

Artificial ecosystem selection for marine polymer degradation

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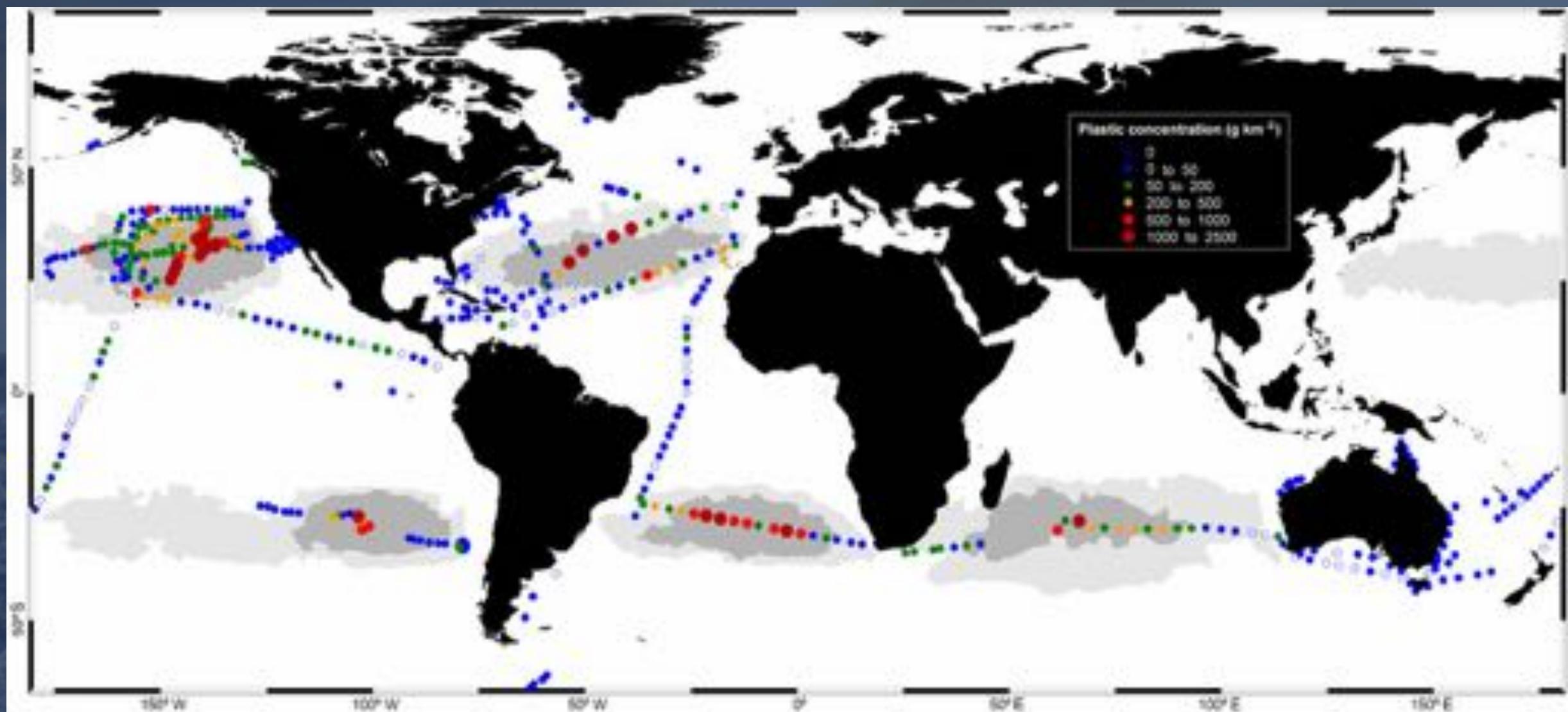
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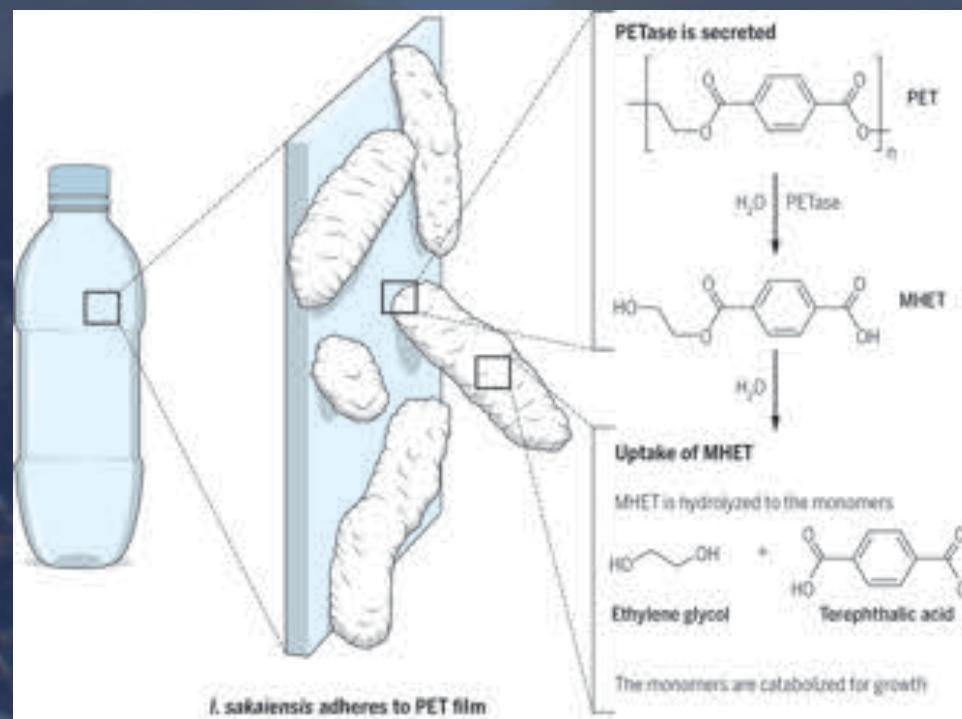
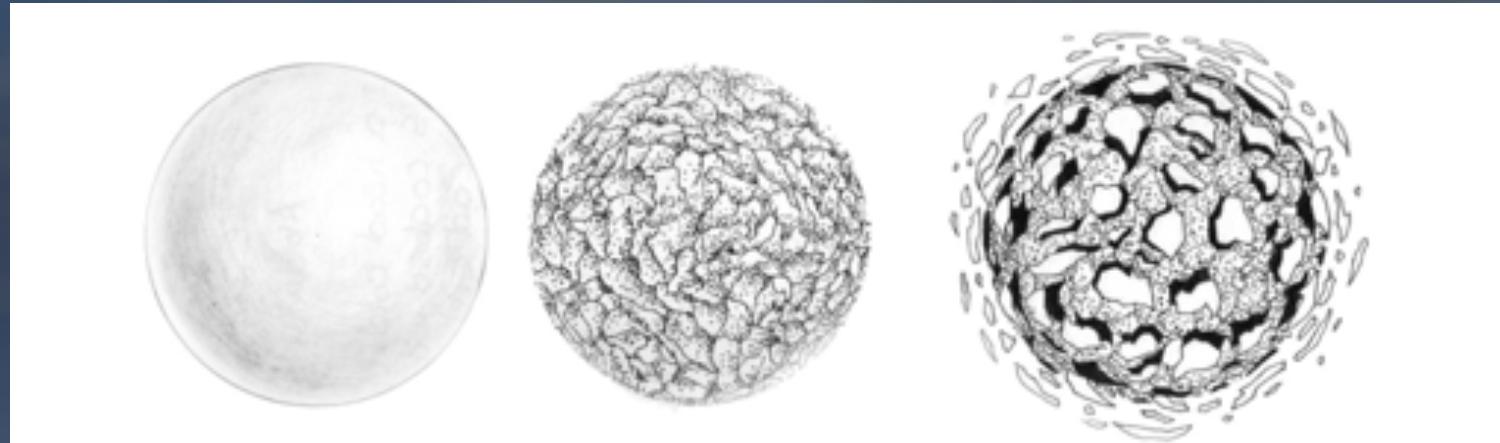
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Introduction: plastics

