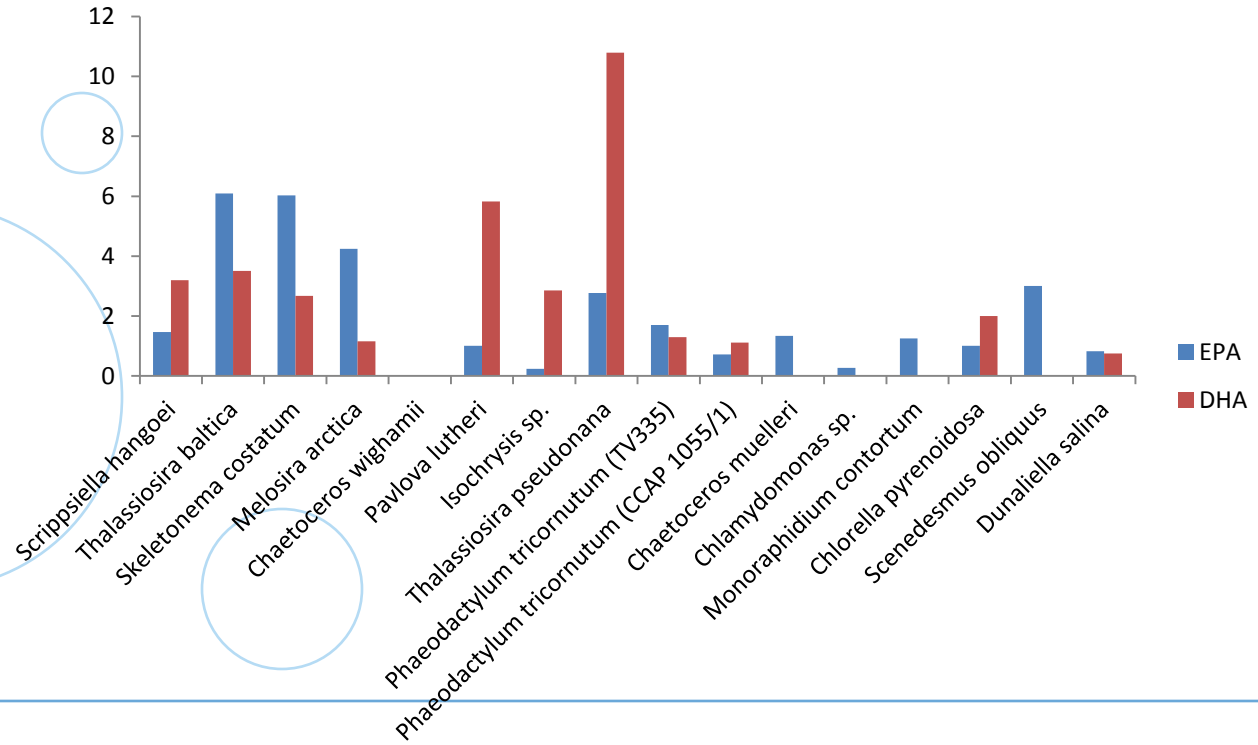
SAFA, MUFA and PUFA



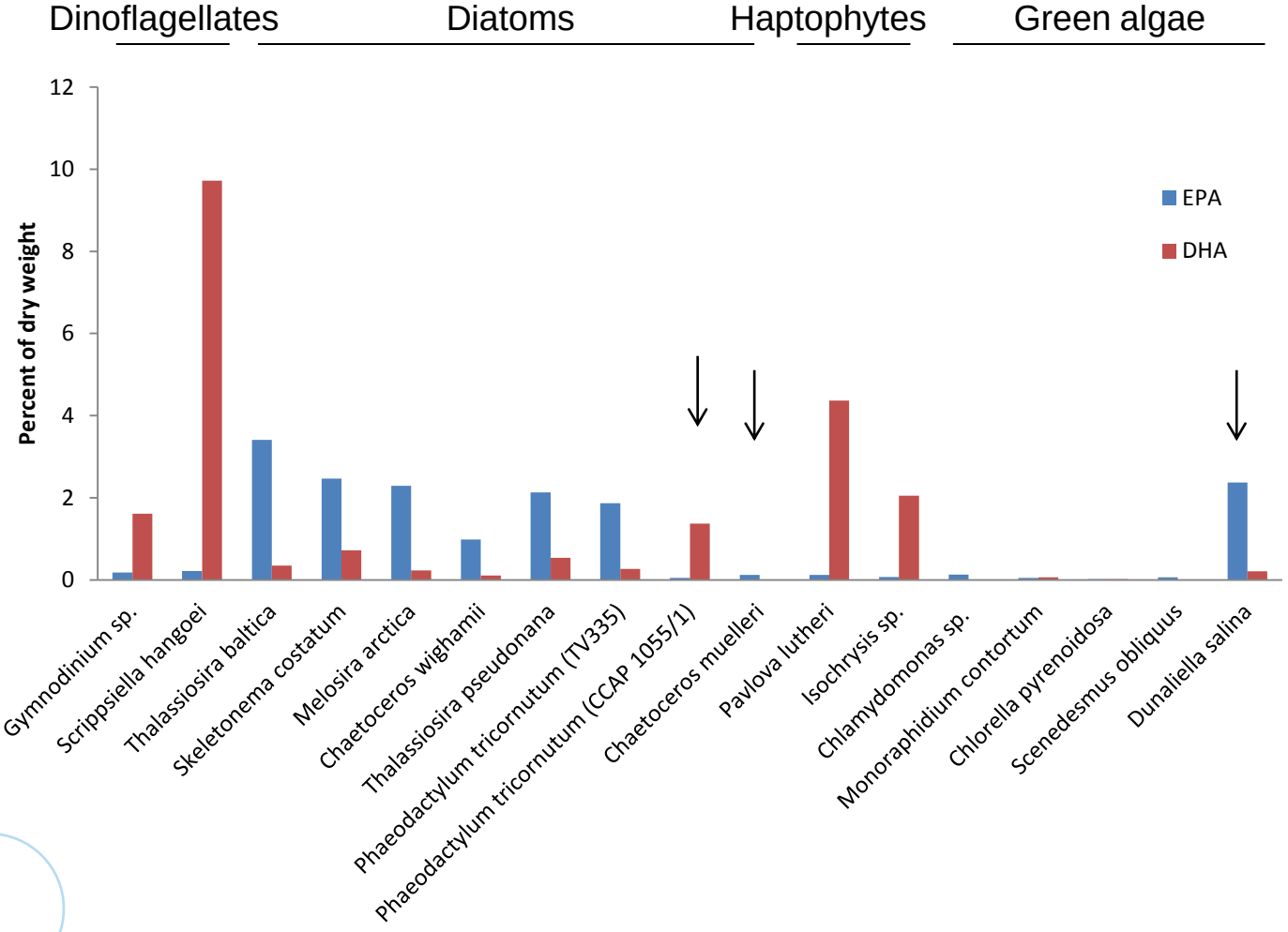
General increase in PUFAs

- PUFAs are often membrane bound but are also known to be