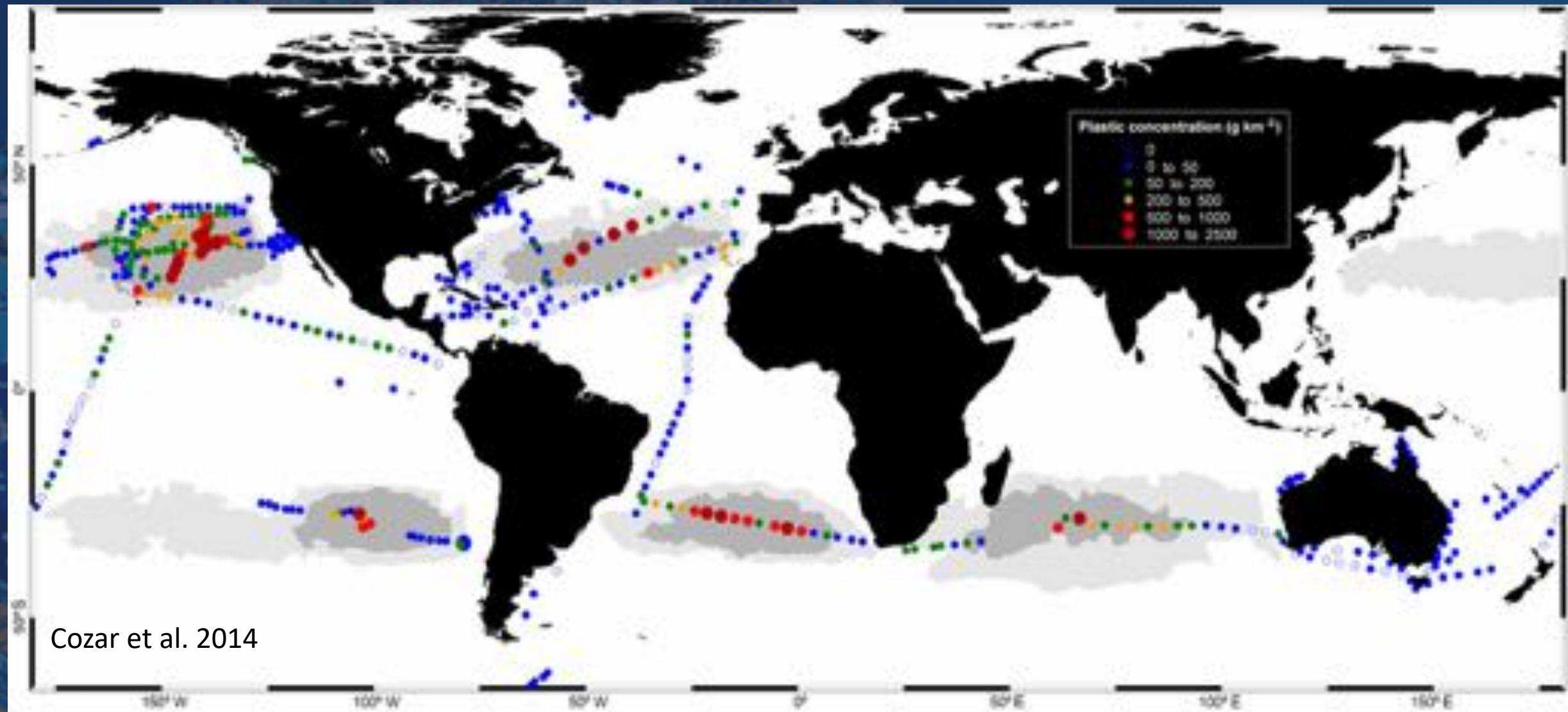
The background image shows a vast, sprawling landfill or waste disposal site from an aerial perspective. The landscape is dominated by large, irregular piles of discarded materials, primarily plastic waste, which appears as small, colorful specks against the dark earth. In the foreground, there's a mix of industrial structures, possibly conveyor belts or processing equipment, and some sparse vegetation. The overall scene conveys a sense of environmental degradation and the scale of waste management challenges.

Artificial ecosystem selection for marine polymer degradation

Robyn Wright

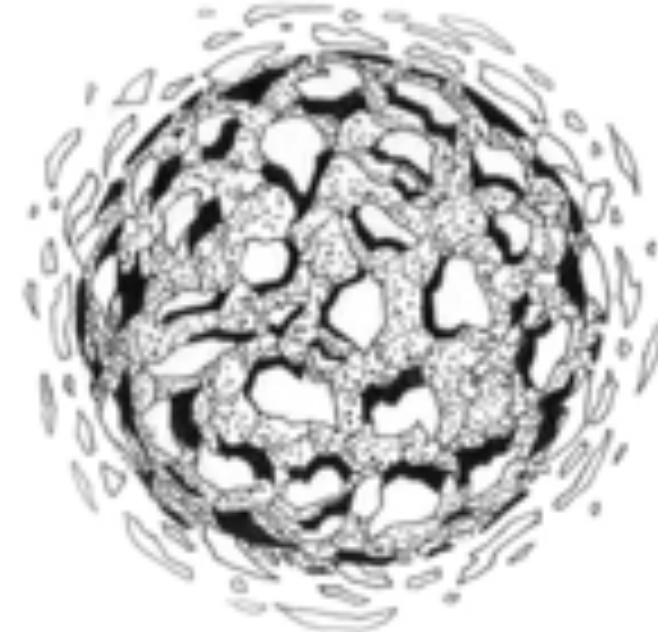
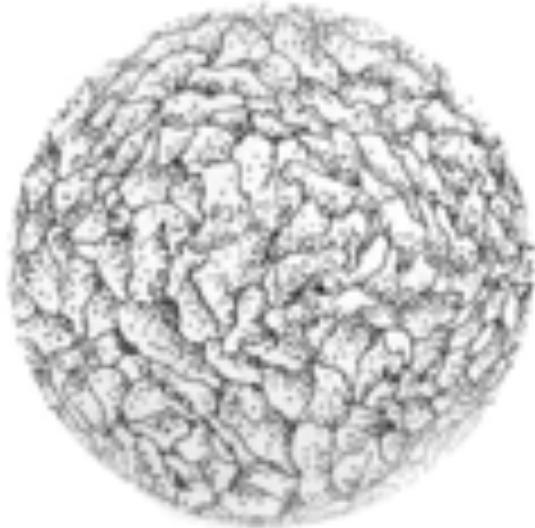
Supervisors: Joseph Christie-Oleza
and Matt Gibson



