



Aalborg Universitet

AALBORG UNIVERSITY
DENMARK

Mapping of Several Putative Polyphosphate-Accumulating Organisms

Petersen, Jette Fischer; Petriglieri, Francesca; Singleton, Caitlin Margaret; Nierychlo, Marta Anna; Gomez, Miriam Peces; Nielsen, Per Halkjær

Publication date:
2021

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Petersen, J. F., Petriglieri, F., Singleton, C. M., Nierychlo, M. A., Gomez, M. P., & Nielsen, P. H. (2021). *Mapping of Several Putative Polyphosphate-Accumulating Organisms*. Poster presented at Danish Microbiological Society congress 2021, Copenhagen, Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

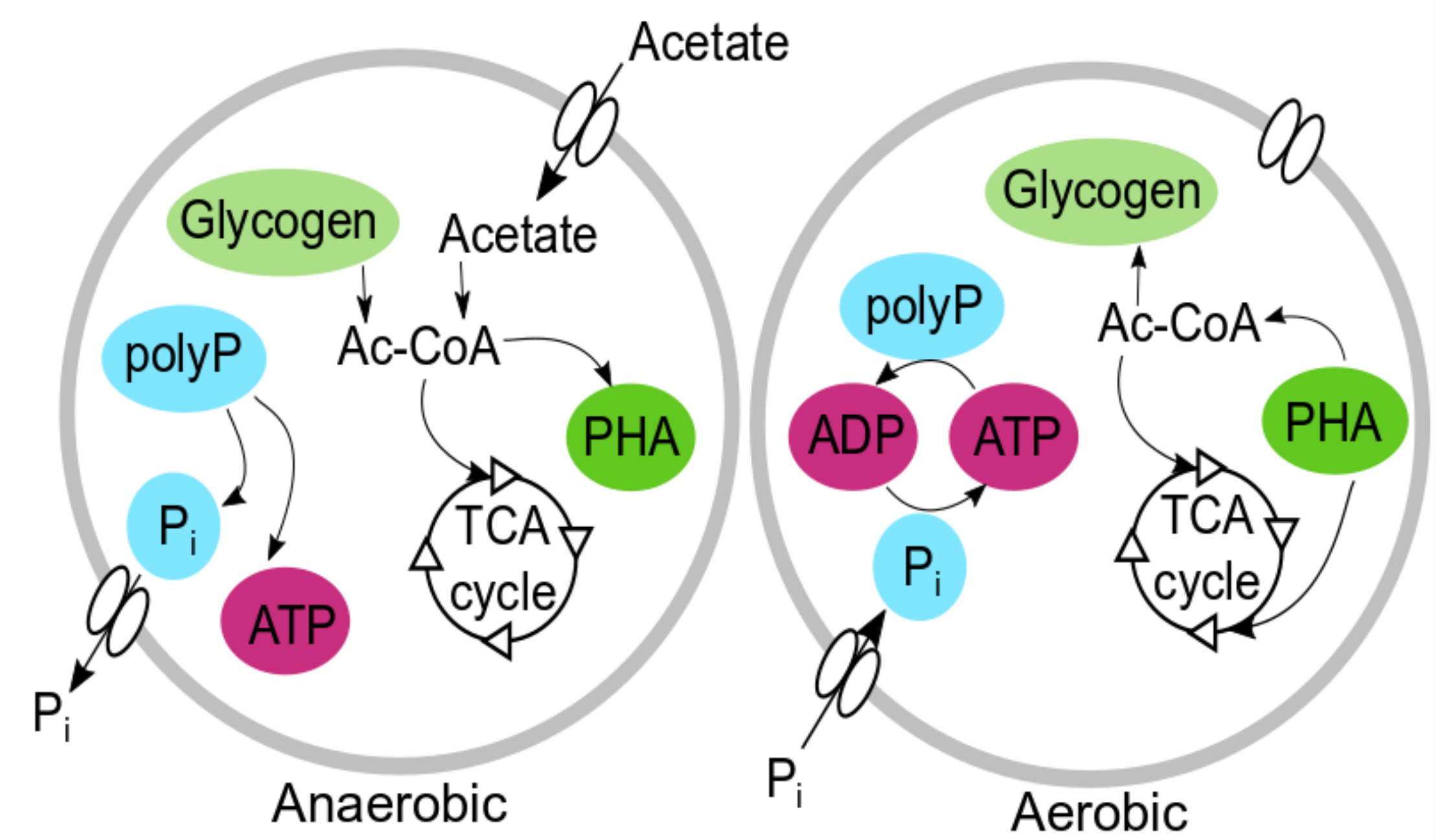
If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

Mapping of Several Putative Polyphosphate-Accumulating Organisms

J. F. Petersen, F. Petriglieri, C. Singleton, M. Nierychlo, M. Peces, P. H. Nielsen
Centre for Microbial Communities, Department of Chemistry and Bioscience, Aalborg University, Aalborg, Denmark

