

Trichlorobacter lovleyi growth kinetics and chlorinated solvent reduction in the presence of oxygen

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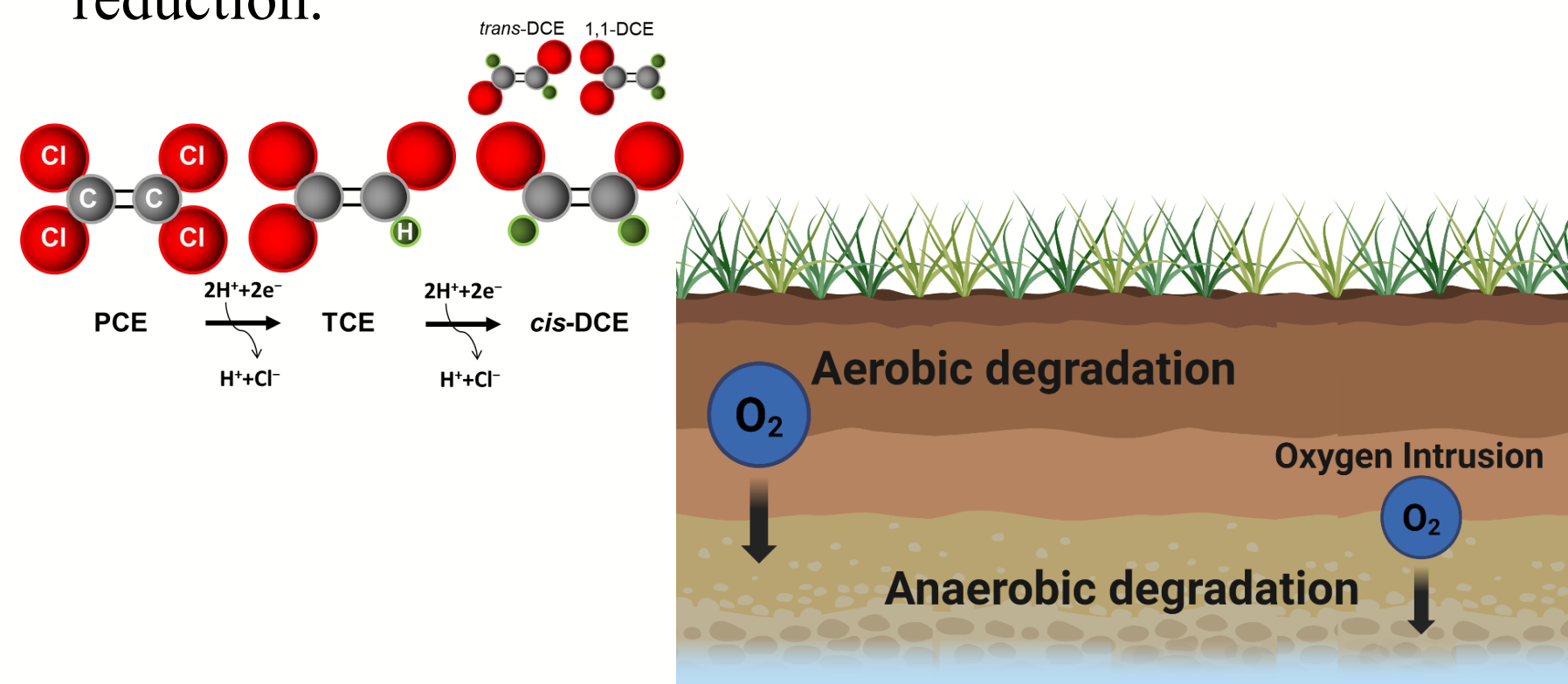
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Background

Chlorinated solvents such as tetrachloroethene (PCE) and trichloroethene (TCE) are persistent groundwater contaminants. *Trichlorobacter lovleyi* (formerly *Geobacter lovleyi*) is a dehalorespiring bacterium that couples acetate oxidation to PCE and TCE reduction and has been detected in diverse sediment and subsurface environments, making it a promising bioremediation agent [1]. Subsurface environments frequently experience oxygen intrusion, creating fluctuating redox conditions. Similar species, such as *Geobacter sulfurreducens*, have been shown to tolerate low oxygen levels[2]. The ubiquitous presence of *T. lovleyi* in subsurface environments and participation in reductive dechlorination motivates an investigation into the oxygen tolerance of *T. lovleyi* during chlorinated solvent reduction.

