Valorization of Monomeric Compounds Originating from Synthetic Polymers by Crypthecodinium Cohnii

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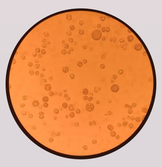
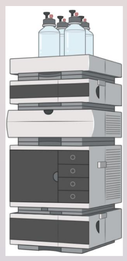
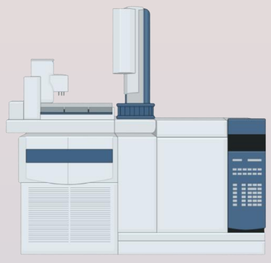
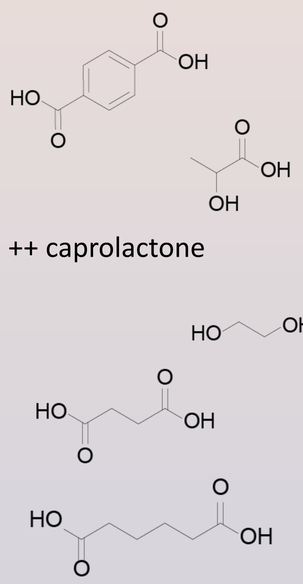
Introduction

Crypthecodinium cohnii stands out among heterotrophic microalgae for its prolific oil accumulation, particularly docosahexaenoic acid (DHA), a crucial compound for human health. The focus of this research was to explore the utilization of monomeric compounds derived from synthetic polymer degradation as sole carbon sources for *C. cohnii* growth and omega-3 fatty acid production.



