

Discovery of long-distance microbial electron transport in the seafloor of the North Sea

The Microbial Electricity Team

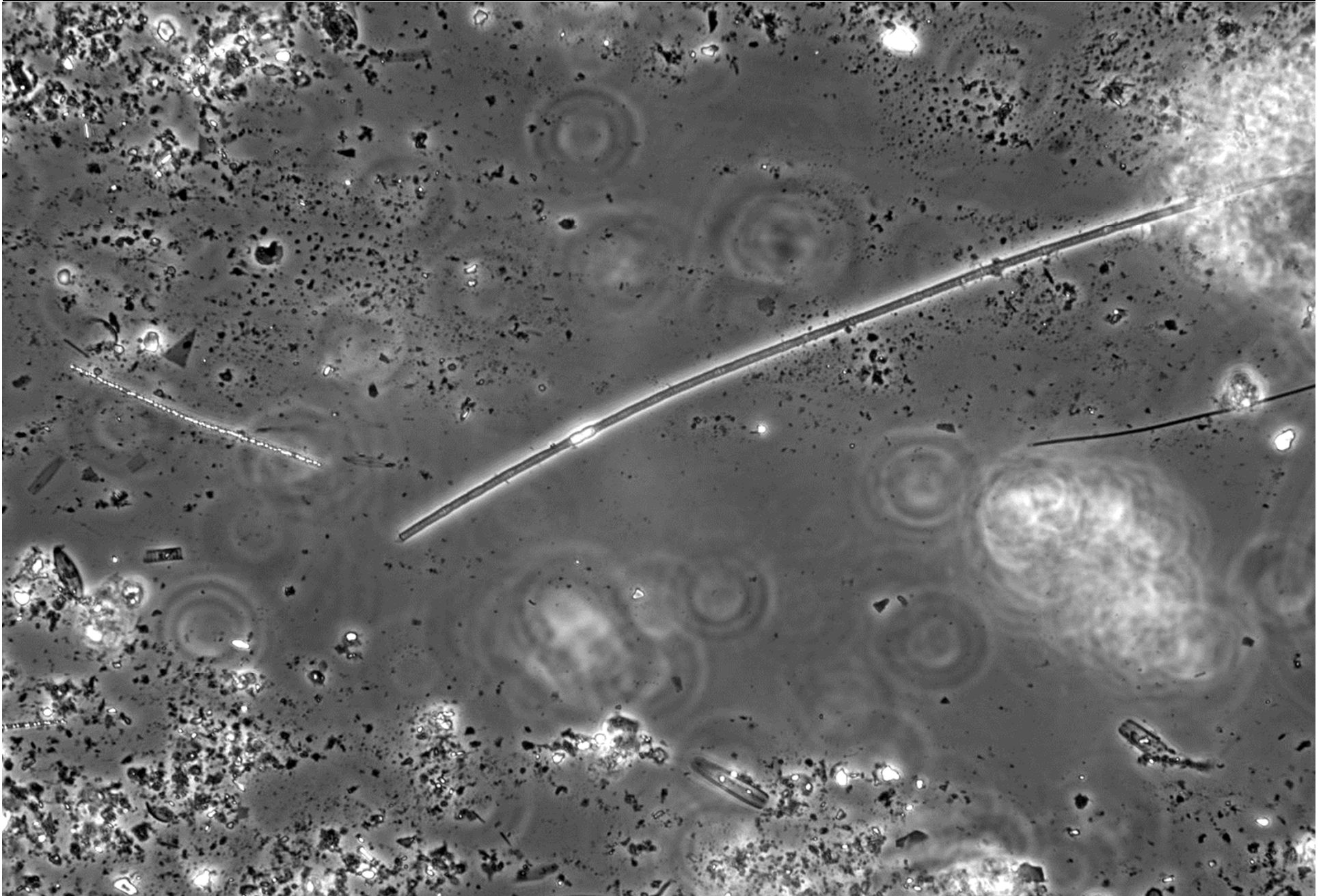
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Martinez, Sairah