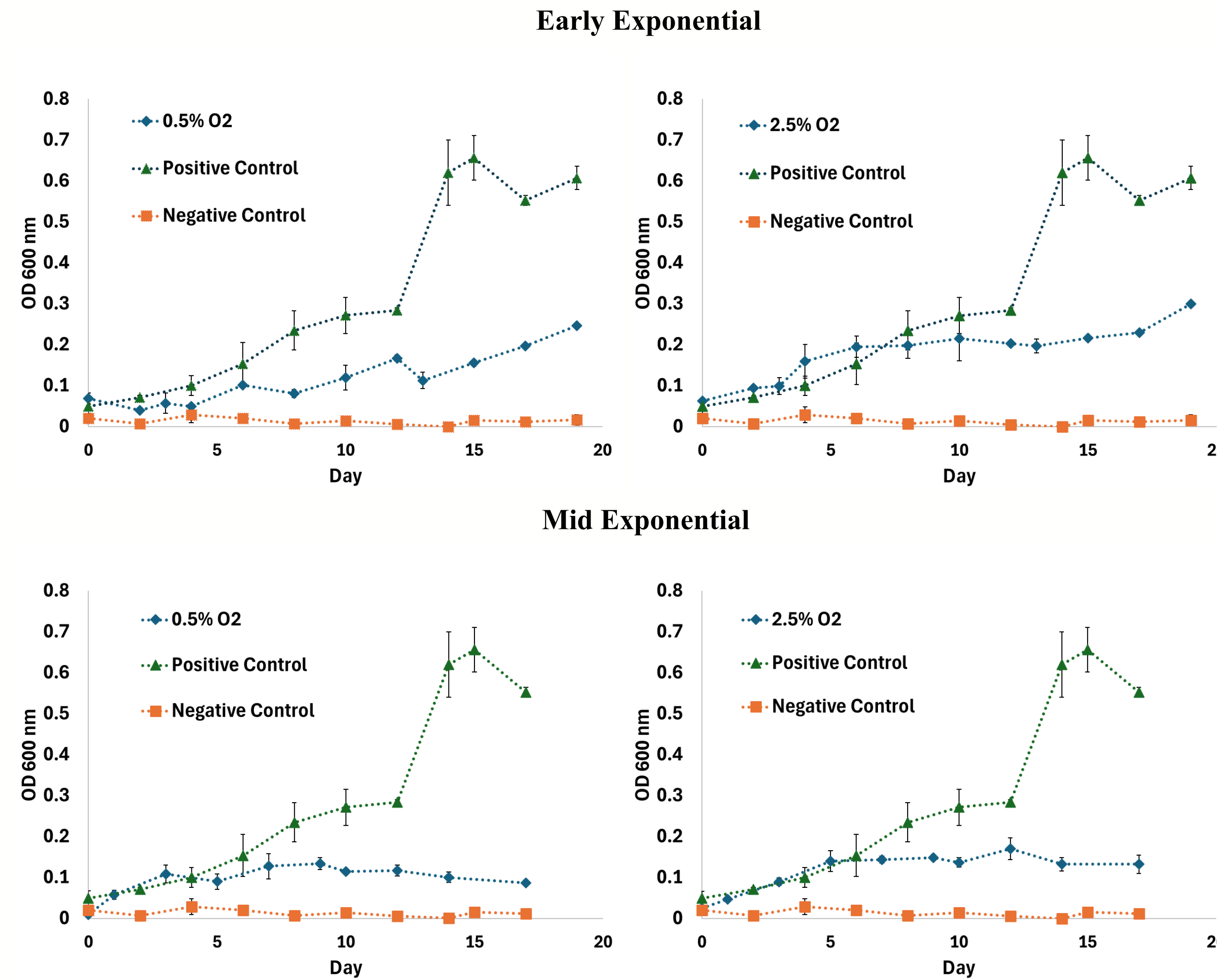


Methods

- T. lovleyi* (5% v/v) grown in 120 mL serum bottles in bicarbonate buffered medium with resazurin.