Cozar et al. 2014

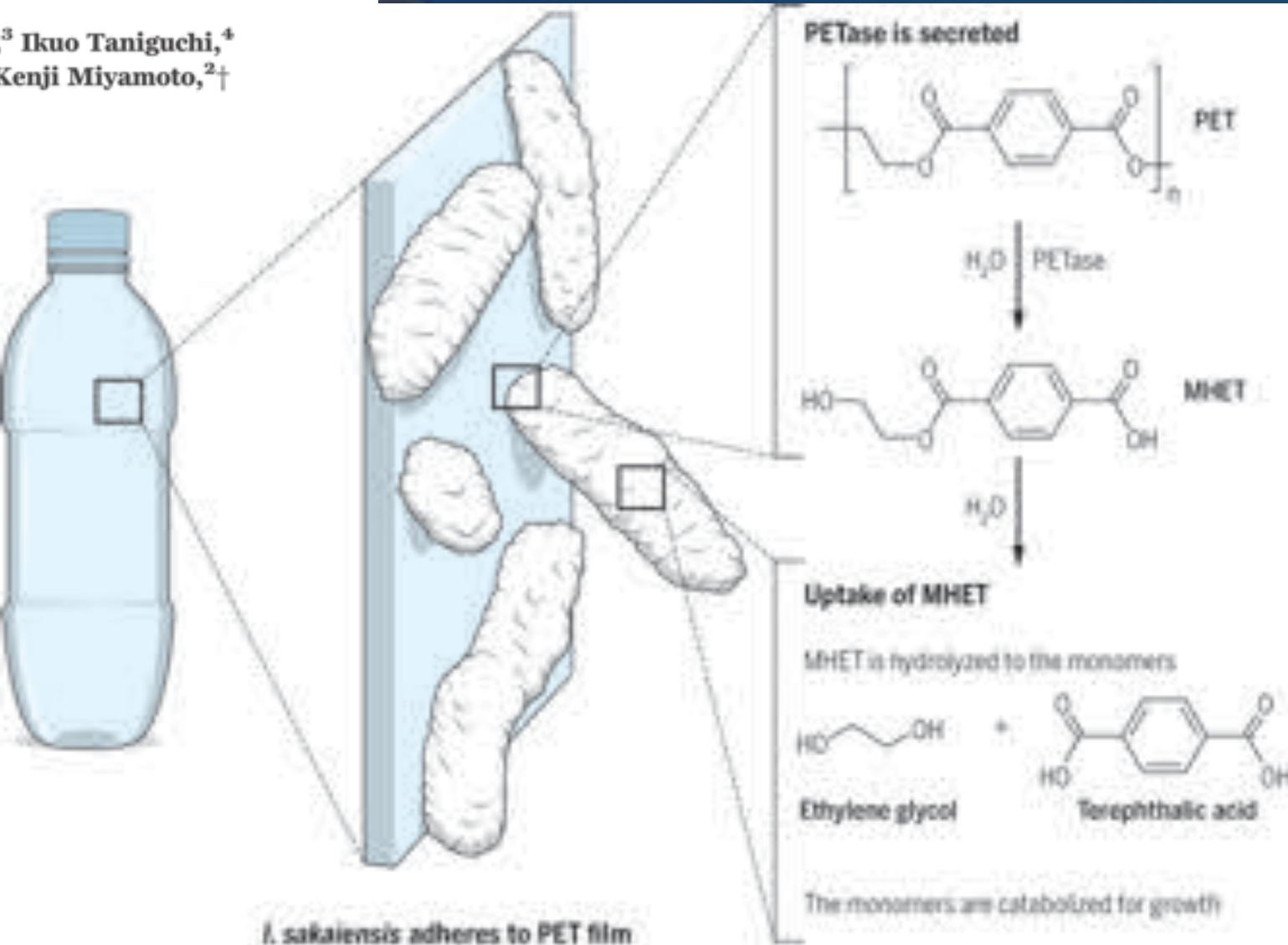
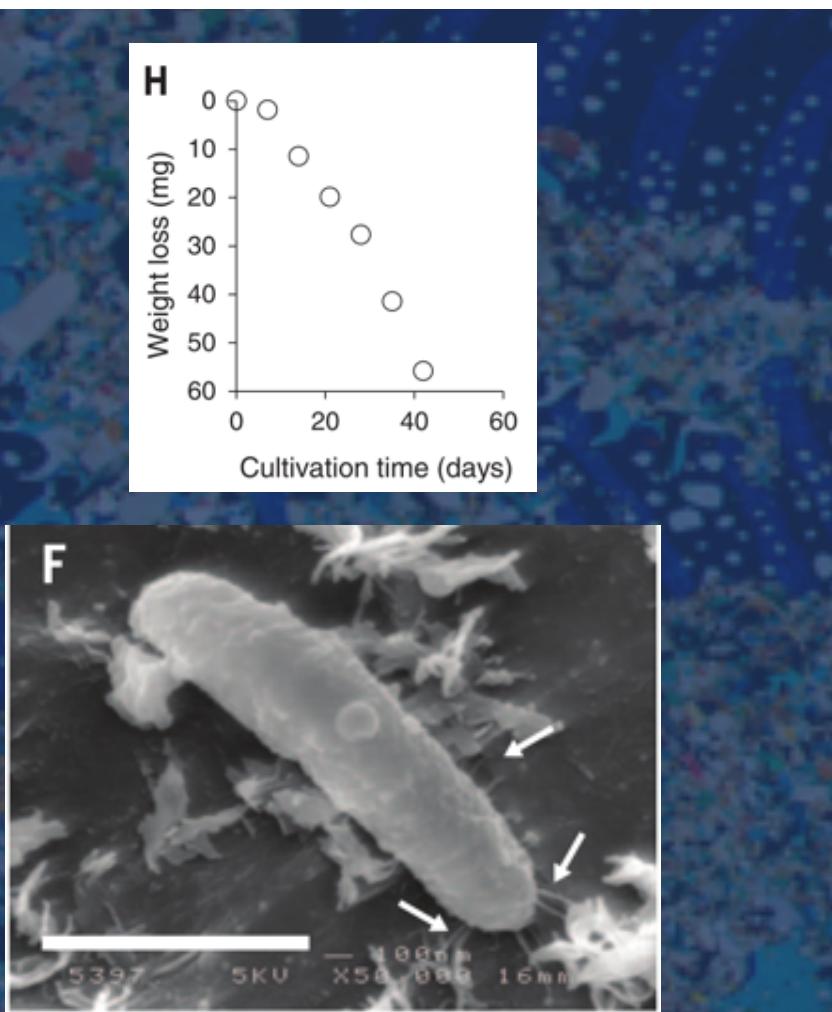
The problem...

Andrade 2017

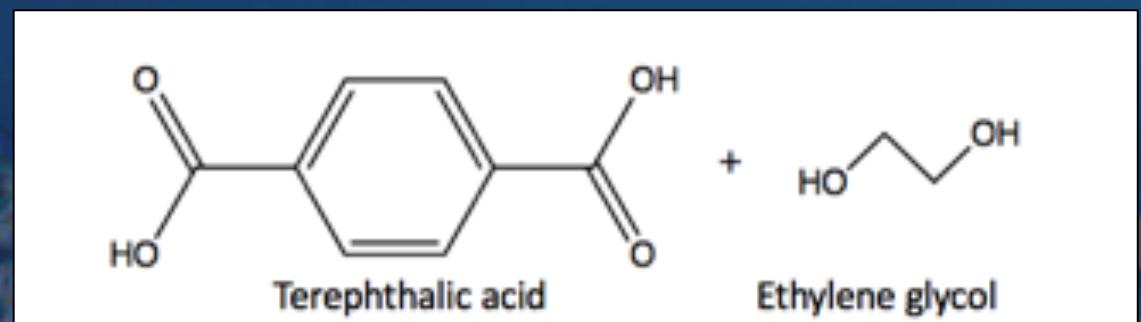
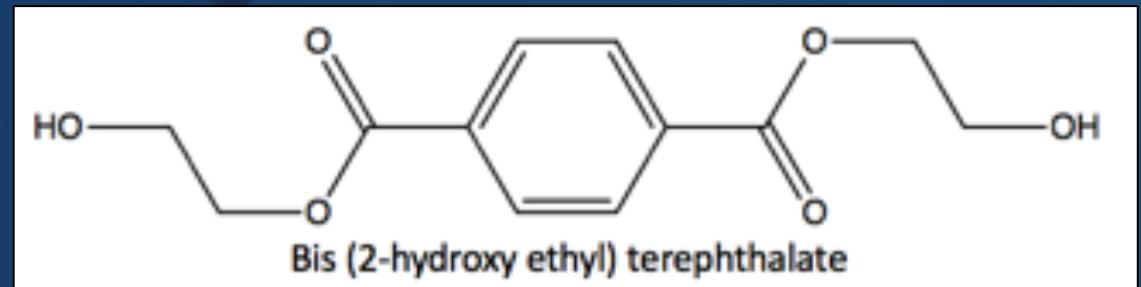
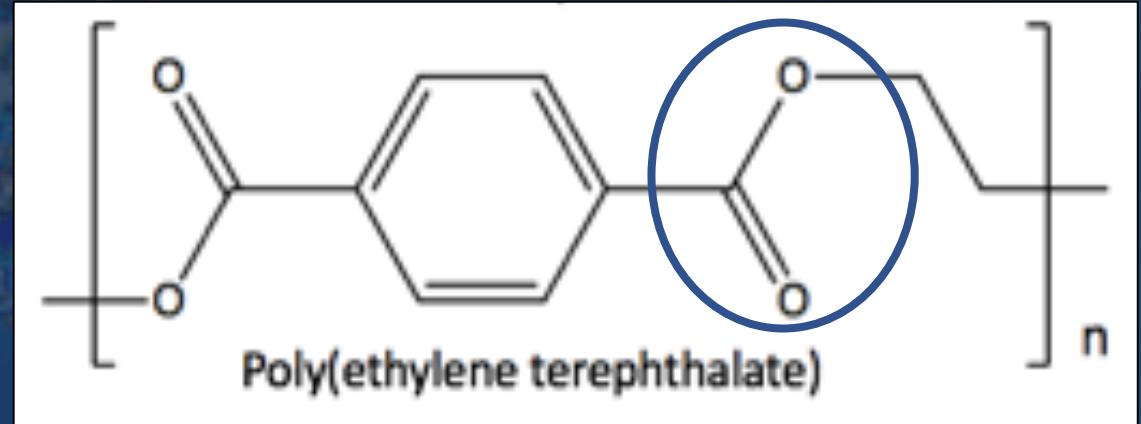


A bacterium that degrades and assimilates poly(ethylene terephthalate)