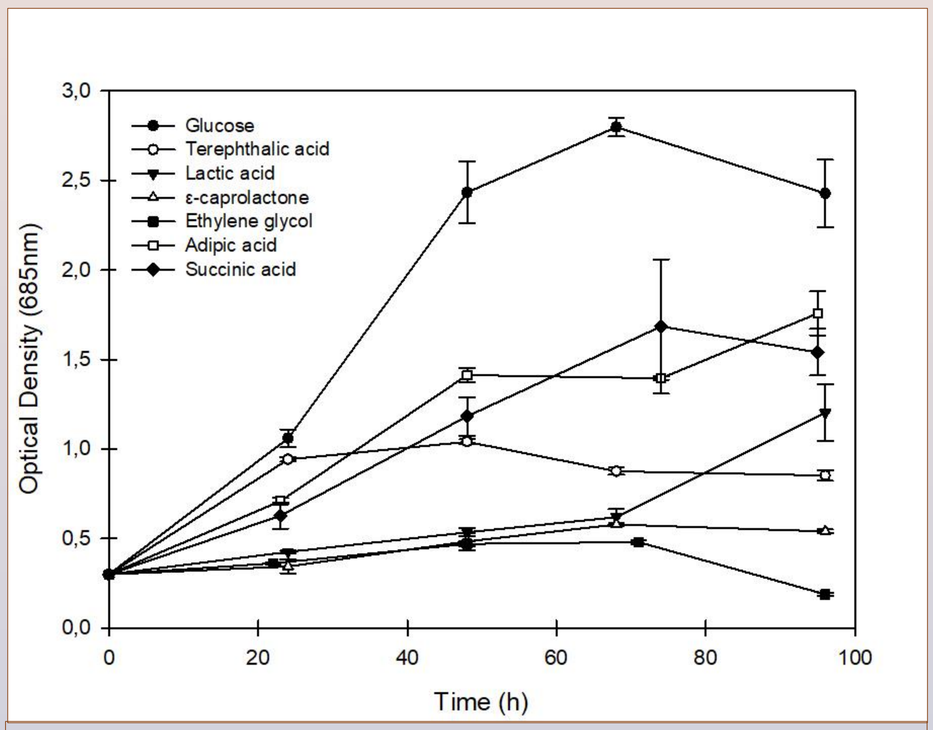






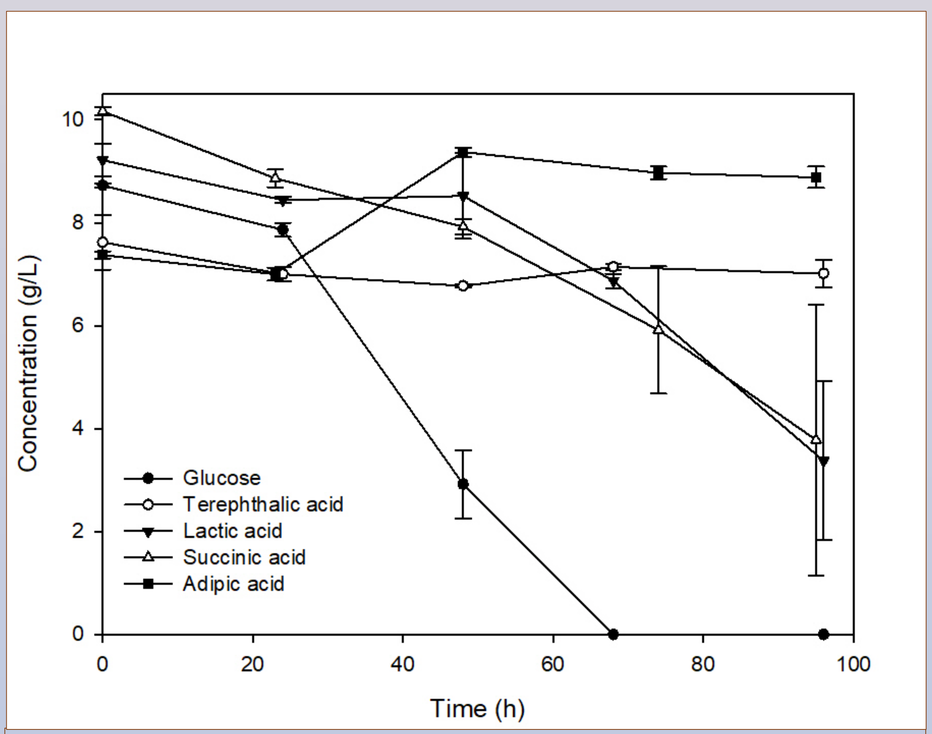
++ caprolactone

Step 1. Screening of carbon sources



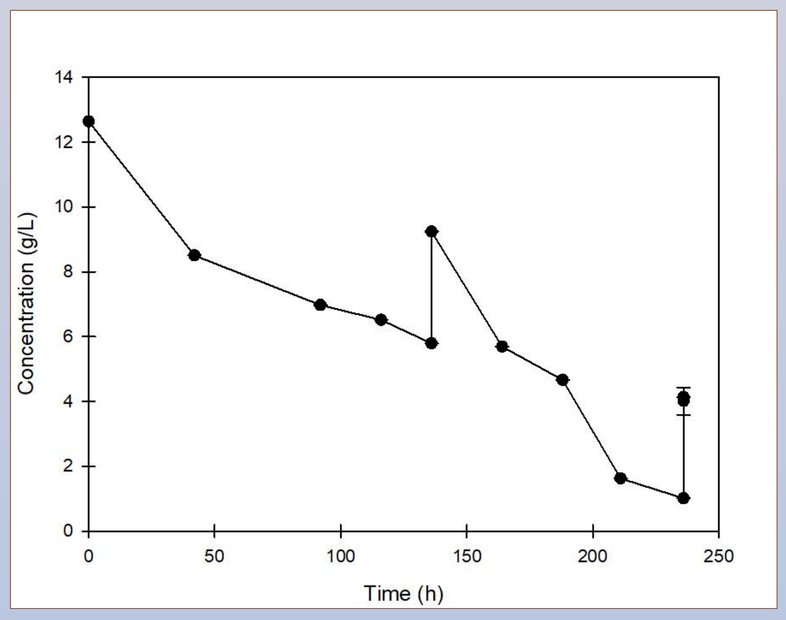
- Growth was observed when acids were used as alternative carbon sources.