Malkin, Dorina Seitaj, Anton Tramper,
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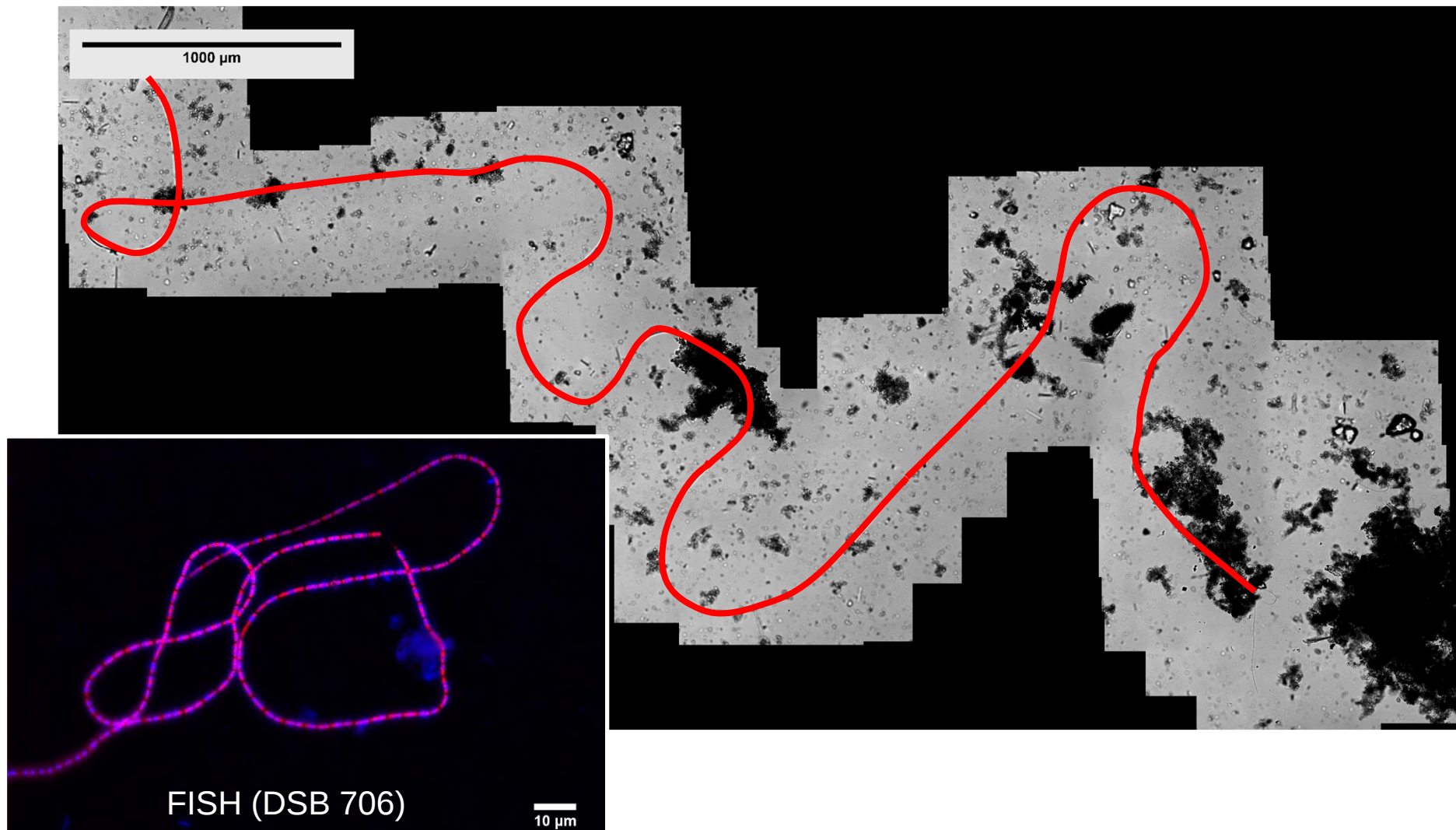


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A surprise in the seafloor...