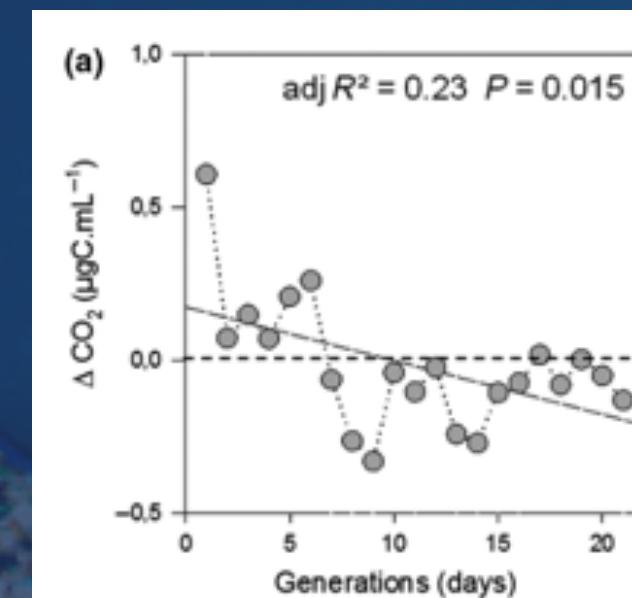
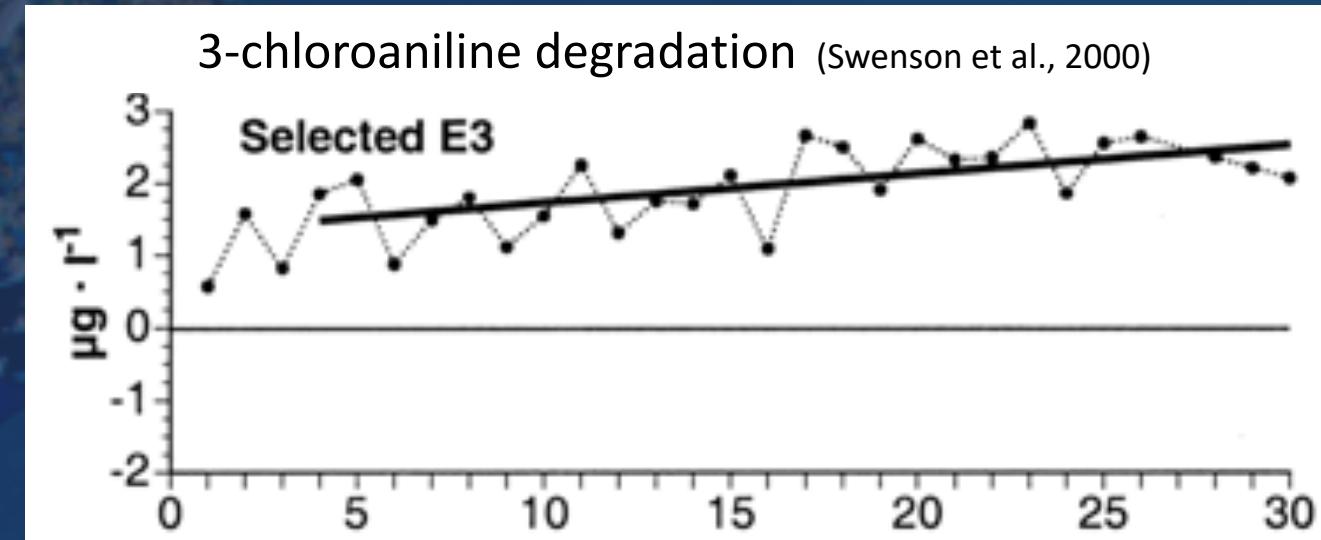
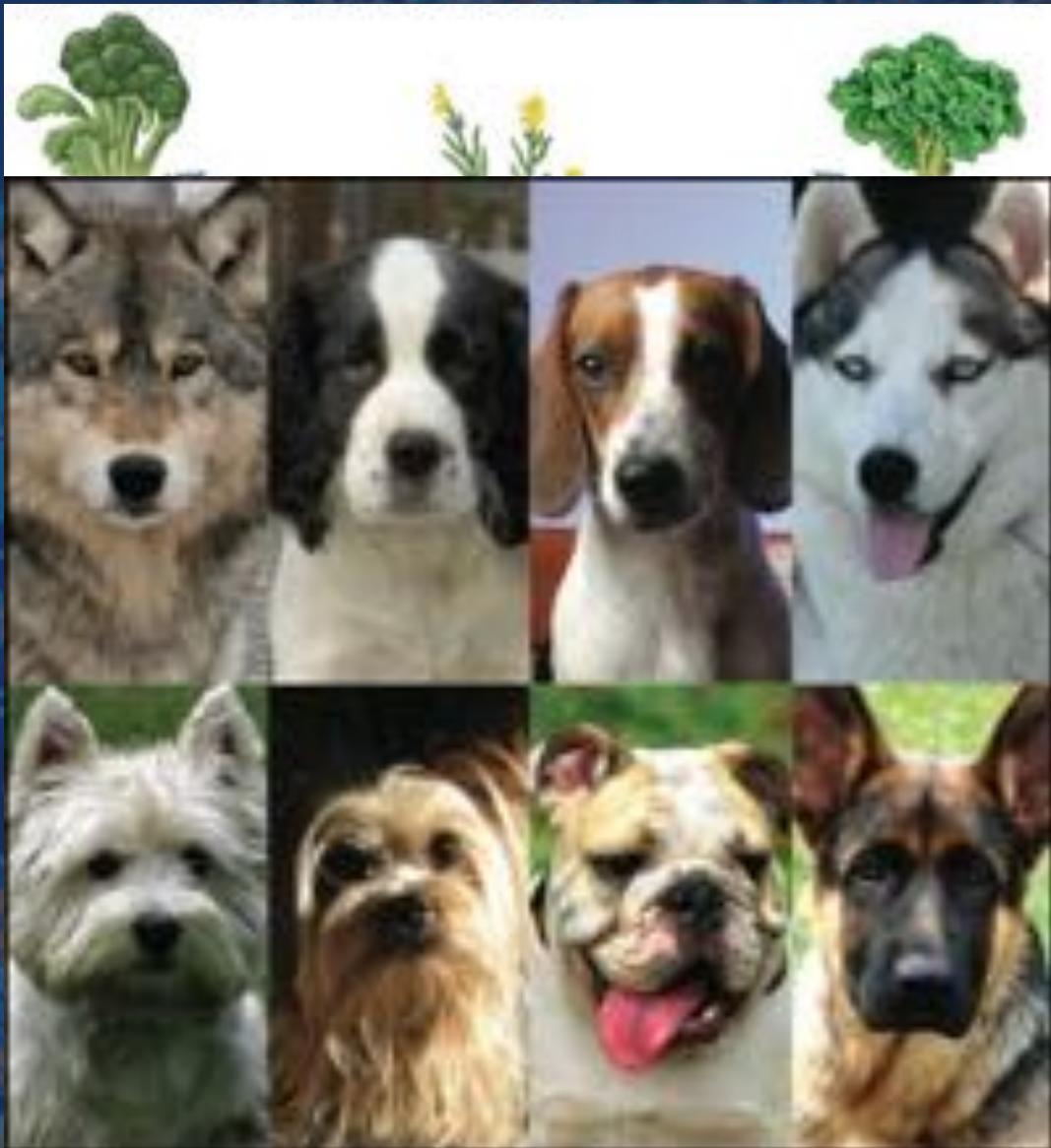
Shosuke Yoshida,^{1,2*} Kazumi Hiraga,¹ Toshihiko Takehana,³ Ikuo Taniguchi,⁴ Hironao Yamaji,¹ Yasuhito Maeda,⁵ Kiyotsuna Toyohara,⁵ Kenji Miyamoto,^{2,†} Yoshiharu Kimura,⁴ Kohei Oda^{1,‡}



Can PET be degraded in marine systems?