Background

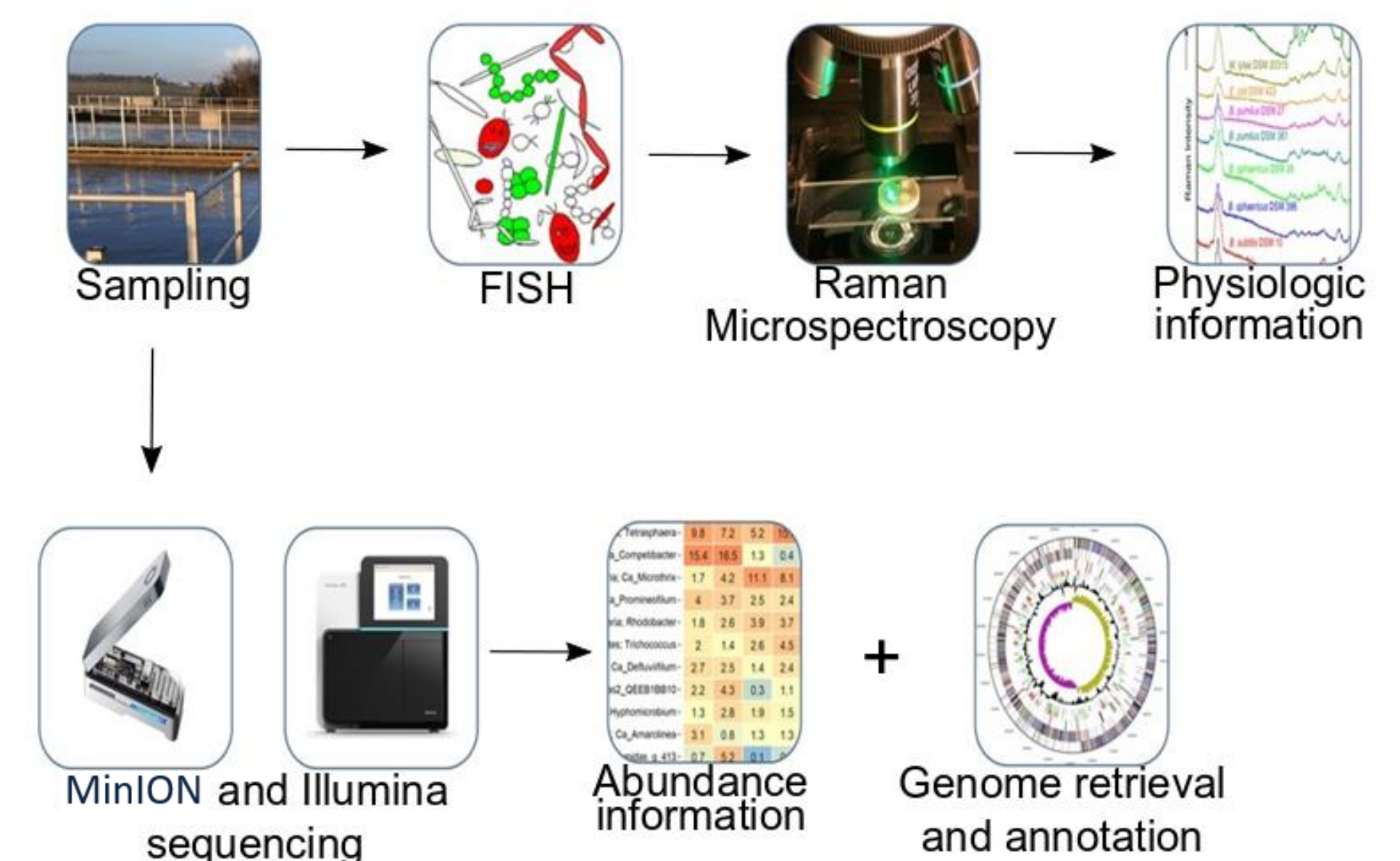
Phosphate (P) is a vital but limited resource in nature, so recycling it will become important to support the increasing demand. By utilizing the **Enhanced Biological Phosphorus Removal (EBPR)** process in wastewater treatment plants, recycling of P from the wastewater is one way to combat this challenge. The EBPR process is controlled by **polyphosphate-accumulating organisms (PAOs)**, such as *Candidatus Accumulibacter*, *Tetrasphaera*, and *Dechloromonas*, but all are not known. They store phosphate intracellularly for further removal and recovery due to **alternating anaerobic and aerobic conditions**.