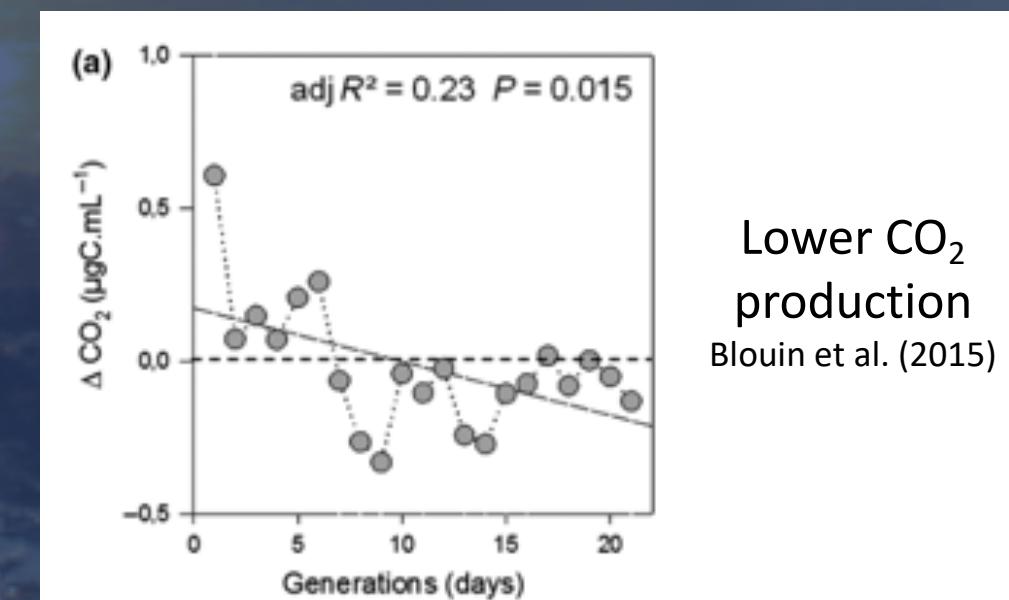
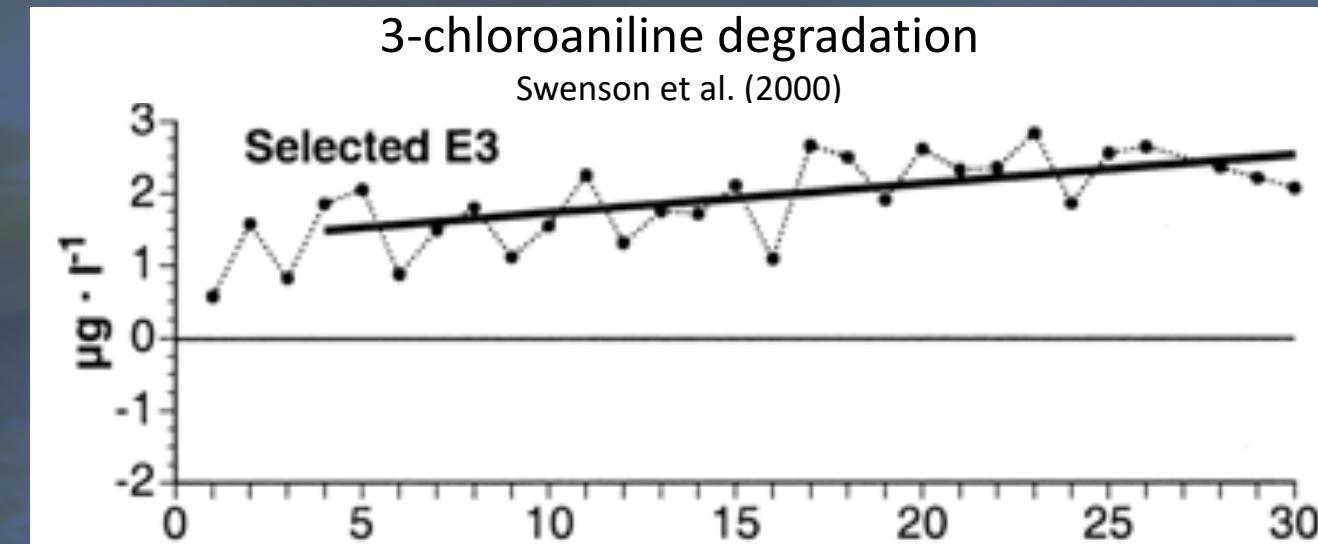
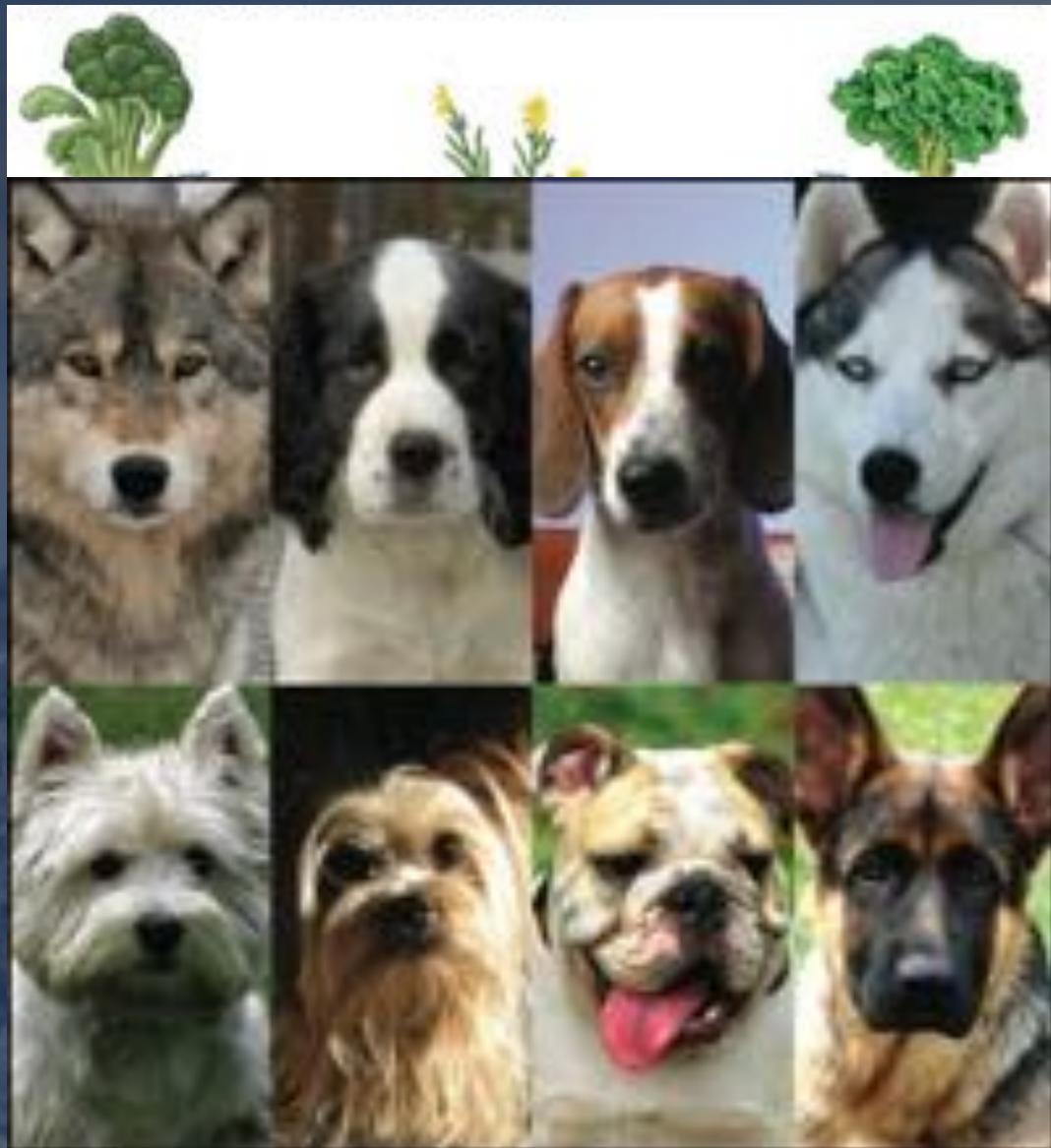