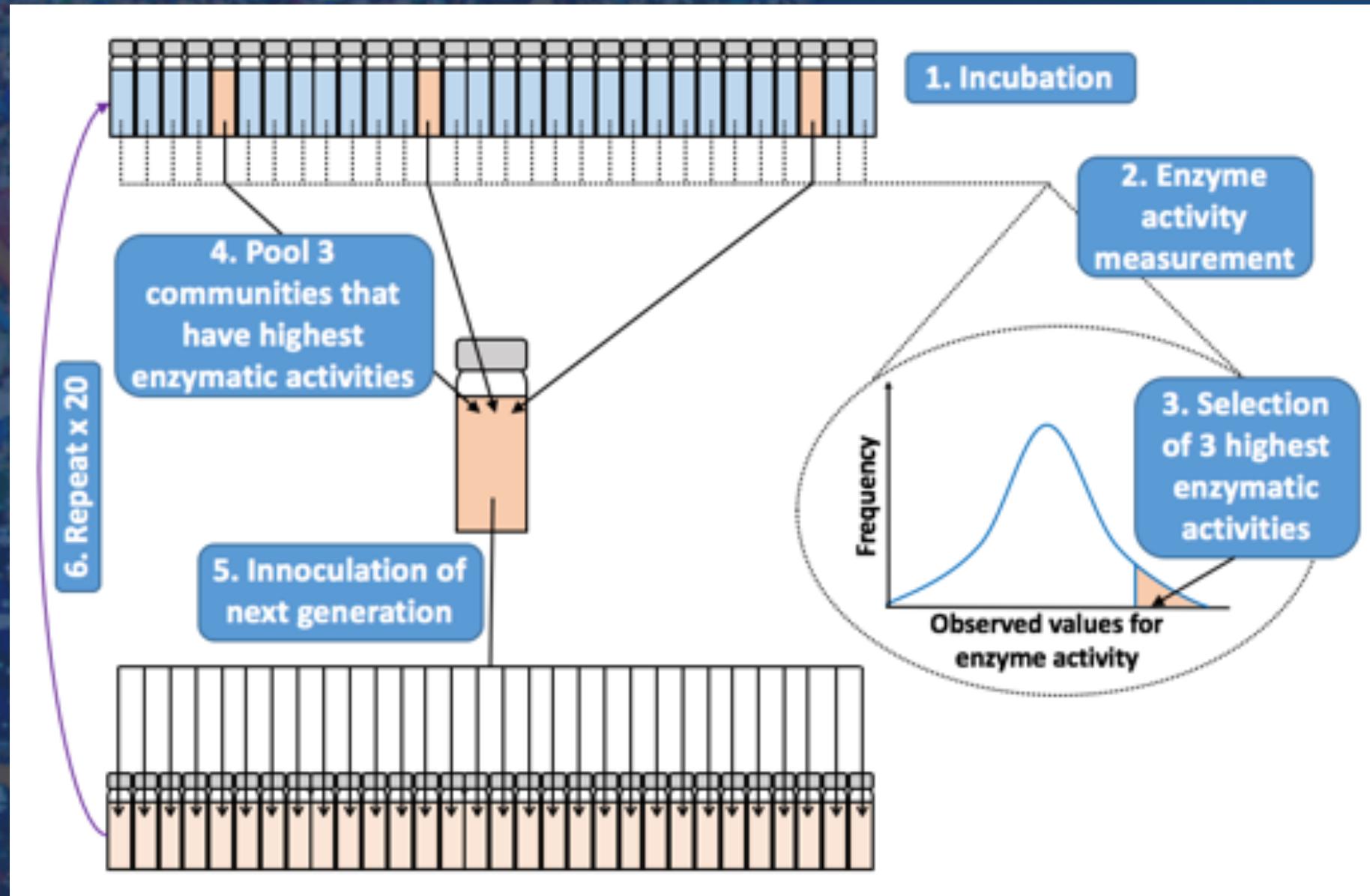


Artificial selection

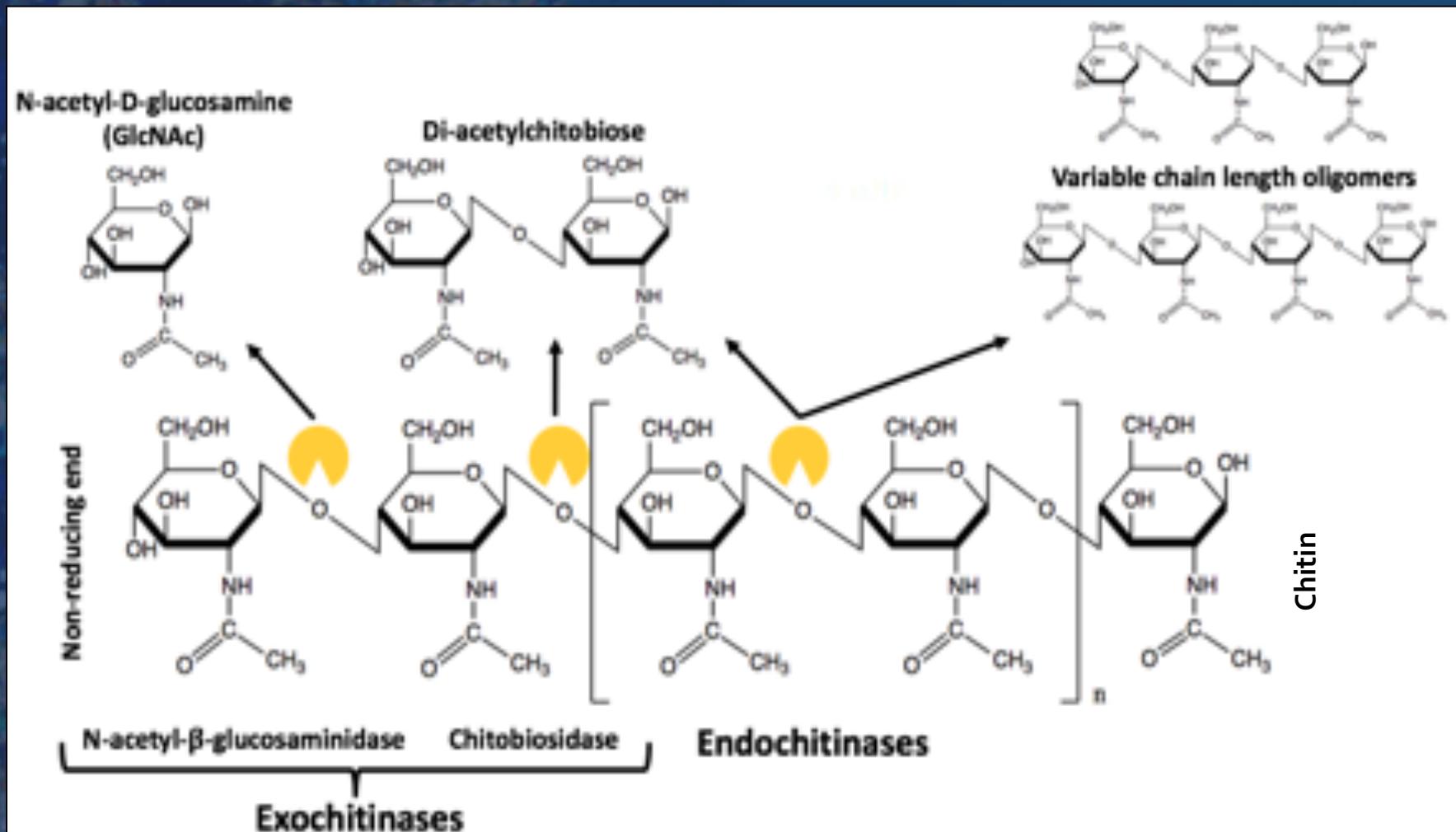


Lower CO₂ production
(Blouin et al., 2015)