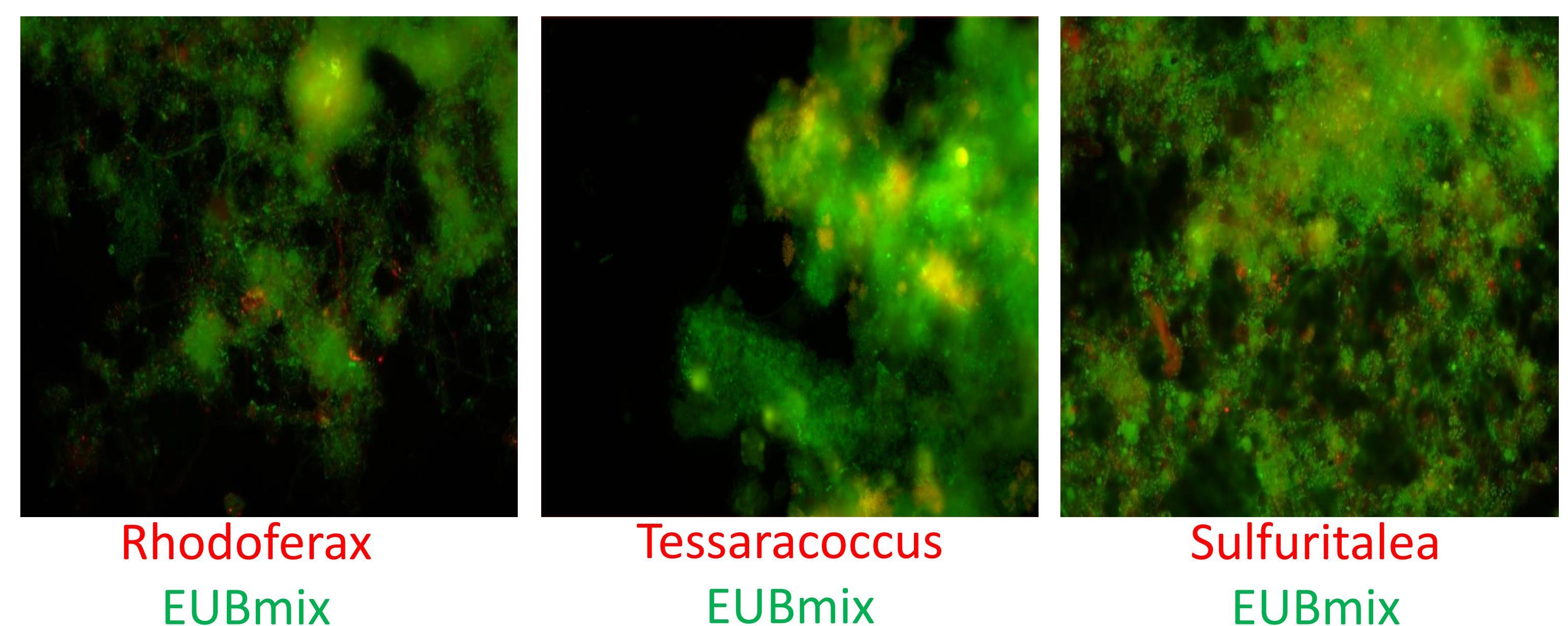
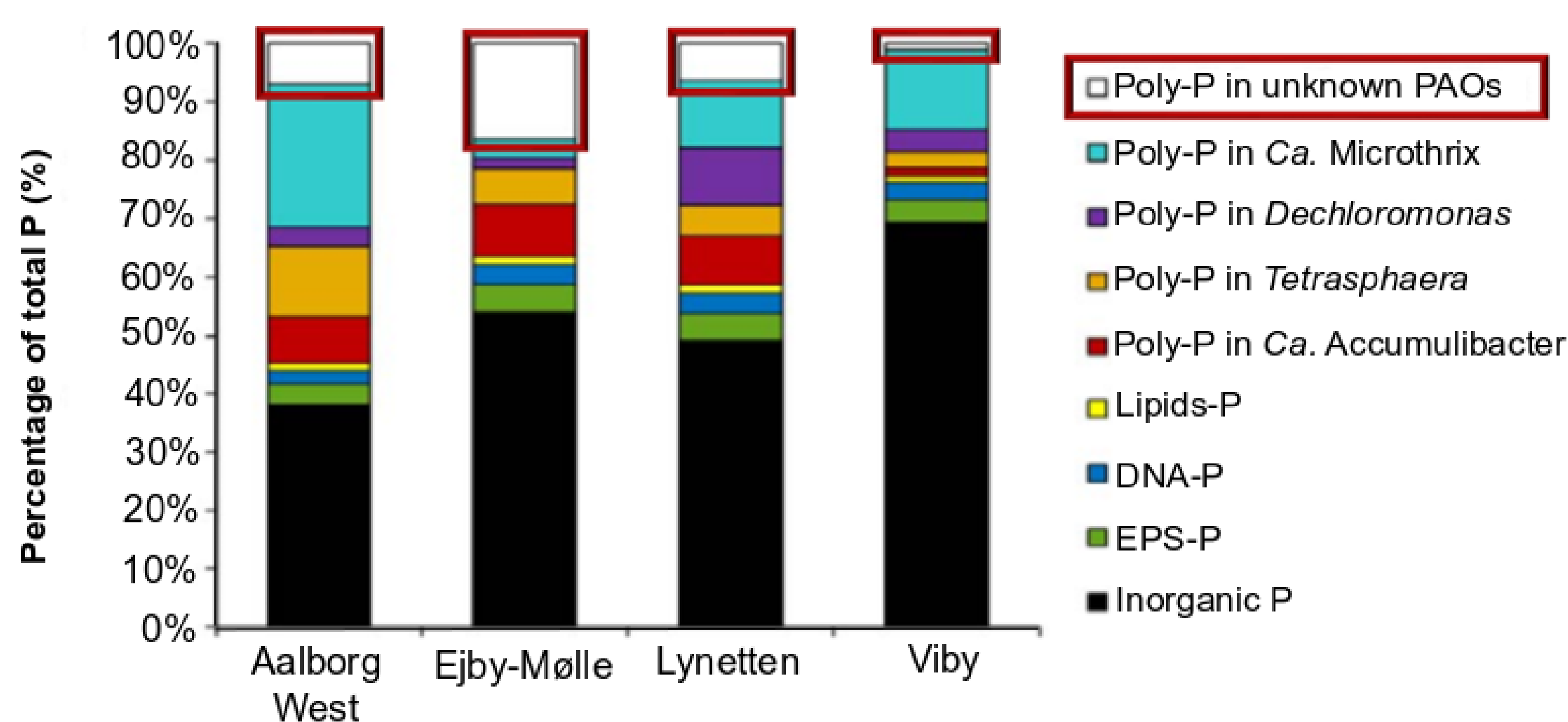
Aim