Introduction: plastics



Andrade (2017)
Yoshida *et al.* (2016)

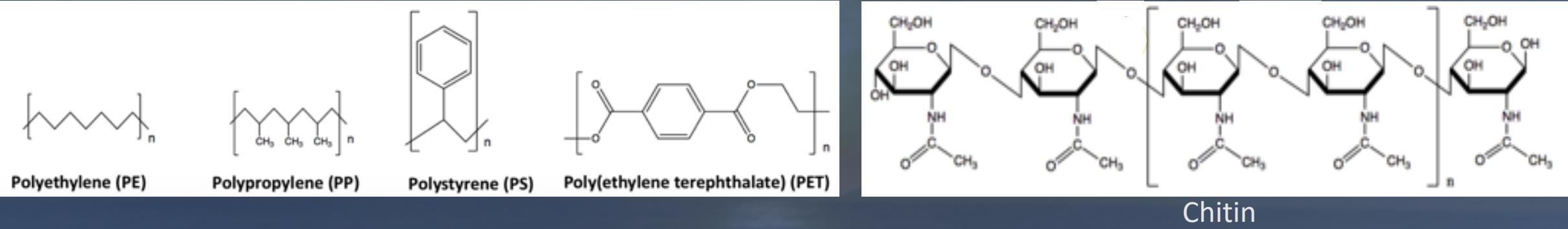
Introduction: artificial selection



Overall aims

- See if artificial selection of microbial communities can be used to evolve a community that is better at plastic degradation than that which naturally exists
- First use chitin as a proof of concept

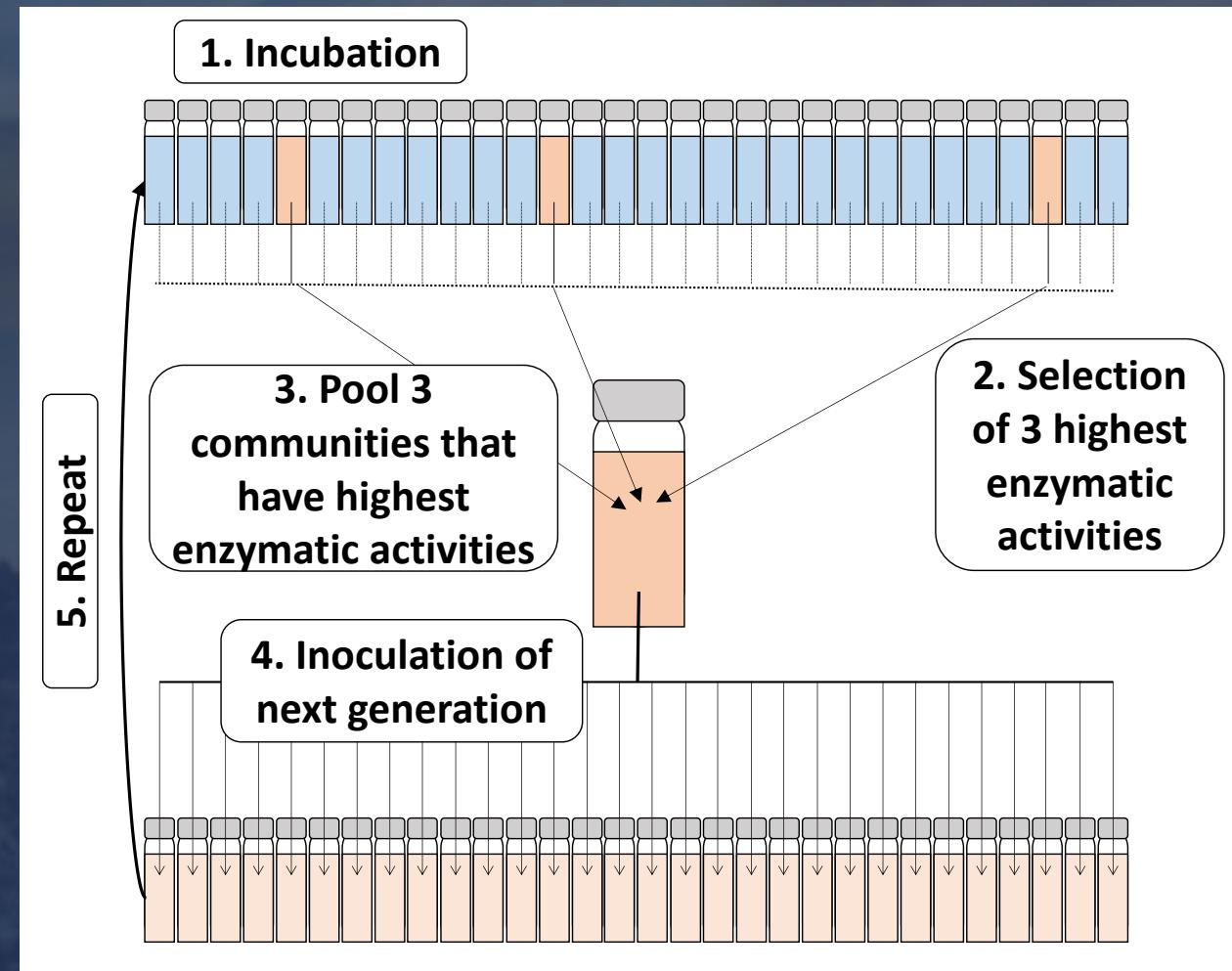
Chitin



Overall aims

- See if artificial selection of microbial communities can be used to evolve a community that is better at plastic degradation than that which naturally exists
- First use chitin as a proof of concept
- Use enzyme activity tests rather than waiting for things to degrade completely so that the method is high-throughput