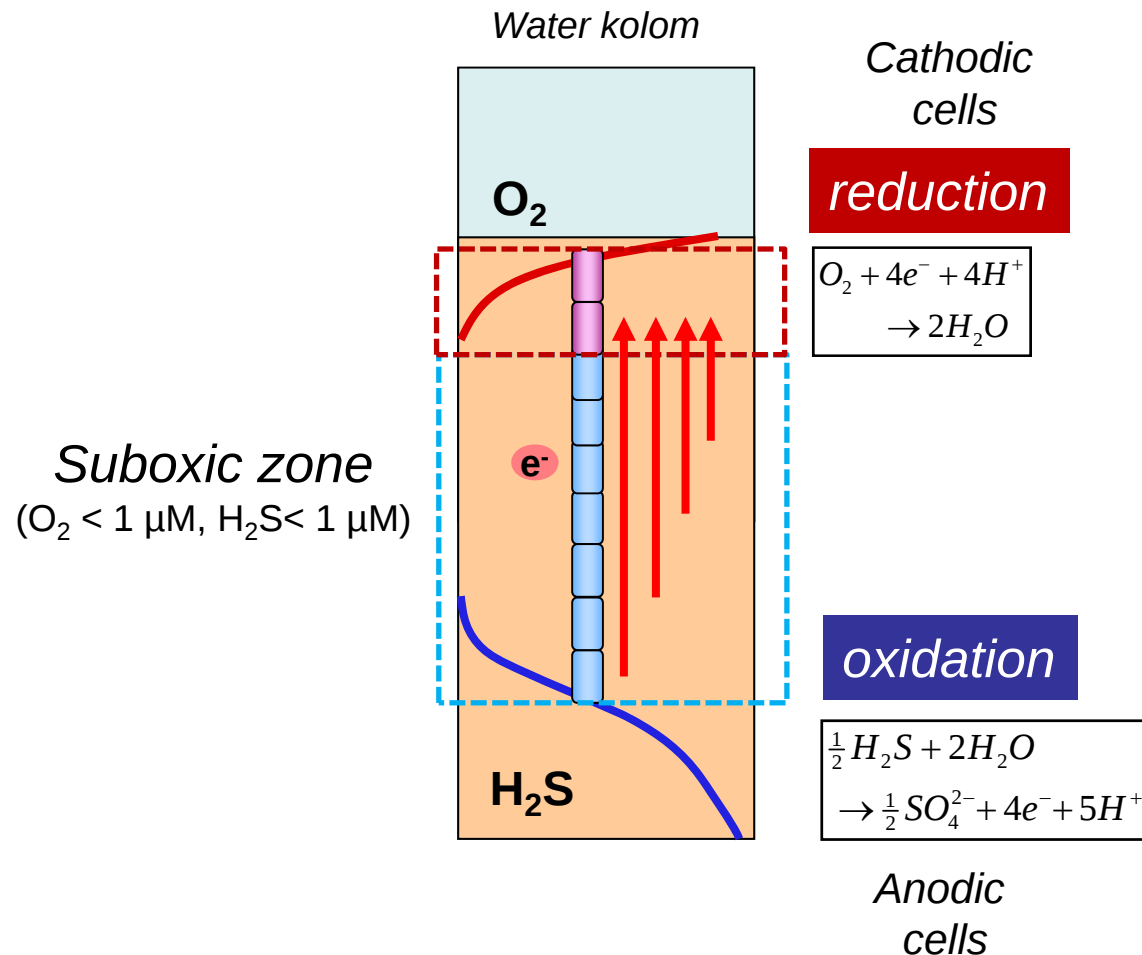


Cable bacteria



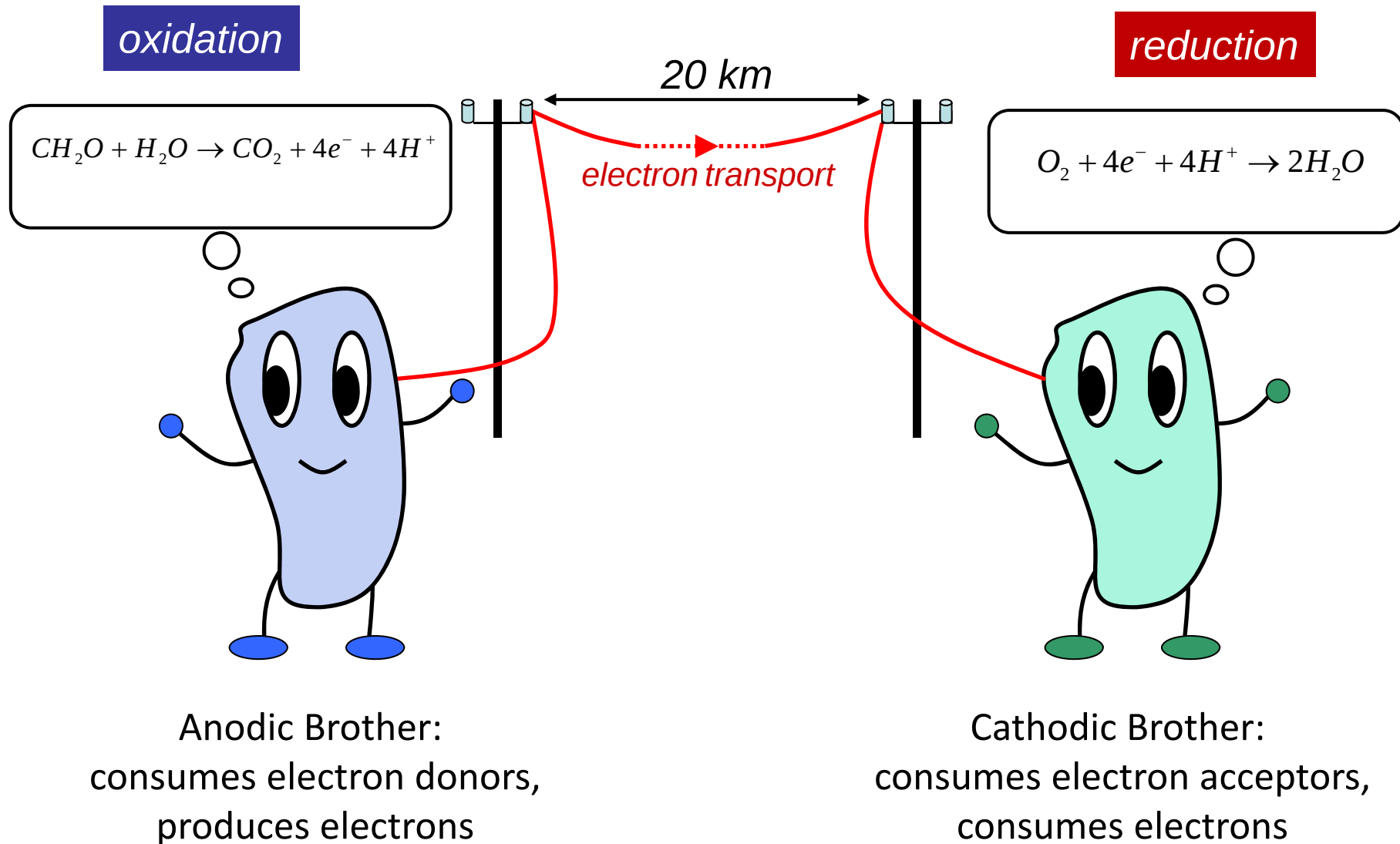
*Long unbranched filaments up to 4 cm, consisting of > 10.000 cells
~Desulfobulbaceae (delta proteobacteria)*