part of triacylglycerols (TAGs)

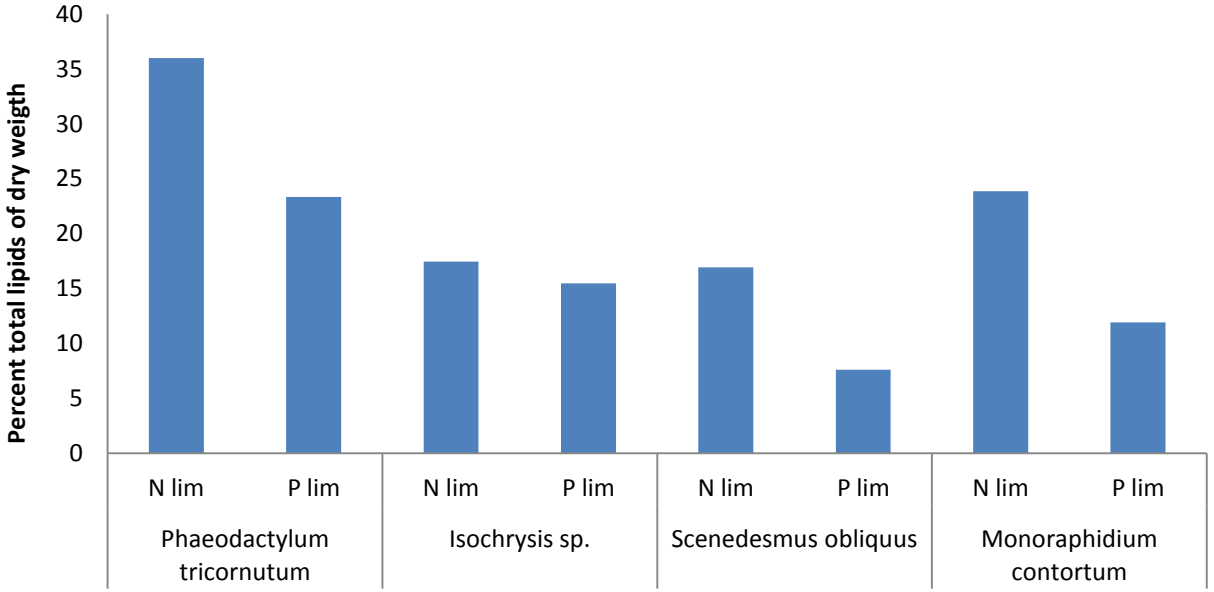
Increase from exponential to stationary growth phase
(assuming our 20:5 and 22:6 were EPA and DHA respectivley)