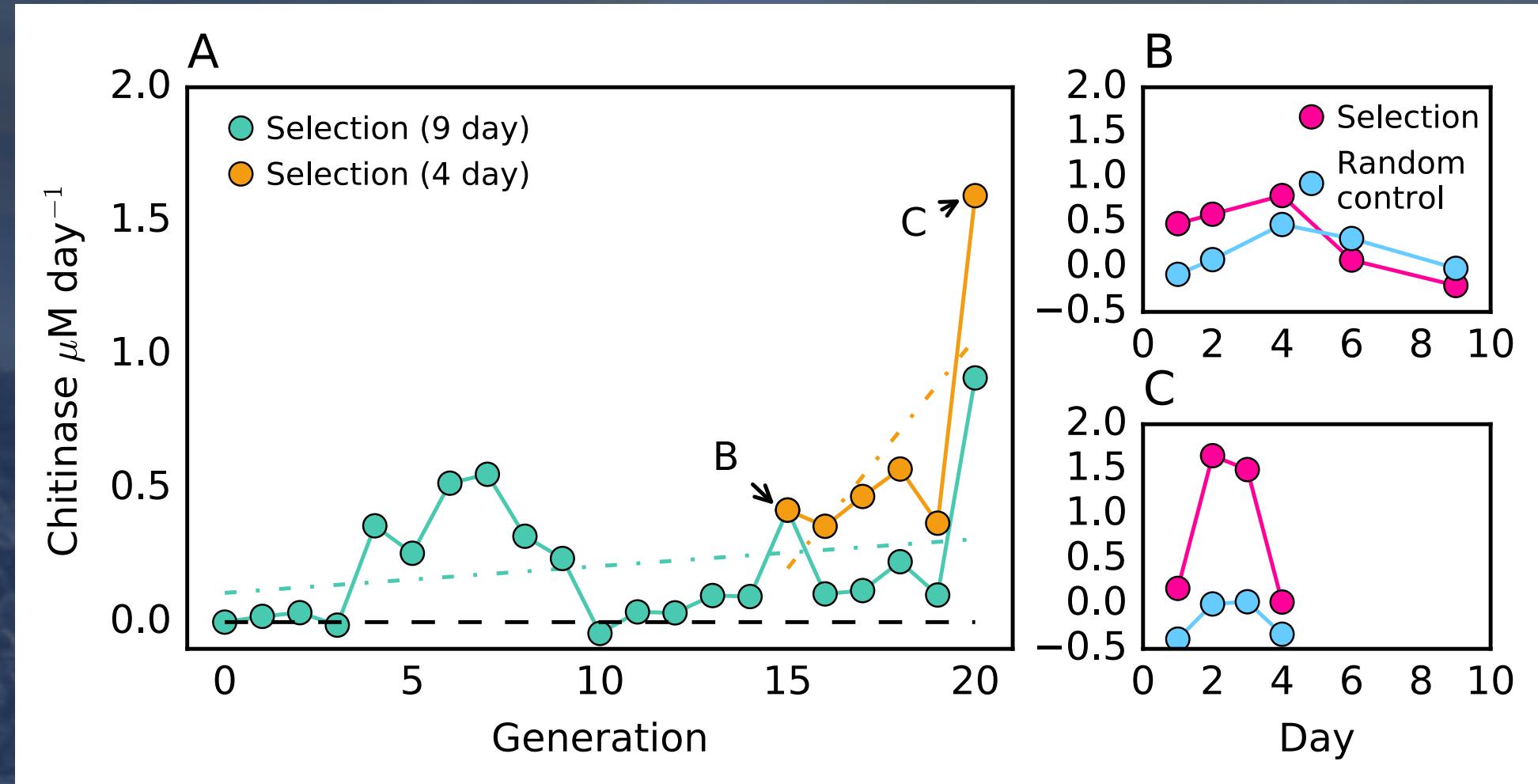
Method: artificial selection



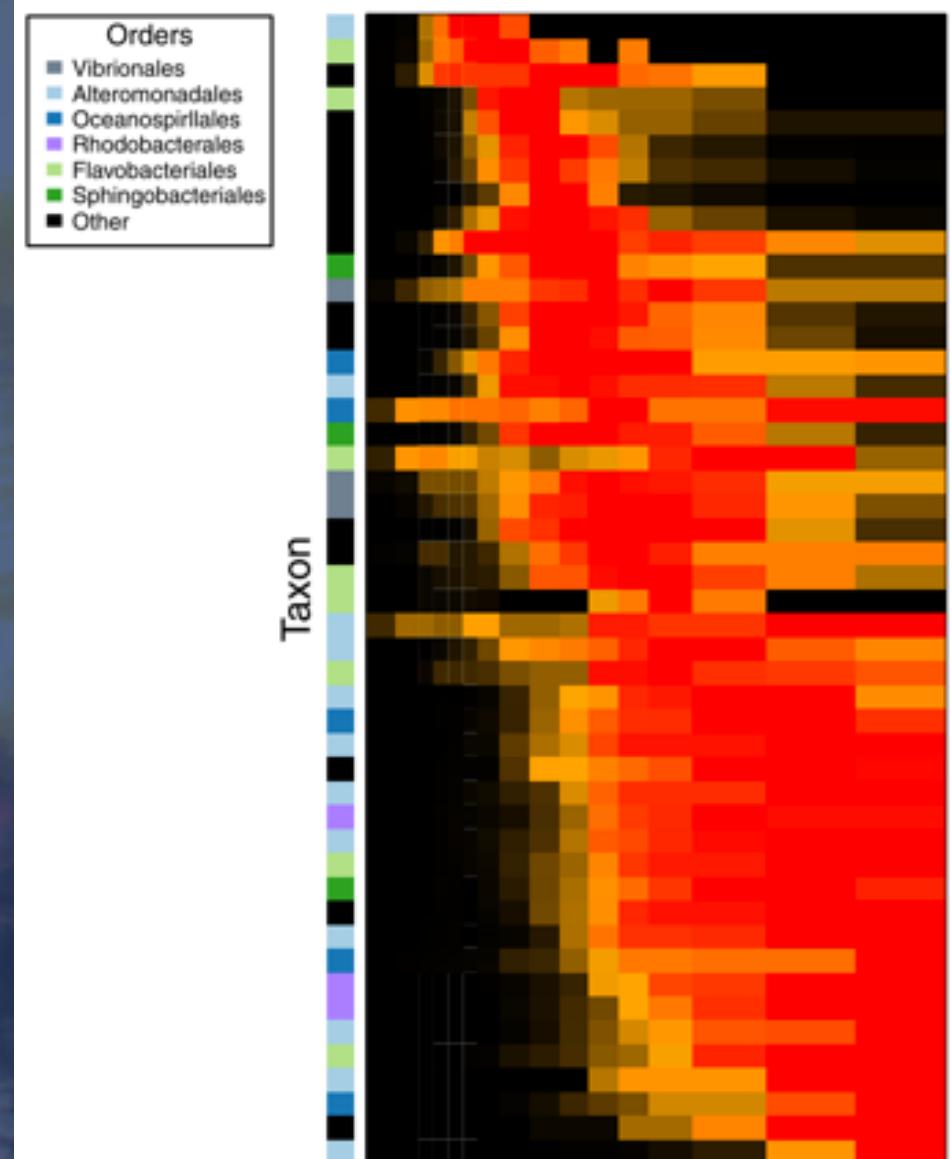
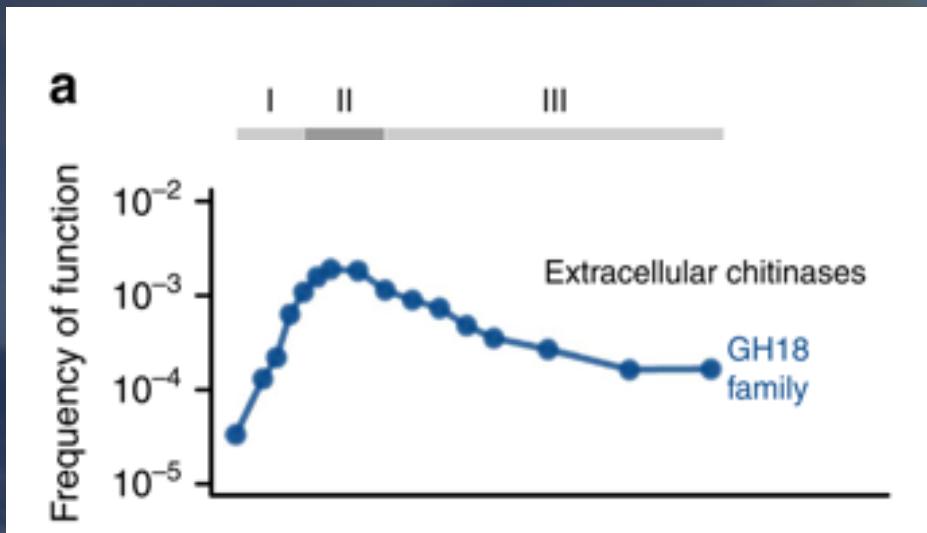
Selection: Three communities with the highest chitinase activity