Metabolism of cable bacteria

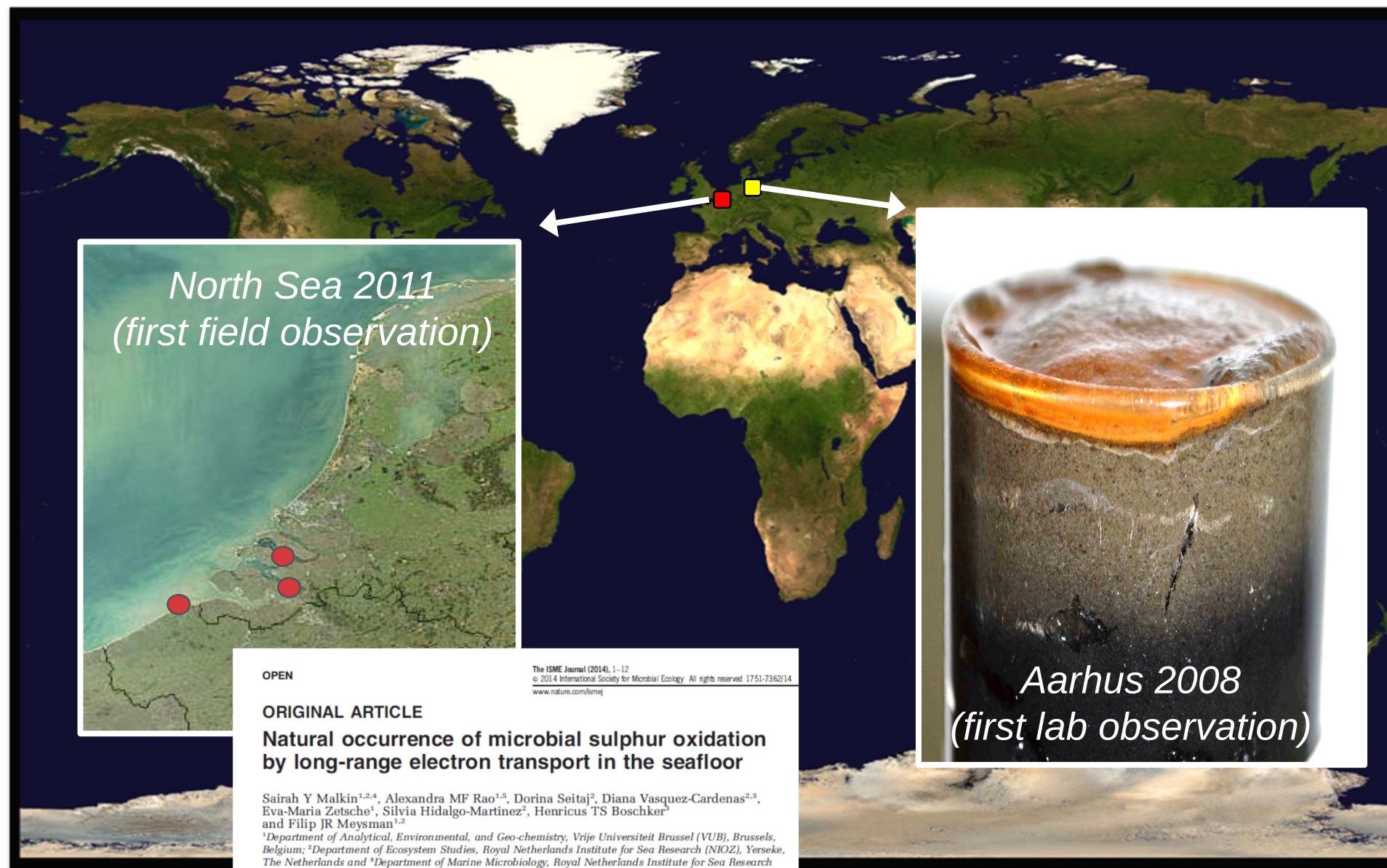


- *Electron transport over centimeter scale distances (1000x further than previously known)*