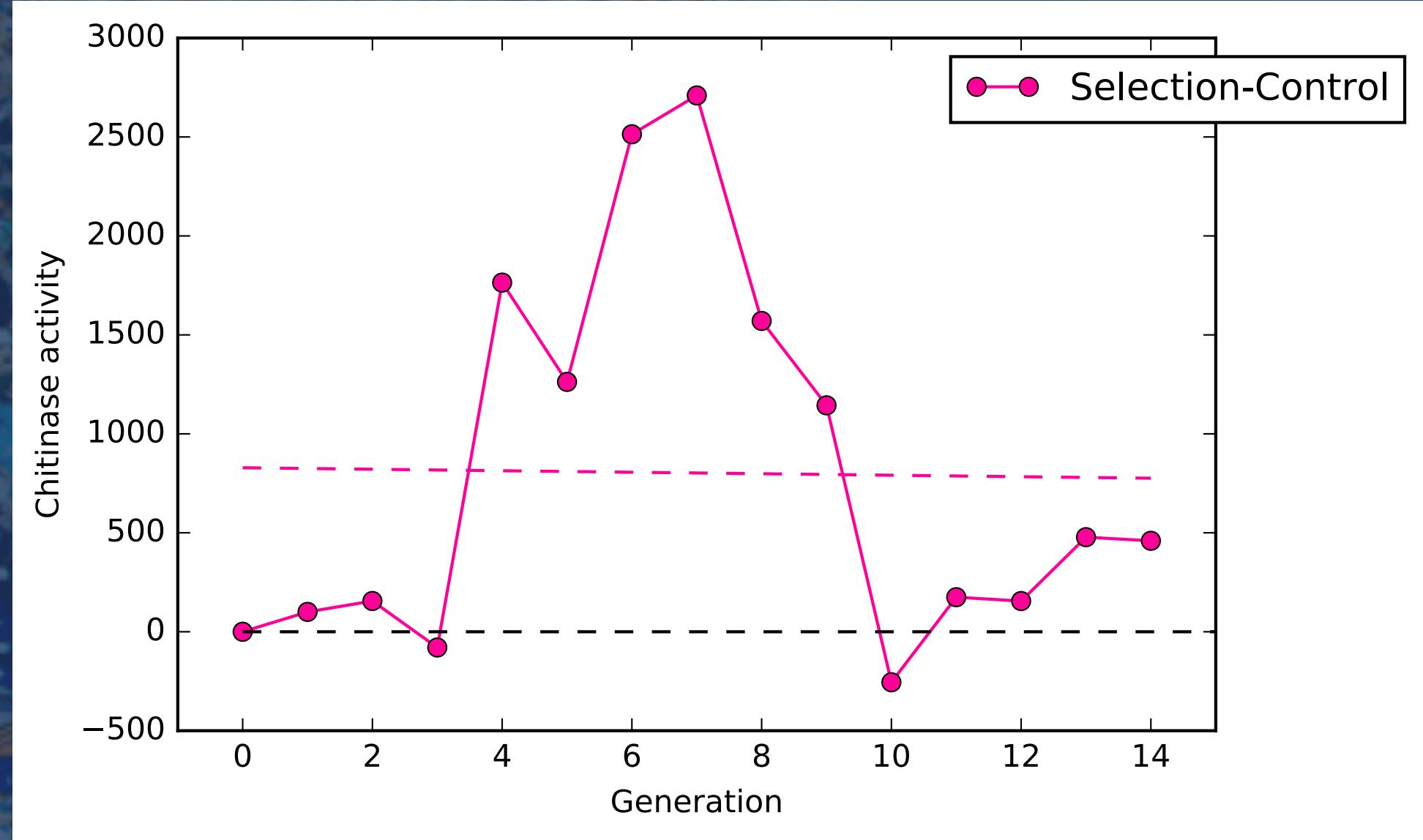
Method



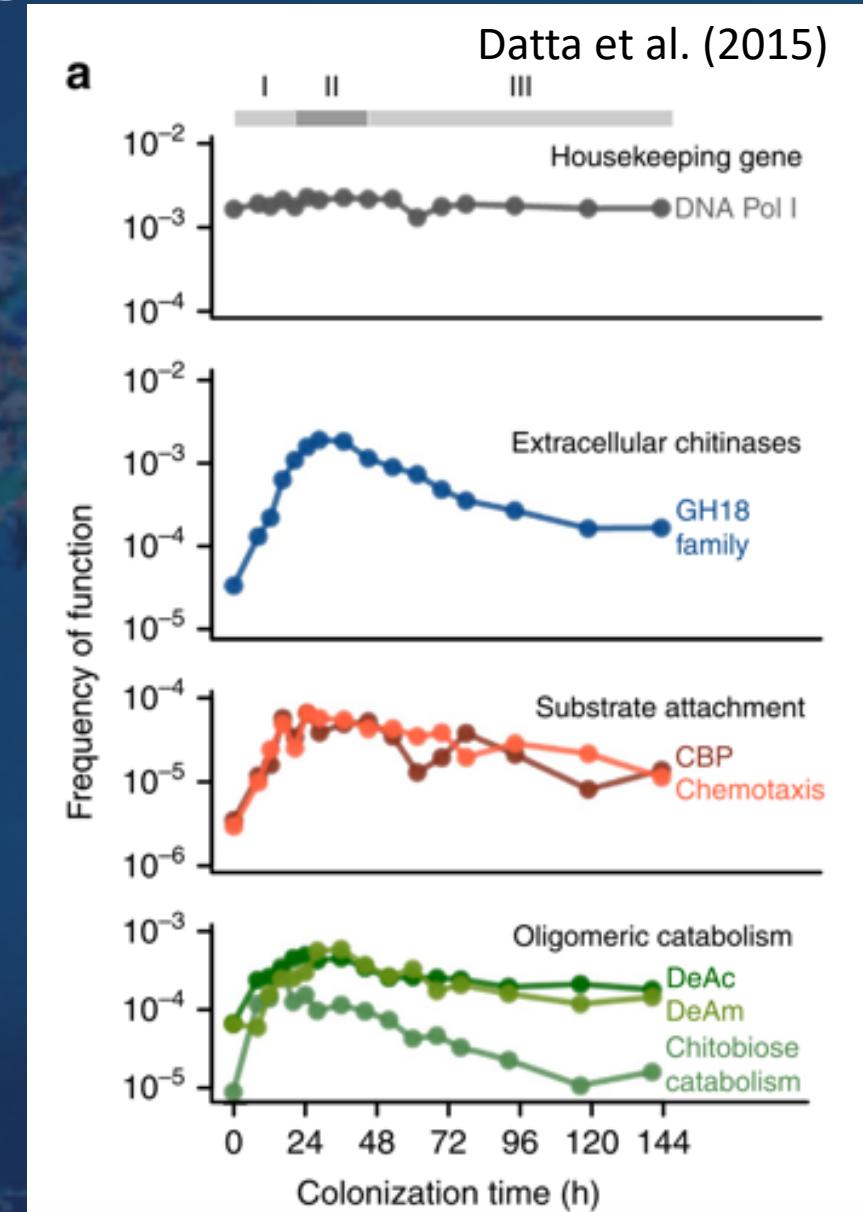
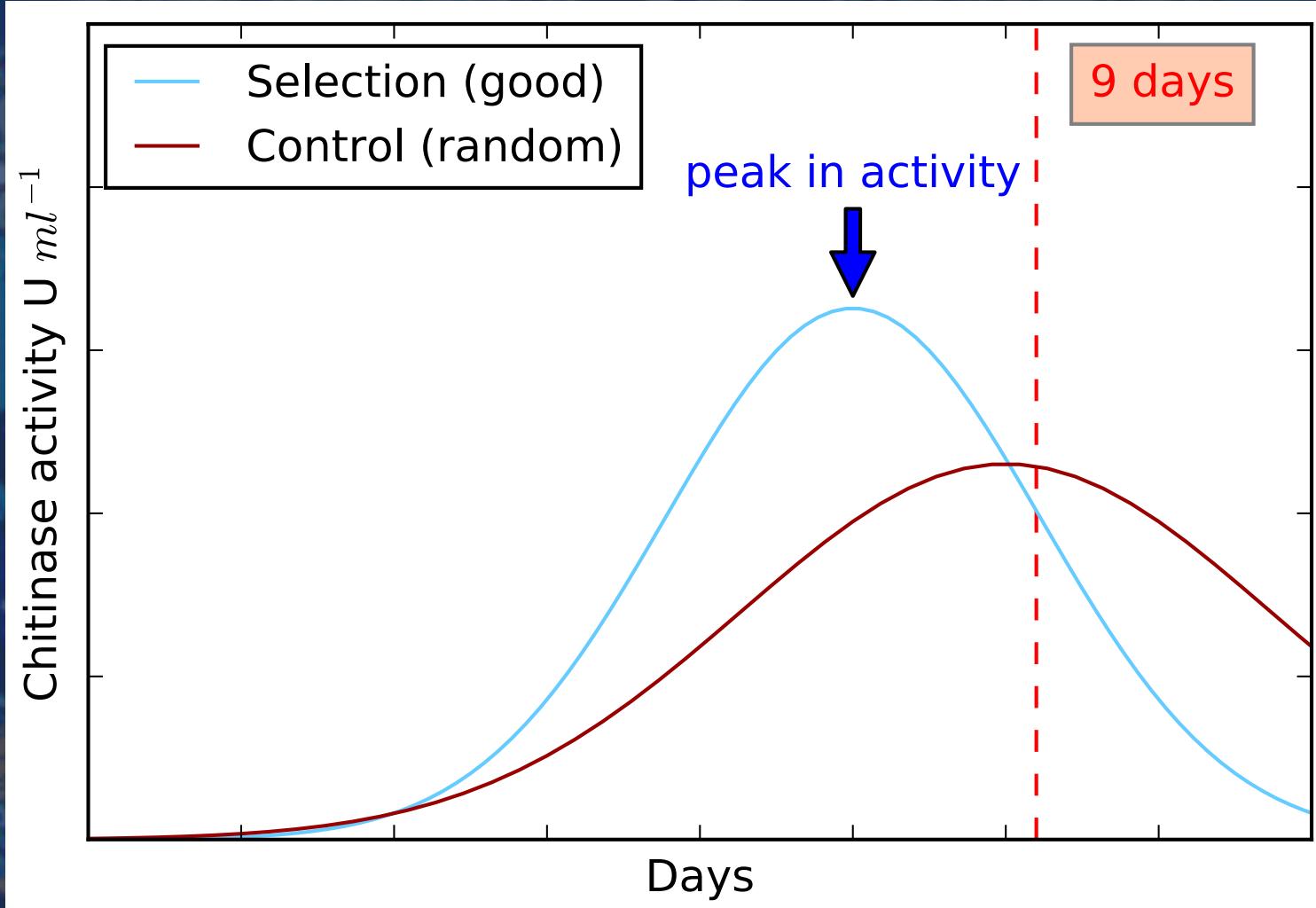
Chitin