used for next generation inoculum.

Random control: Three random communities selected for the next generation inoculum.

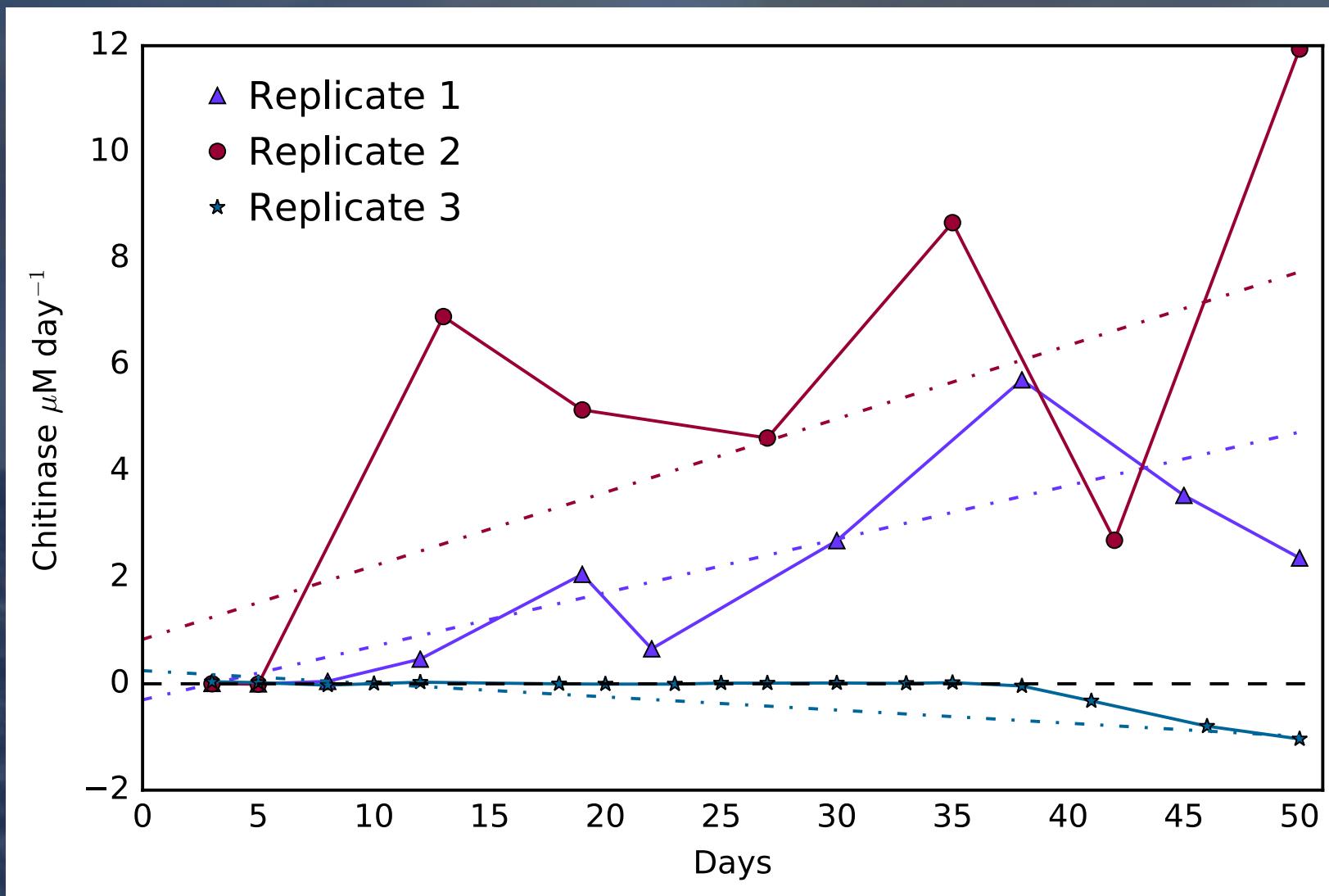
Results: first artificial selection experiment