New paradigm in biology: cells cooperating for energy



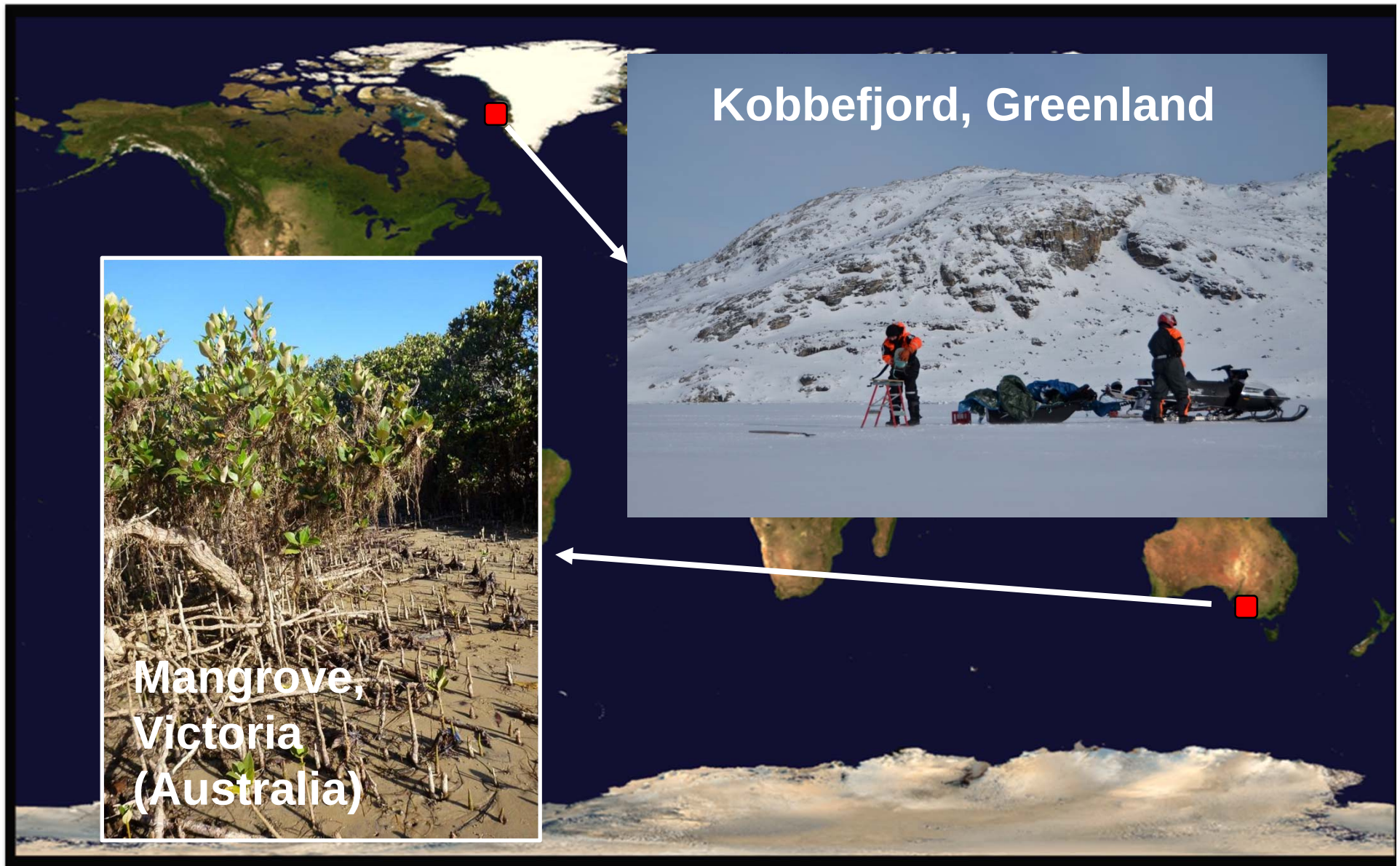
Global distribution, globally important?