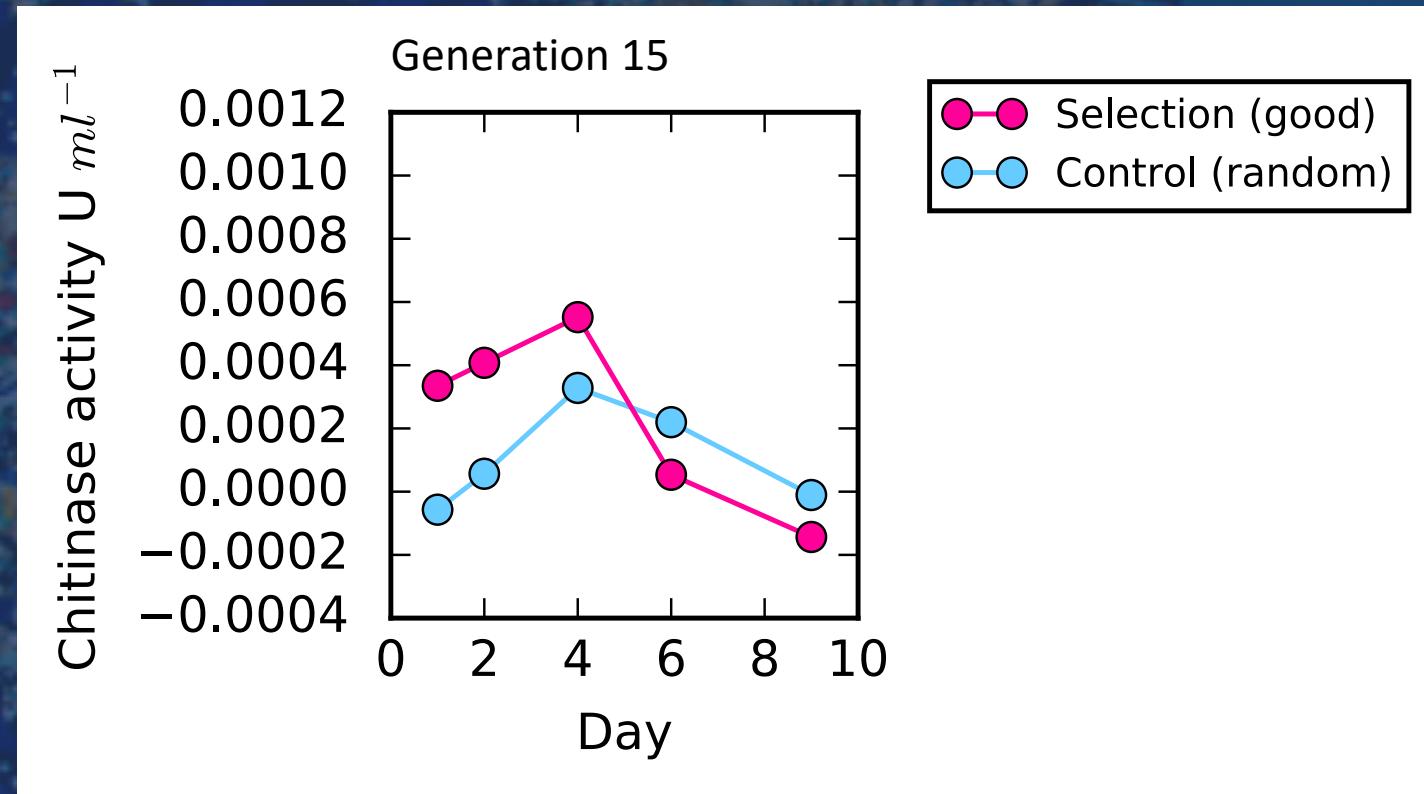
Results



Why was the selection not working as expected?



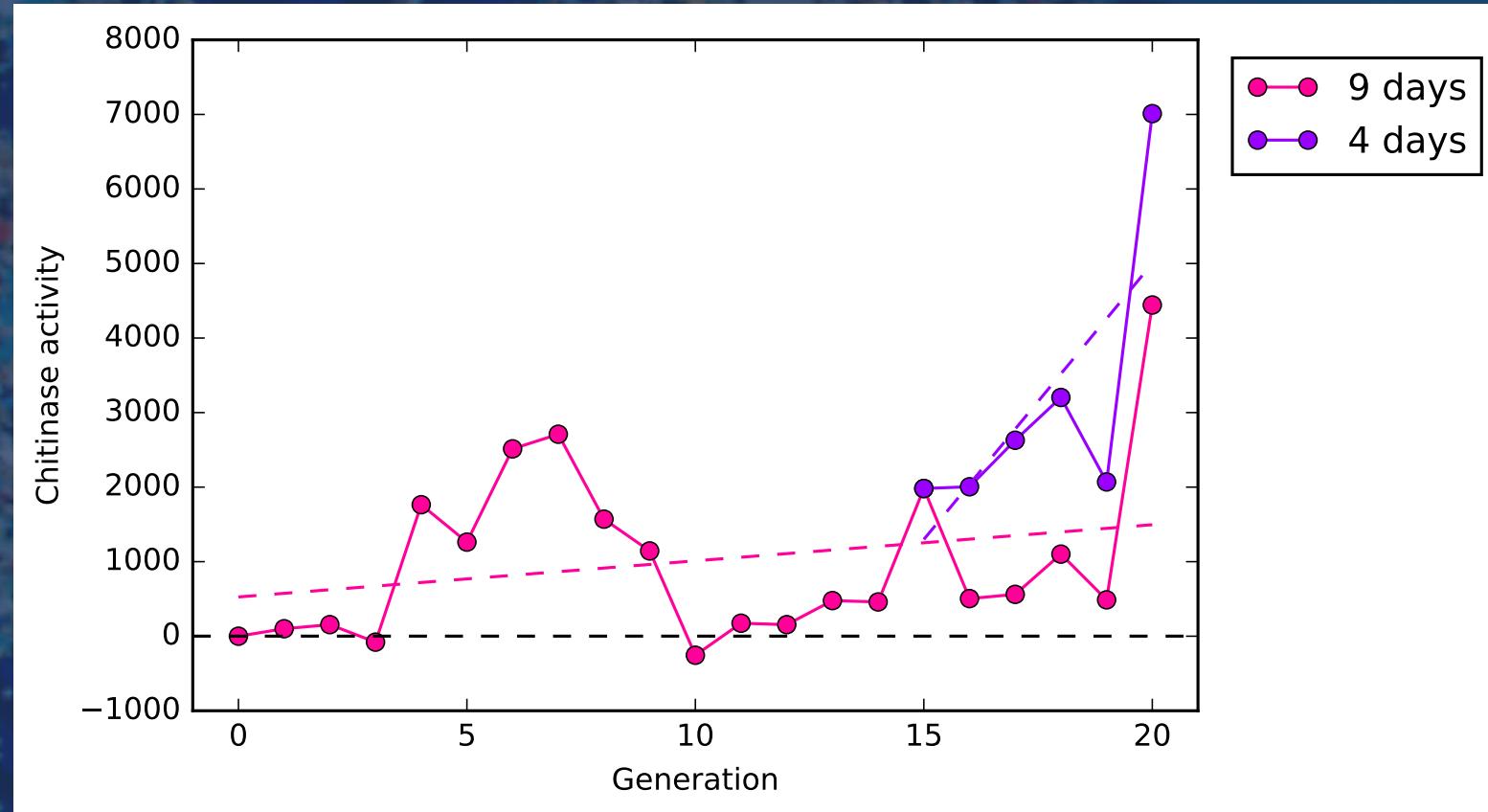
Why was the selection not working as expected?



Optimal incubation reduced to 4 days (from 9 days).