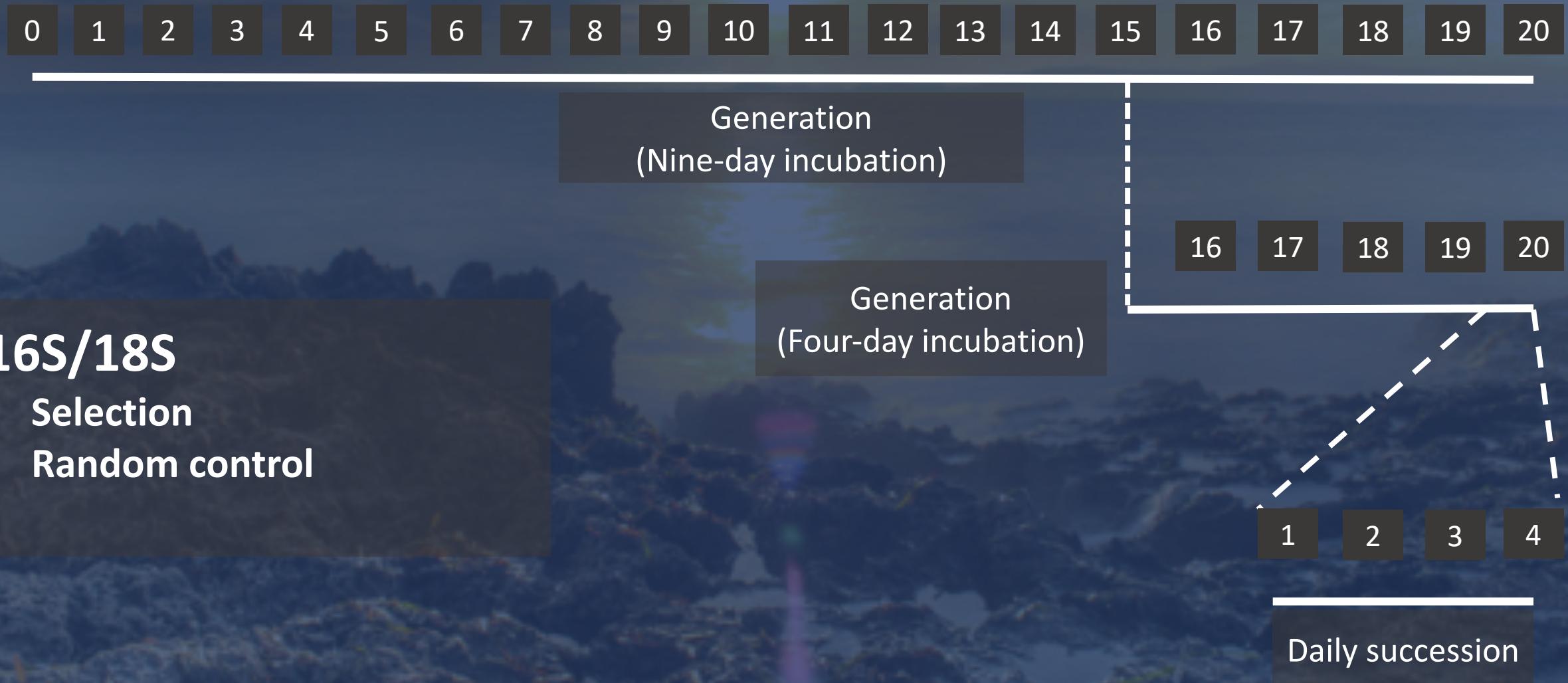
Results: first artificial selection experiment



Results: second artificial selection experiment



Method: MiSeq (community sequencing)

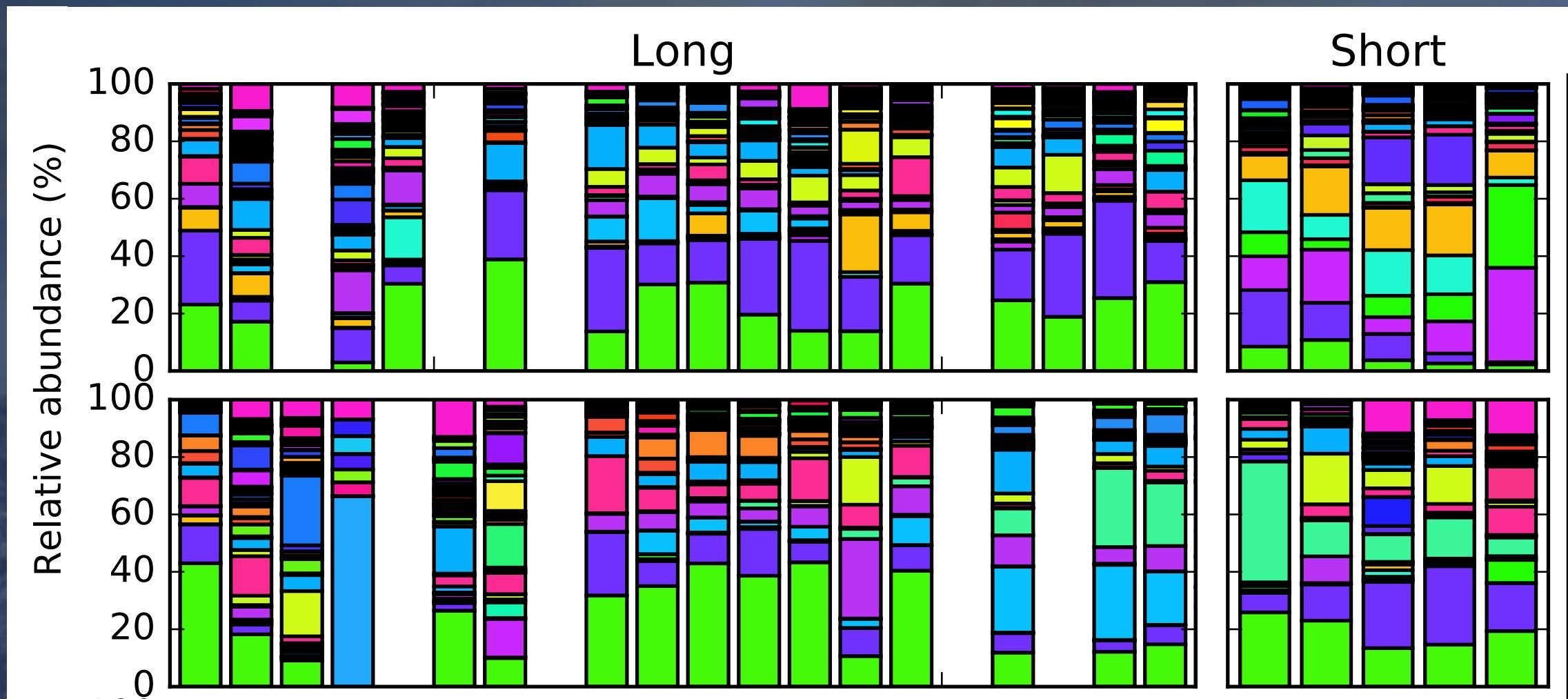


Method: MiSeq (community sequencing)