Type	O2%	PCE, mM	<i>T. lovleyi</i> cells (v/v%)
Pos Control	0	-	5
Neg Control	0	0.6	(heat killed)
PCE + O2	2.5	0.6	5
PCE - O2	0	0.6	5

Growth Results



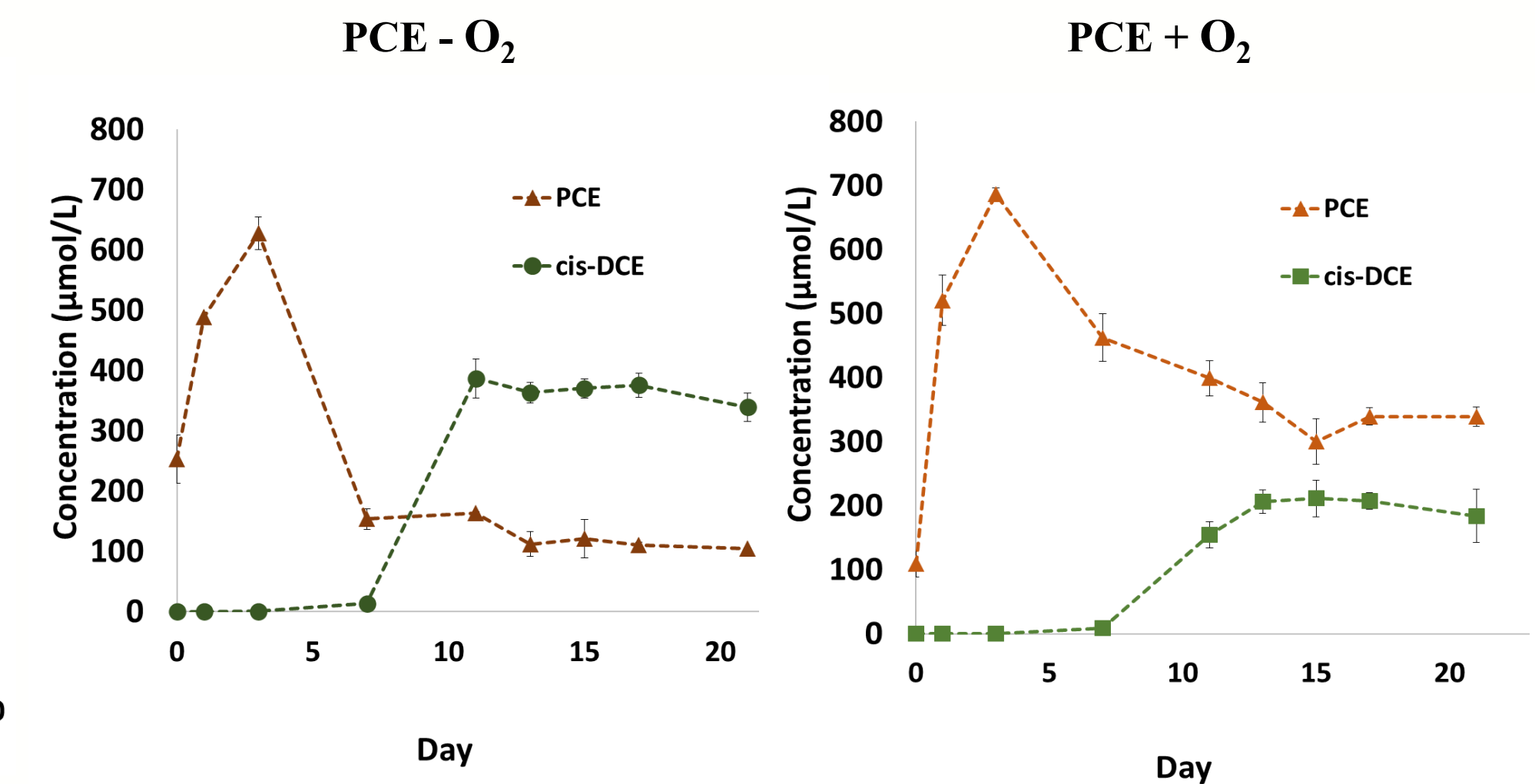
References

[1]Y. Sung et al., Environ. Microbiol., 2006. [2]Lin et al., Appl. Environ. Microbiol., 2004.

Acknowledgements

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Dechlorination Results



Key Findings

- Cells exposed to O₂ during the early-exponential phase reached higher cell densities (0.11 ± 0.02 OD600), in comparison to cells exposed to O₂ during mid-exponential growth phase (0.27 ± 0.03 OD600).
- Cells are more successful at overcoming oxygen exposure during early phases of growth.
- PCE concentrations decreased over time under PCE- O₂ and PCE + O₂ conditions, indicating active dichlorination by *T. lovleyi*.
- Accumulation of cis-DCE confirmed its formation as a transformation product.
- T. lovleyi* can sustain metabolic activity and dechlorination in the presence of oxygen, warranting reclassification as a aerotolerant anaerobic bacterium.