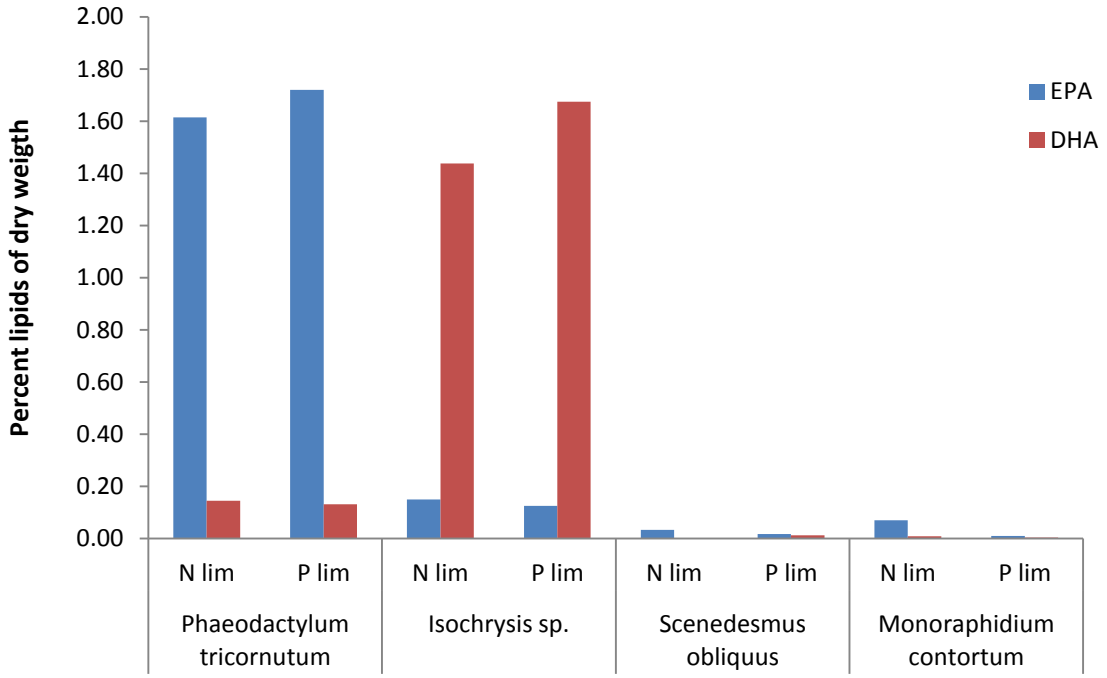
EPA and DHA content during stationary growth phase



N or P limitation affects lipid concentration



N or P limitation affects lipid composition



Conclusion

- Baltic Sea algae contained similar amounts of fatty acids as benchmark species and there were no consistent difference in lipid amounts between cold and warm water species
- Higher lipid concentration during stationary growth phase
- Diatoms produced EPA (except marine *P. tricornutum*)
- Dinoflagellatges and Haptophytes produced DHA
- Green algae produced very little EPA and DHA (except *D. salina*)
- The concentration of Omega 3 fatty acids is highly species specific and dependent on growth conditions