After shortening incubation time

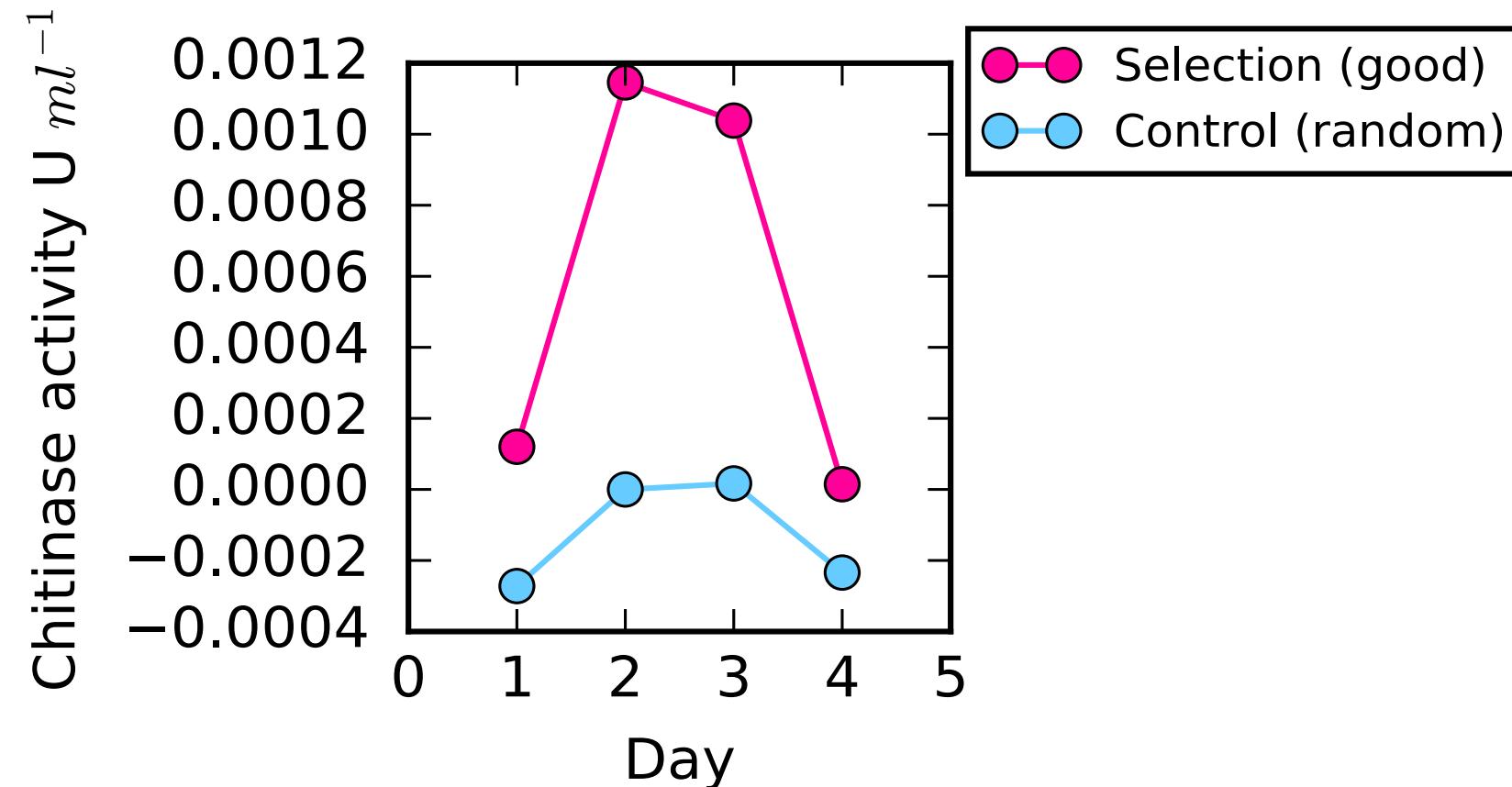
Graph showing *selection – control*



9 day generation incubation time:
little increase in chitinase activity.

4 day generation incubation :
increase in chitinase activity.

Generation 20



Optimal incubation reduced to 2 days (from 4 days).

MiSeq

Generation
(9 day incubation)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

16 17 18 19 20

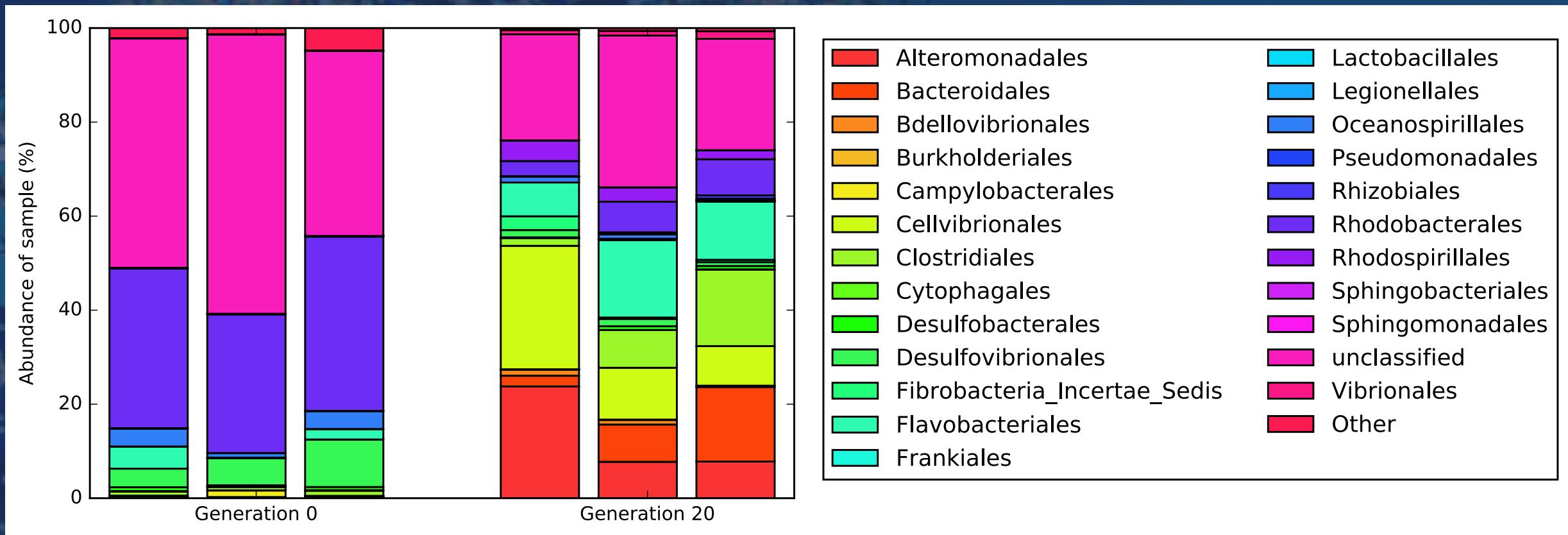
Generation
(4 day incubation)