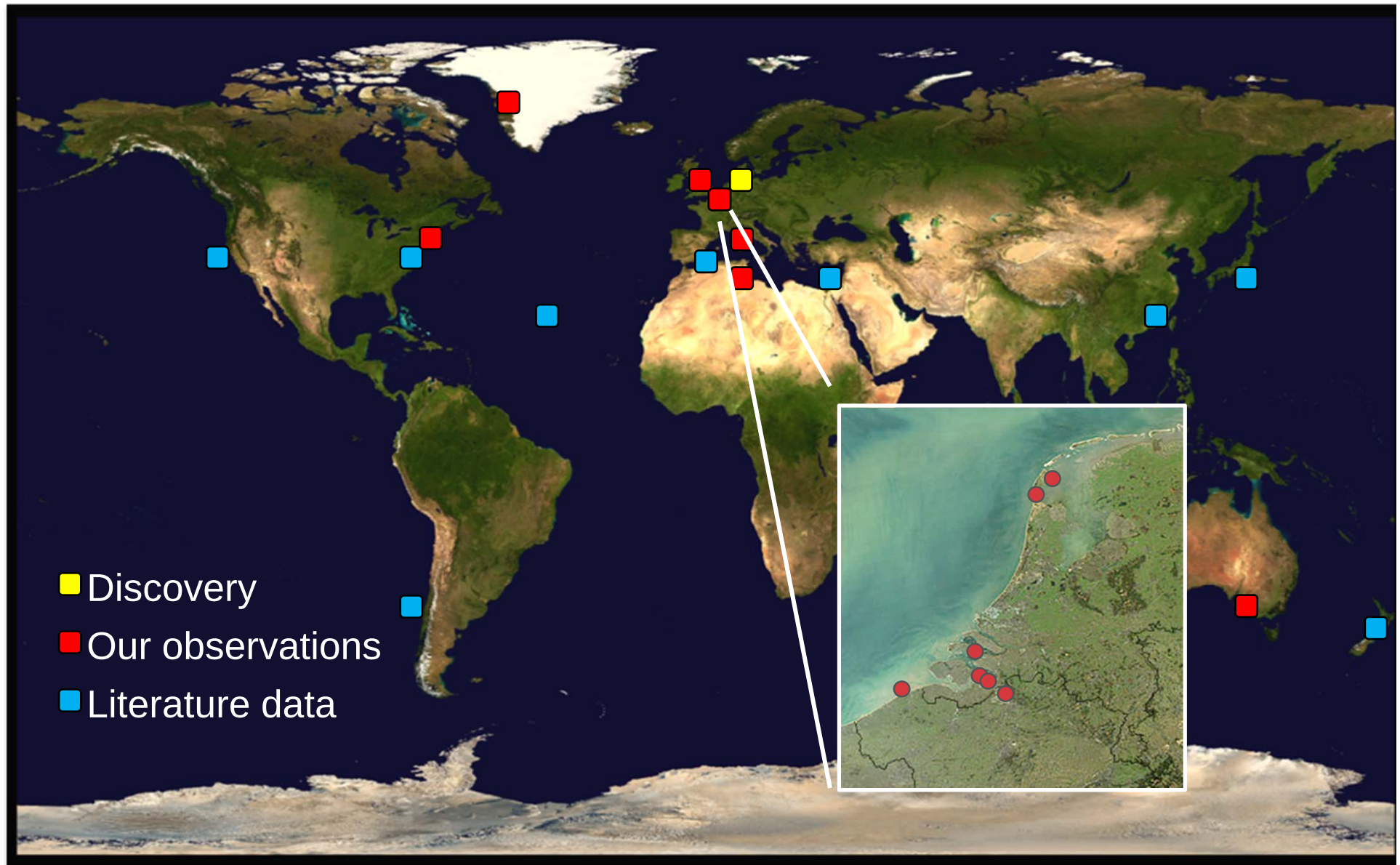
Discovery



Global distribution, globally important?