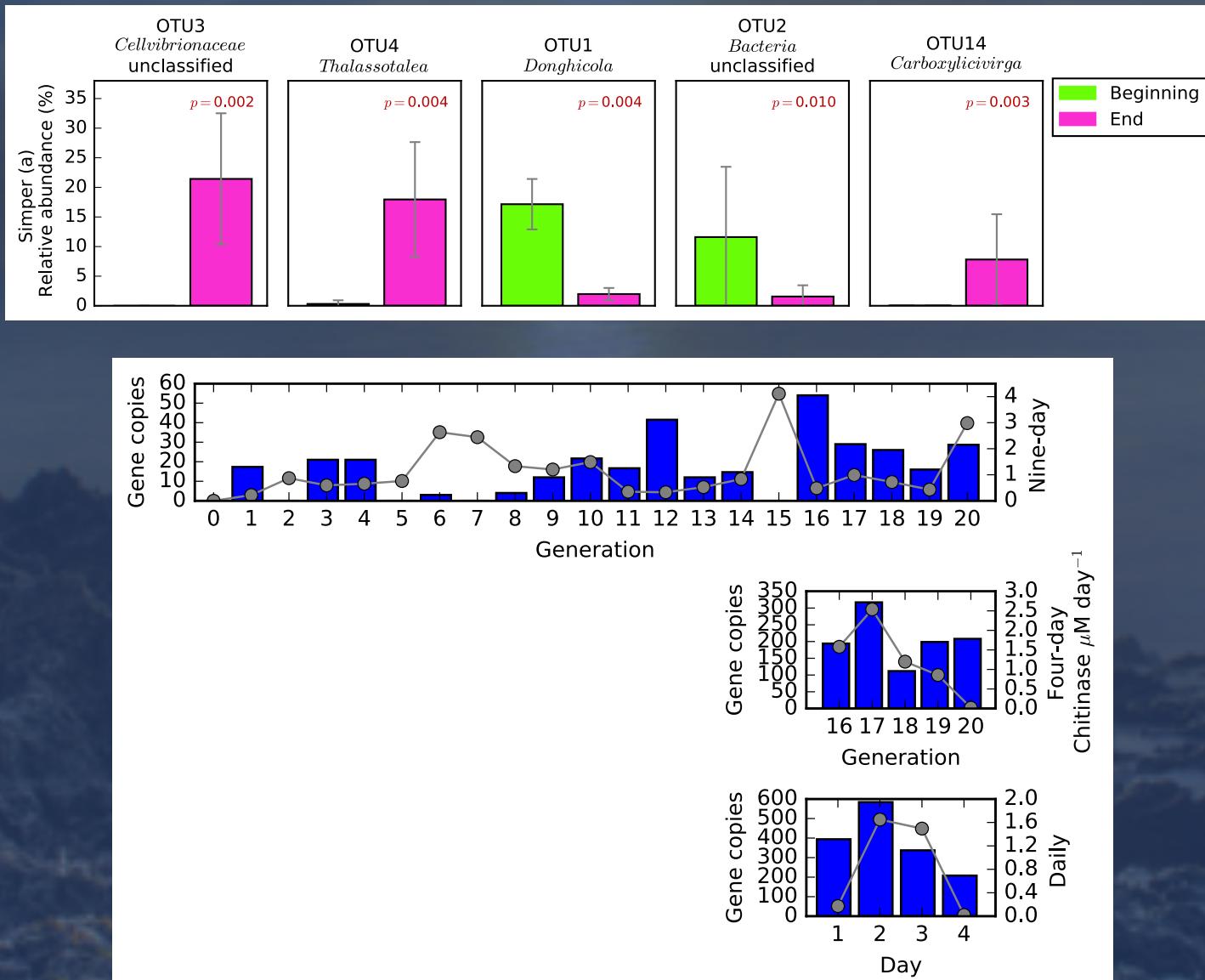
Aims

- What changed over the whole experiment?
- What were the major differences between the beginning and the end?
- What changed when I used optimal selection time?
- Is change in chitinase activity associated with any particular groups or organisms?
- Do I see community succession?

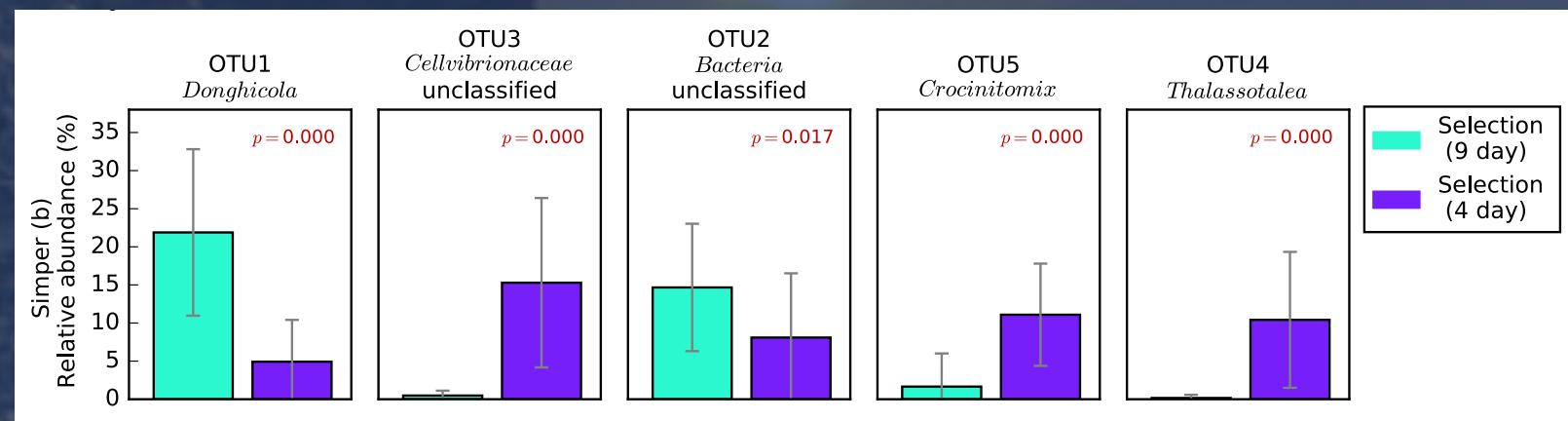
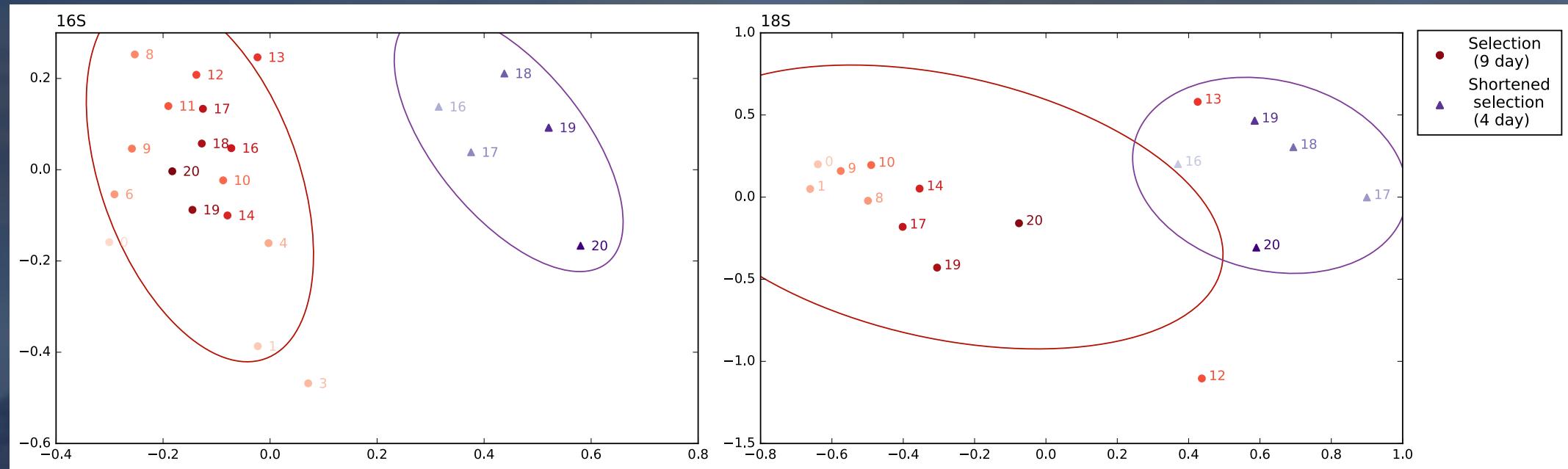
Results: MiSeq – change over the whole experiment