1 2 3 4

Days

16S chitin community: order

Generations 0 vs 20



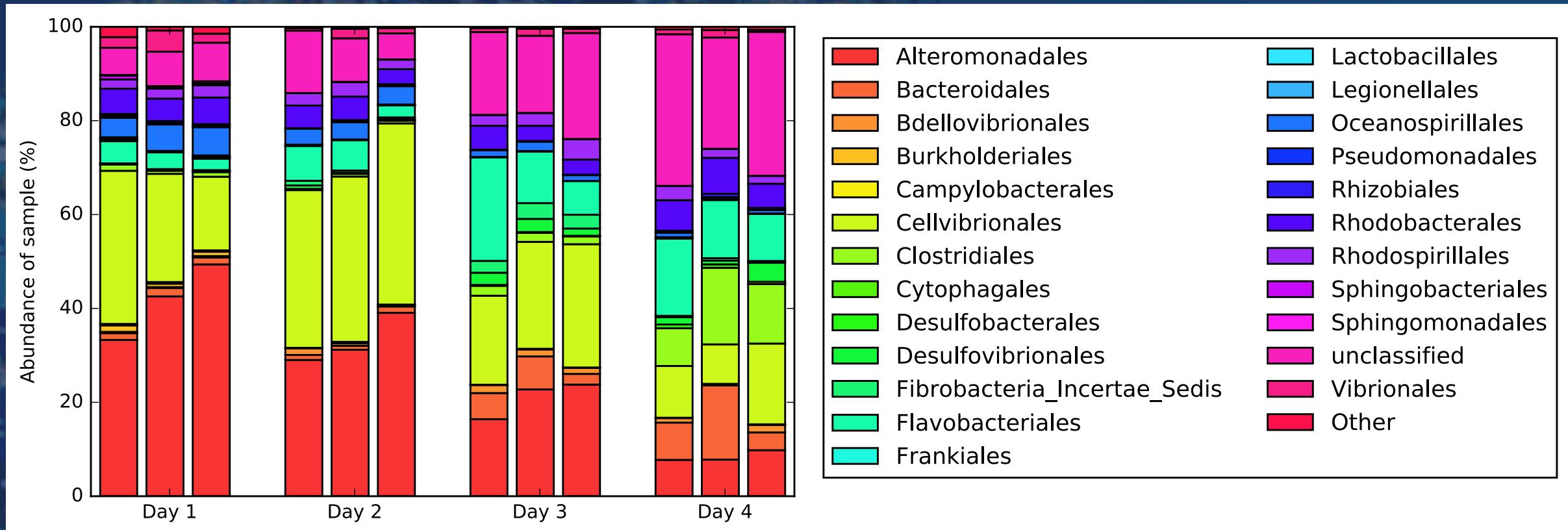
- Alteromonadales
- Cellvibrionales

- Clostridiales
- Flavobacterales

- Rhodobacterales
- Unclassified

16S chitin community: order

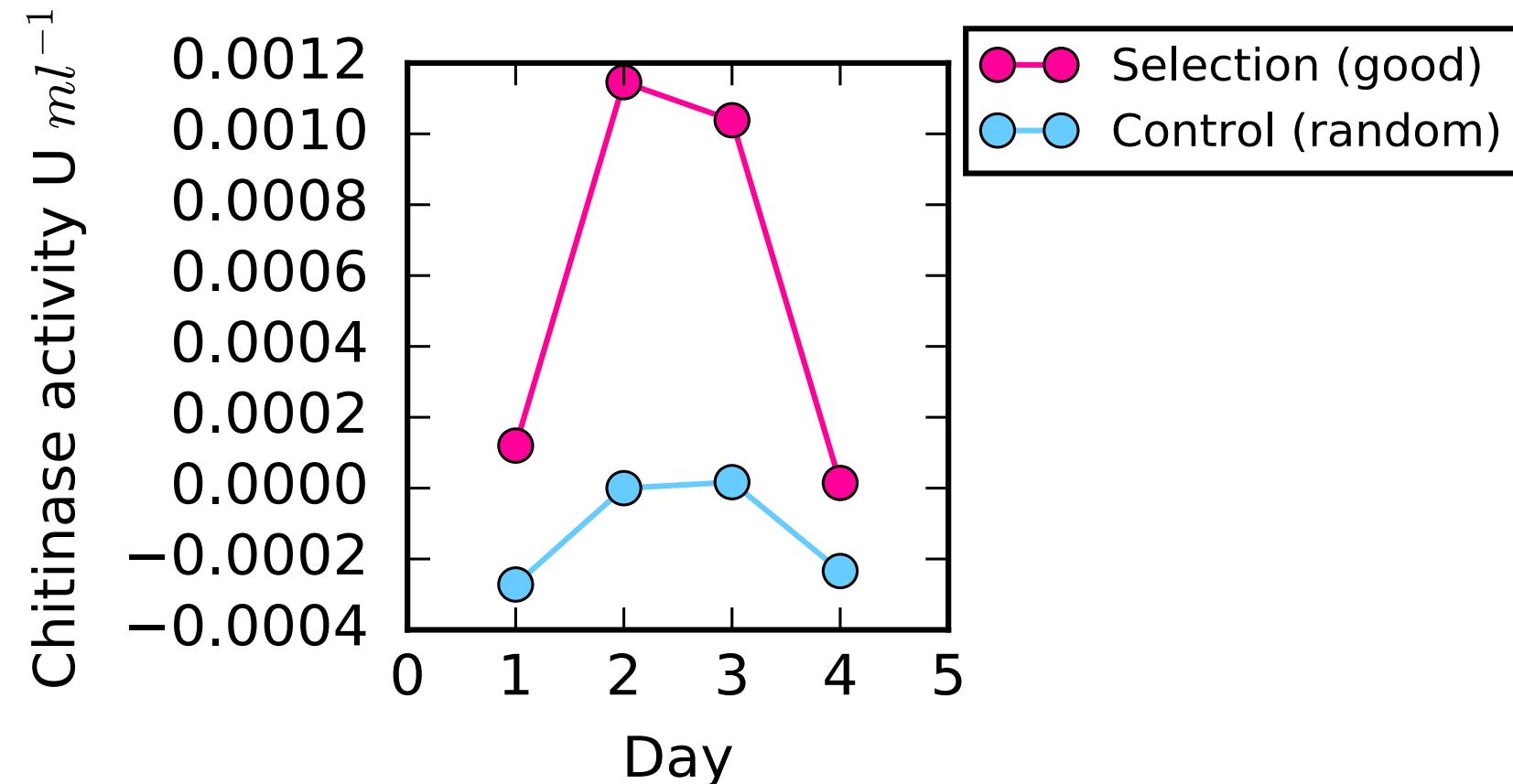
Generation 20 – days 1, 2, 3, 4



- Alteromonadales
- Bacteroidales
- Cellvibrionales
- Flavobacterales
- Oceanospirillales
- Rhodobacterales
- Unclassified

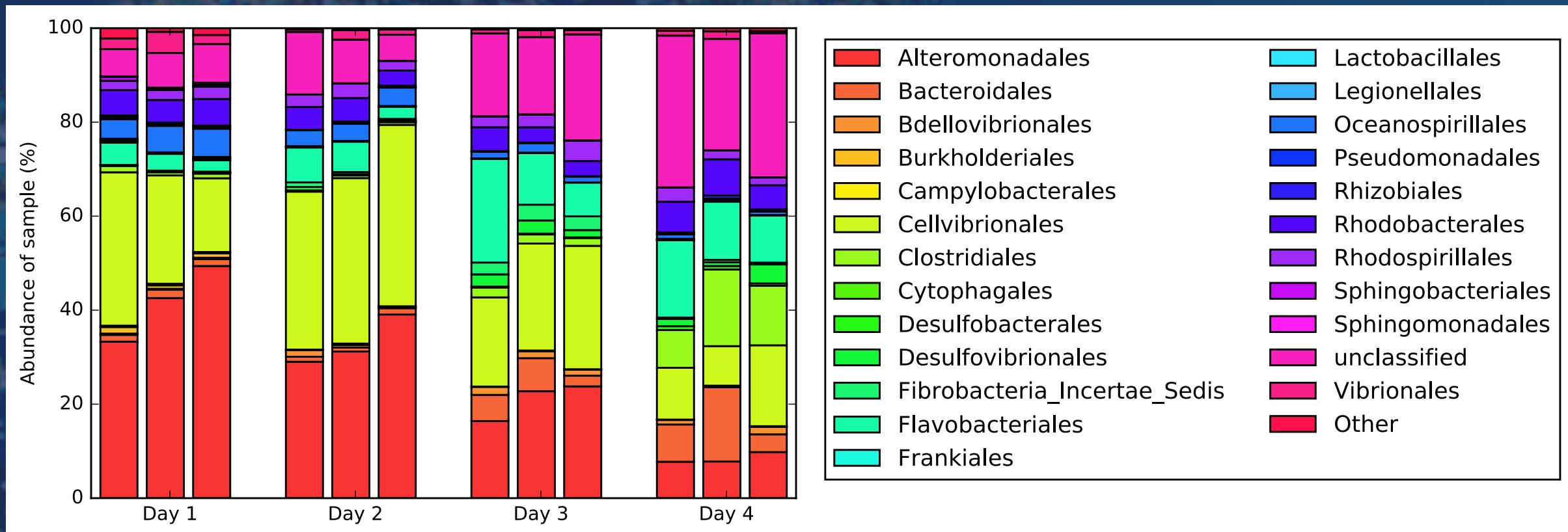
16S chitin community: order

Generation 20 – days 1, 2, 3, 4



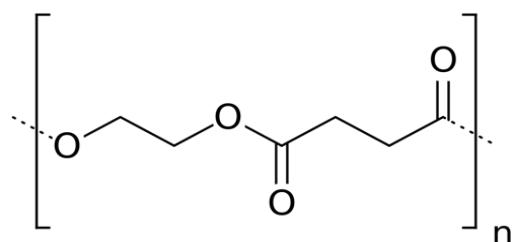
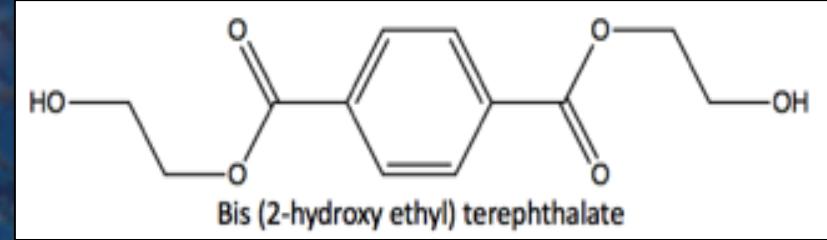
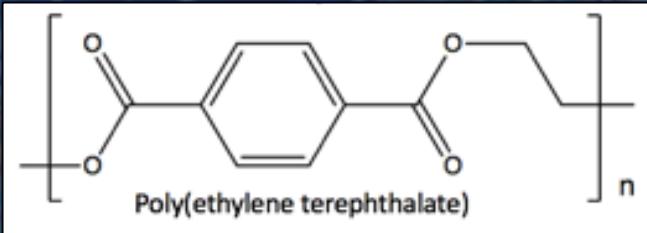
16S chitin community: order

Generation 20 – days 1, 2, 3, 4

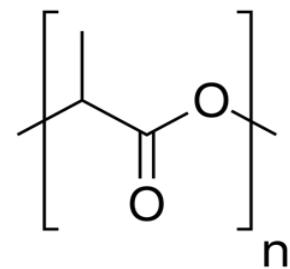


- Alteromonadales
- Bacteroidales
- Cellvibrionales
- Flavobacterales
- Oceanospirillales
- Rhodobacterales
- Unclassified

Future



Polyethylene succinate



Acknowledgements

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Joseph Christie-Oleza

Matt Gibson

Christie-Oleza group

Gibson group



Thanks for listening!!