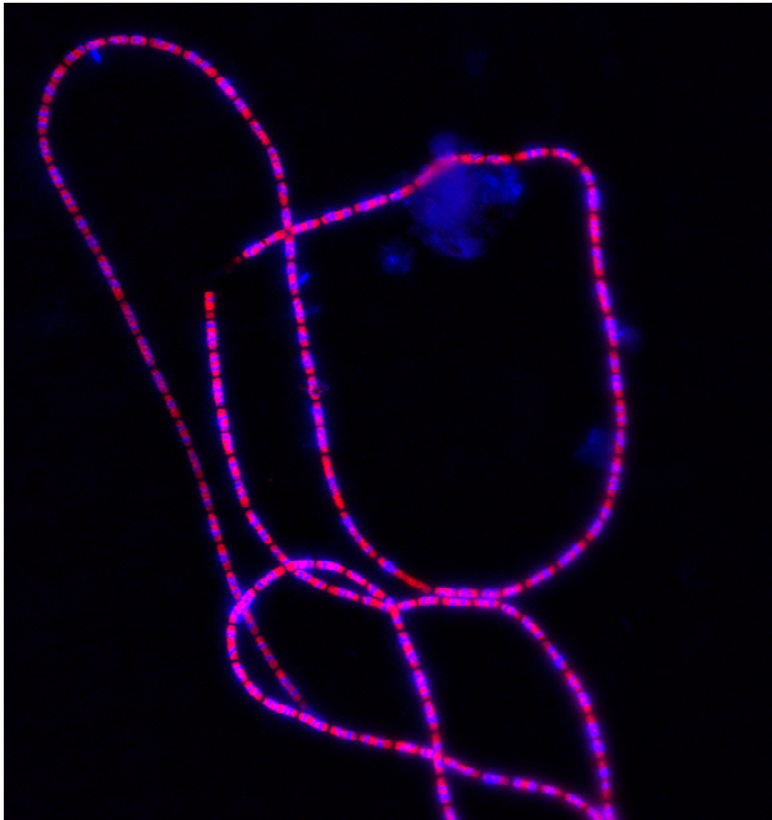
Global distribution, globally important



Large scale ecosystem impact?



Cable bacteria acts as guardian angels



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Cable bacteria generate a firewall against euxinia in seasonally hypoxic basins

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NAS

Conclusions

1. Long filamentous “cable bacteria” induce **long-distance electron transport** in the seafloor (new paradigm in biology).
2. Cable bacteria were first discovered under natural conditions in the North sea, but now known to be a **global phenomenon** (seasonal hypoxic basins, salt marshes, mangroves...)
3. Cable bacteria have a strong impact on the biogeochemical cycling in the seafloor, with potential **larger scale ecosystem impacts** (reducing impact of coastal seasonal hypoxia)

Take home message for young researchers:

There are truly new discoveries to be made in the ocean....

Acknowledgements

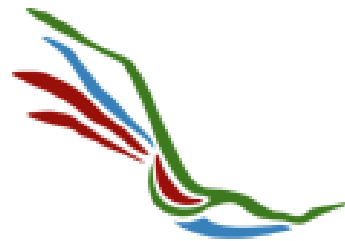
- N Risgaard-Petersen, L Damgaard, LP Nielsen @ Univ. Aarhus (sharing latest findings and ideas)
- F. Sulu-Gambari, M.Hagens, C. Slomp @ Univ. Utrecht (Lake Grevelingen field study)

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Thanks to the great electroteam!



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Former team members:

- Dr. Sairah Malkin (postdoc). Now postdoc at Department of Marine Sciences, University of Georgia.
- Dr. Jack Van de Vossenberg (postdoc). Now Senior Lecturer in Microbiology at UNESCO-IHE.
- Sarah Engelhardt (research assistant). Now PhD at Griffith University (Australia)
- Celine Van Bijsterveldt (BSc thesis). Now MSc at Utrecht University (Netherlands)

Joining the team? 3 year postdoc in marine microbiology available!