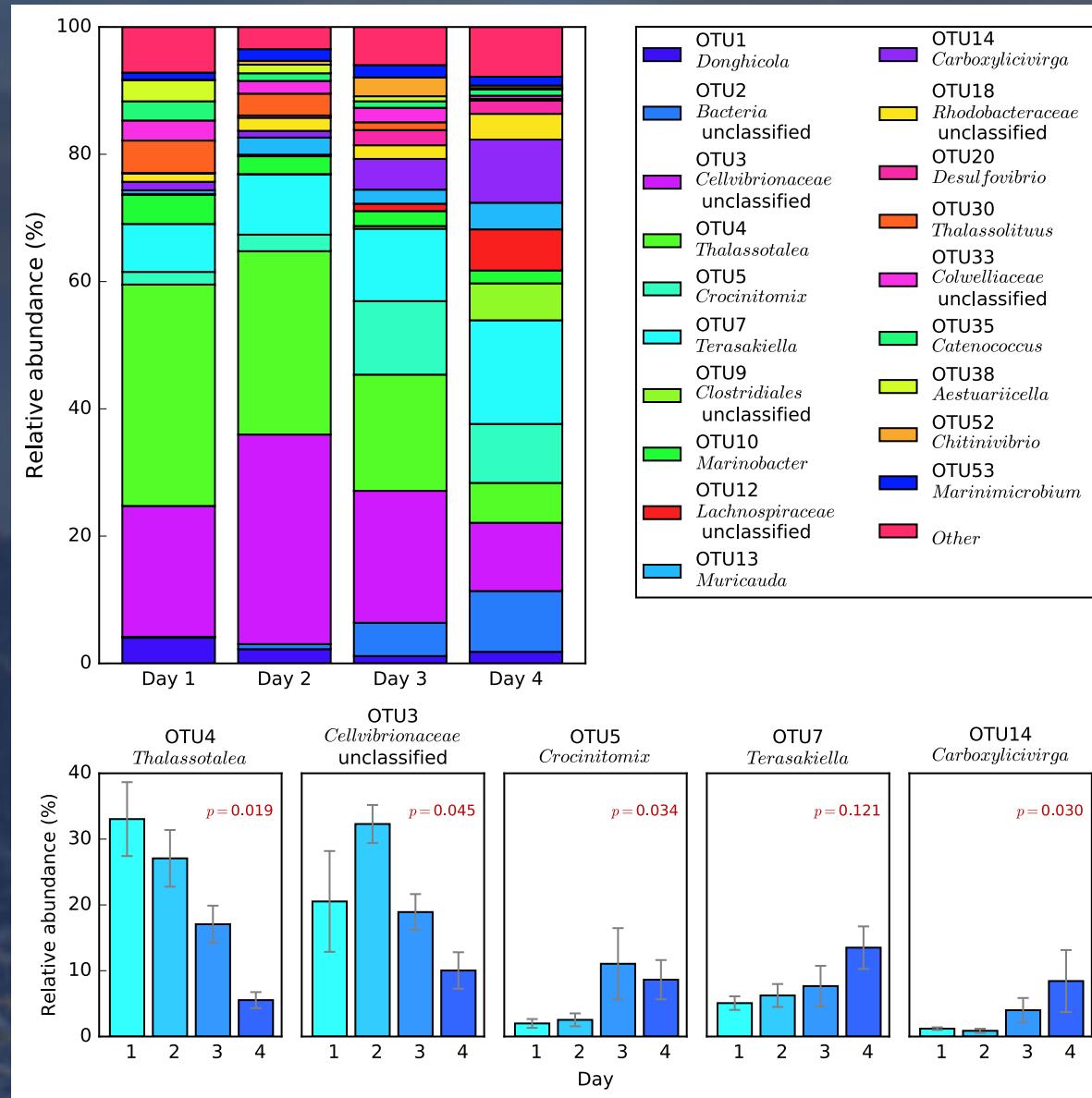
Results: MiSeq – change over the whole experiment



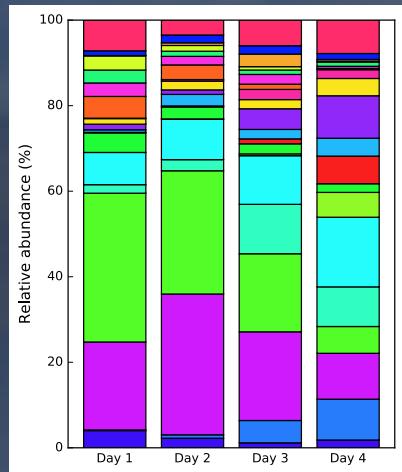
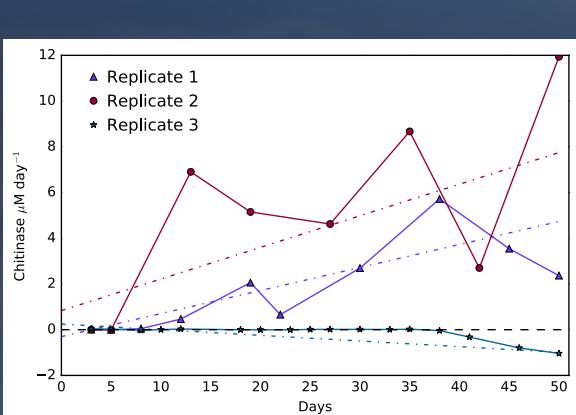
Results: MiSeq – differences with optimal selection time



Results: MiSeq – succession within a generation



Summary



- Chitinase activity increased across the experiment
- Optimal selection time is very important
- Enrichment of chitin degraders (currently looking at degradative ability of isolates)

Future work

- Current work is applying this to PET
 - Looking at community succession before and after the selection
- Using PET monomer BHET and a range of different types of PET (low crystallinity, weathered, etc.)



Acknowledgements



@RobynJWright

- Joseph Christie-Oleza
- Matthew Gibson
- Christie-Oleza group:



www.christieoleza-lab.com

