The importance of genetic diversity and the associated bacterial community in the marine diatom *Skeletonema marinoi*

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INTRODUCTION

Phytoplankton play a central role in global biogeochemical cycles and are the foundation of most marine food webs. Previous research has shown that genetic diversity buffers against negative effects from different stressors (Sjöqvist & Kremp 2016, Wolf et al. 2019). Phytoplankton, especially diatoms, harbor distinct bacterial communities in the so called phycosphere (Fig. 1) (Seymour et al. 2017). The associated bacteria play a beneficial, and sometimes even crucial role for growth and survival of diatoms (Amin et al. 2012). However, the importance of genetic diversity in phytoplankton during a disruption of the associated bacterial community has not been studied previously.

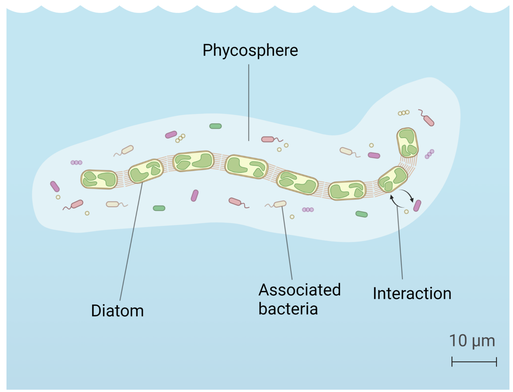

Figure 1. The phycosphere is the immediate surrounding area of phytoplankton, colonized by bacteria. Various types of interactions take place between phytoplankton and different bacteria in the phycosphere.

OBJECTIVES

To investigate:

- If different monoclonal strains show phenotypic differences in growth parameters
- The role of the diatom-associated bacterial community for the growth of marine diatoms in the Baltic Sea
- The role of the genetic diversity in diatoms when the associated bacterial community is disrupted

METHODS

The marine diatom *Skeletonema marinoi* was used as a model species in laboratory experiments (Fig. 2). A stress treatment consisting of antibiotics was used to disrupt the diatom-associated bacterial community. To investigate the role of genetic diversity during and after in-direct antibiotic stress, we compared the response of mono- vs. multiclonal populations.

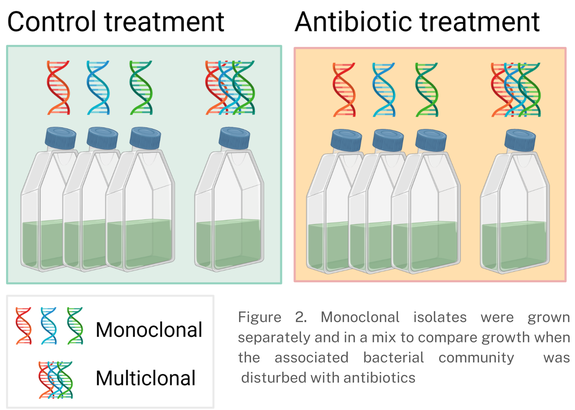

Figure 2. Monoclonal isolates were grown separately and in a mix to compare growth when the associated bacterial community was disturbed with antibiotics

RESULTS

- Different isolates showed phenotypic differences in some of the measured growth parameters in control conditions
- Disrupting the associated bacterial community resulted in a strong negative effect on the growth of *S. marinoi* (Fig. 3 and 4).
- Genetically diverse populations recovered significantly better from the stress treatment compared to the monoclonal populations.

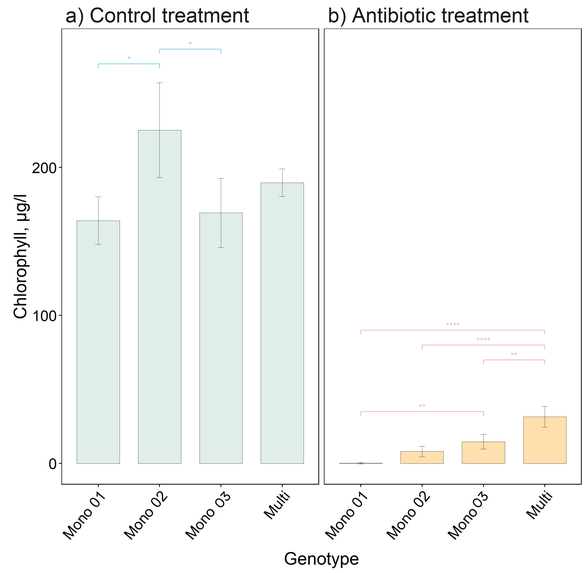

Figure 3. The mean chlorophyll *a* concentrations (+/- SD) in a) the control treatment and b) the stress treatment at the end of the experiment. The multiclonal populations showed significantly better recovery from the stress treatment compared to all three monoclonal populations grown separately.

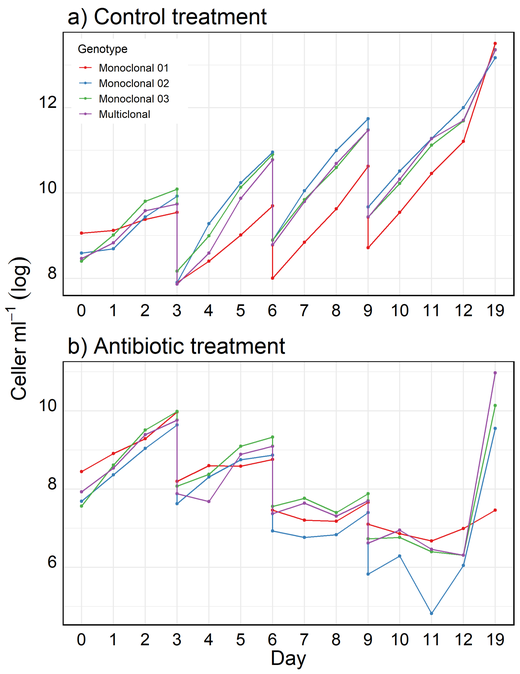

Figure 4. The mean cell concentrations of *S. marinoi* in a) the control treatment and b) the stress treatment throughout the experiment, in logarithmic scale. Note the different scales on the y-axes.

CONCLUSIONS

The results emphasize the importance of genetic diversity in phytoplankton during different stressors. The results also highlight the need of more studies on interactions between phytoplankton and other microorganisms in marine habitats.

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