Growth of *Limnothrix* (strain AC0243) under various light, temperature and salinity conditions

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*Limnothrix* (strain AC0243) ecology

- Identify environmental conditions sustaining or promoting growth

**Why?**
- Human health concerns
- Found in under-tap water filters
Fitzroy River, Central Queensland
Light intensities and *Limnothrix*

- *Limnothrix* species partial to low light conditions
- Determine light intensity range for strain AC0243
  - Five cultures per treatment
  - Starting cultures of 10,000 cells mL\(^{-1}\)
  - Incubated at 27\(^{\circ}\) C for 14 d
Light treatments

- 0 μE m² s⁻¹
- 0 μE m² s⁻¹ with glucose
- 80 μE m² s⁻¹
- 160 μE m² s⁻¹
- 400 μE m² s⁻¹
- 560 μE m² s⁻¹
Comparing cell concentrations for each light treatment at fourteen days.
Light intensity treatment findings

• Dark treatments no added glucose
  • Declining cell concentrations
  • No cells recovered after 10 d

• Dark treatments with added glucose
  • Increased in cell concentrations over 14 d

• Greater light intensities yielded greater growth
*Limnothrix* and temperature

- Recovered from waters ranging from 5° C to 60° C
- Determine temperature range for strain AC0243
  - Five cultures per treatment
  - Starting cultures of 10,000 cells mL⁻¹
  - Incubated at 10 μE m² s⁻¹ light for 14 d
Temperature treatments

- 7° C
- 15° C
- 25° C
- 35° C
- 45° C
- 55° C
Comparing cell concentrations for each temperature treatment at fourteen days
Limnothrix and salinity

• Found in fresh to hypersaline waters
• Found in Gladstone Harbour
  • Sodium chloride
• Determine salinity range for strain AC0243
  • Five cultures per treatment
  • Starting cultures of 10,000 cells mL$^{-1}$
  • Incubated at 27° C
  • Under 10 $\mu$E m$^2$ s$^{-1}$ light for 14 d
# Salinity treatments

<table>
<thead>
<tr>
<th>Sodium chloride concentration (gL⁻¹)</th>
<th>Mean conductivity (µS cm⁻¹)</th>
<th>Water type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>450</td>
<td>Fresh</td>
</tr>
<tr>
<td>0.25</td>
<td>1038</td>
<td>Fresh</td>
</tr>
<tr>
<td>0.50</td>
<td>1450</td>
<td>Fresh</td>
</tr>
<tr>
<td>1.00</td>
<td>2181</td>
<td>Brackish</td>
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<tr>
<td>10.00</td>
<td>16745</td>
<td>Brackish</td>
</tr>
<tr>
<td>40.00</td>
<td>56600</td>
<td>Saline</td>
</tr>
</tbody>
</table>
Results: Salinity treatments over fourteen days

![Graph showing mean cell concentrations over time for different salinity treatments.](image-url)

- **Incubation period (d):** 0 2 4 6 8 10 12 14 16
- **Mean cell concentrations (cells mL⁻¹):** 0, 10, 200, 300, 400, 500, 1000, 2000, 3000, 4000, 5000, 10000, 20000, 30000, 40000, 50000, 100000, 200000, 300000, 400000, 500000, 1000000, 2000000, 3000000, 4000000, 5000000, 10000000, 20000000, 30000000, 40000000, 50000000, 100000000.

- **Salinity treatments:** 0.00 gL⁻¹, 0.25 gL⁻¹, 0.50 gL⁻¹, 1.00 gL⁻¹, 10.00 gL⁻¹, 40.00 gL⁻¹.
Comparing cell concentrations for each salinity treatment at fourteen days

Sodium chloride concentration (gL⁻¹) 0 0.25 0.5 1 10 40

Mean cell concentration (cells mL⁻¹) 0 2e+6 4e+6 6e+6 8e+6 1e+7

Sodium chloride concentration (gL⁻¹) 0 0.25 0.5 1 10 40
Cell concentrations salinity

Mean cell concentration (cell mL⁻¹)

Incubation period (d)
Summary

• Grow in the dark
  • Alternative carbon source

• Grow at temperatures ranging from 7° C to 55° C
  • Lower, Higher

• Grow in up to 40 gL$^{-1}$ sodium chloride

• Potentially adapt to wide range of environments
  • Pipelines
  • Hot springs
  • Estuaries

• Morphological plasticity requires polyphasic approach for identification
Thank you