- Investigate whether the putative PAOs *Rhodofexax*, *Tessaracoccus*, and *Sulfuritalea* are in fact PAOs
- Determine their **metabolic potential** using **metagenomics**
- Define the levels and dynamics of **important storage polymers** by **FISH-Raman** microspectroscopy

Methods



Results



- Recent P mass balance showed that we are still missing some PAOs
- The putative PAOs were abundant in varying degree in DK wastewater treatment plants

Proteobacteria; Rhodofexax	0.9	0.9	0.6	1	0	1.1	1.9	0.8	1.6	0.7	1.2	0.2	1.3	0.9	0.8	0.6	0.1	1.5	0.7	1.5	0.5	2.1	0.8	2	0.9	2	1.8	1	0.9	0.9	1.2	1.1	1.5	1.2	0.9	0.9	2.1	1.8	0.5
Proteobacteria; Sulfuritalea	1.3	0.9	0.4	0.7	0	1.7	0.8	1.1	1.6	1.4	0.3	0.2	1	0.6	1.1	0.2	0	0.2	0.2	0.7	1.3	1.4	0.4	0.3	0.2	0.9	1.2	0.8	1.5	0.7	1.1	0.4	1	0.7	1.3	0.2	1	0.7	0.2
Actinobacteria; Tessaracoccus	0.1	0.3	0.3	0.5	0	0.4	0.5	0.1	0.1	0.5	0.8	2.2	0.5	0.2	0.2	0.3	0.1	0.7	0.6	0.3	0.1	0.2	2.6	0.7	0.6	0.4	0.6	0.4	0.2	0.2	0.3	0.6	0.1	0.5	0.5	0.5	0.5	0.7	0.1
	Avedøre -	Bjergmarken -	Bjerringbro -	Boeslum -	CP Kelco -	Damhusåen -	Egå -	Ejby Mølle -	Esbjerg E -	Esbjerg W -	Fomæs -	Fredericia -	Haderslev -	Hirtshals -	Hjørring -	Horsens -	Kalundborg -	Kerteminde -	Kolding -	Lundtofte -	Lynetten -	Maragerfjord -	Marselisborg -	Middelfart -	Mørke -	Odense NE -	Odense NV -	Randers -	Ribe -	Ringkøbing -	Skive -	Søholt -	Viborg -	Viby -	Aabenraa -	Aby -	Aalborg E -	Aalborg W -	Aars -

Conclusion

Genus- or species specific FISH probes were designed. Intracellular storage polymers of the FISH-defined cells were investigated with Raman microspectroscopy and all showed potential for poly-P storage, but not necessarily with the classic PAO metabolism. The ecophysiology was supported by annotating their metabolic pathways with the use of high-quality metagenome assembled genomes.



@fischer_jette

@PHNLab

Centre for Microbial Communities



AALBORG UNIVERSITY
DENMARK