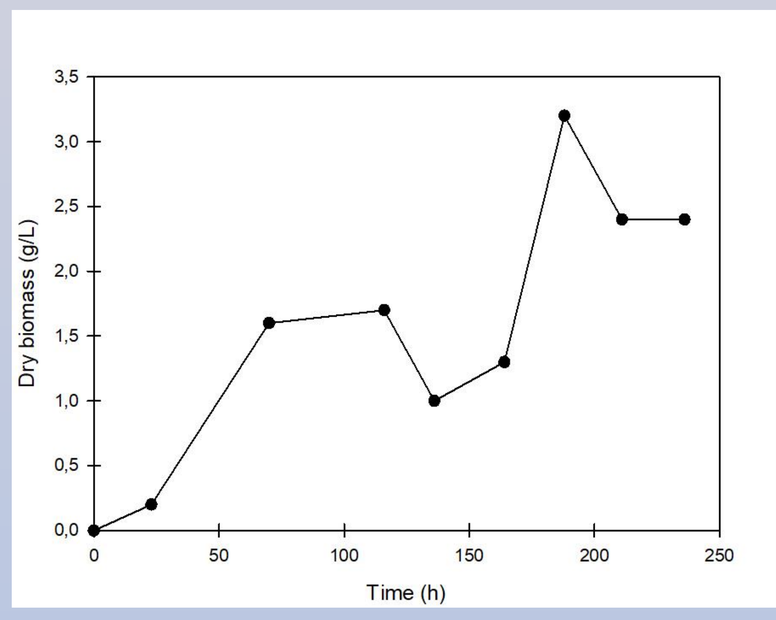
Step 2. Carbon source consumption & fatty acids production

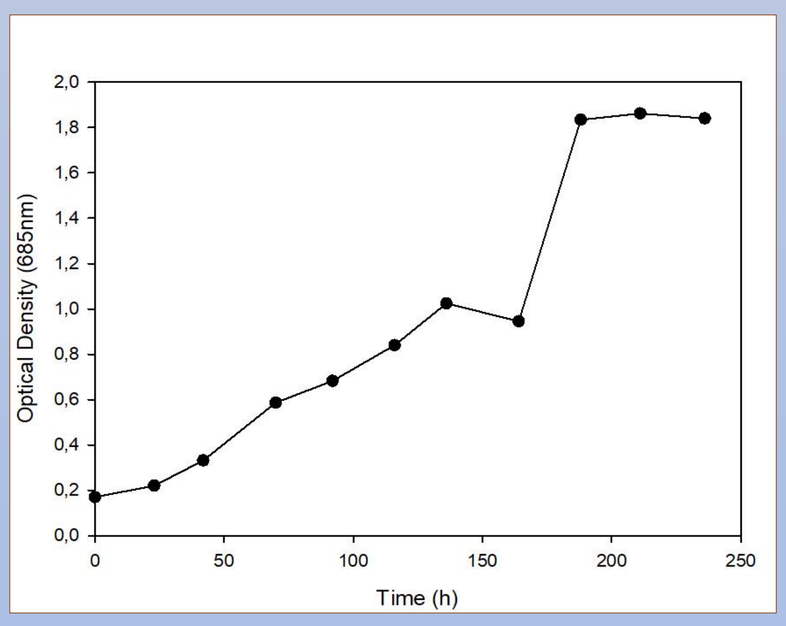


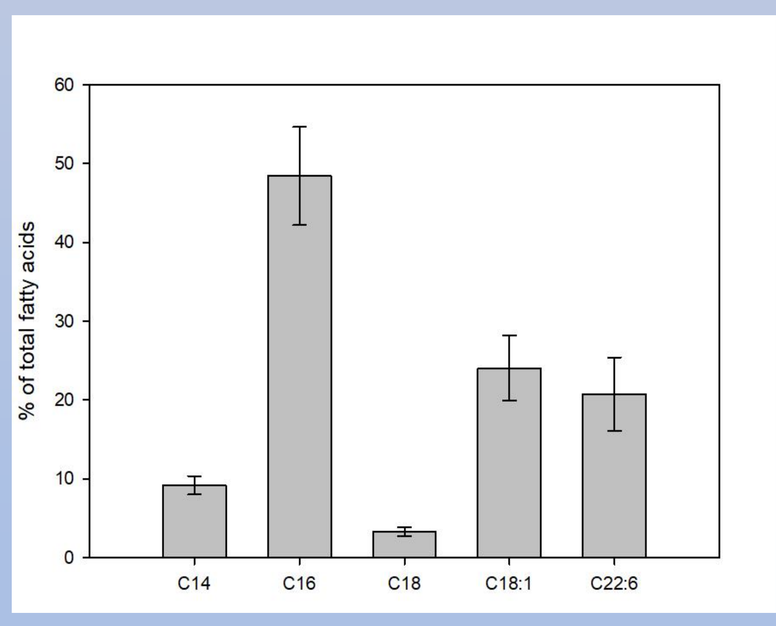
- Significant measurement variances due to biological samples.
- Apart from glucose, only lactic and succinic acid were consumed, while terephthalic and adipic acid's concentrations were stable.

Step 3. Exploring the most promising source



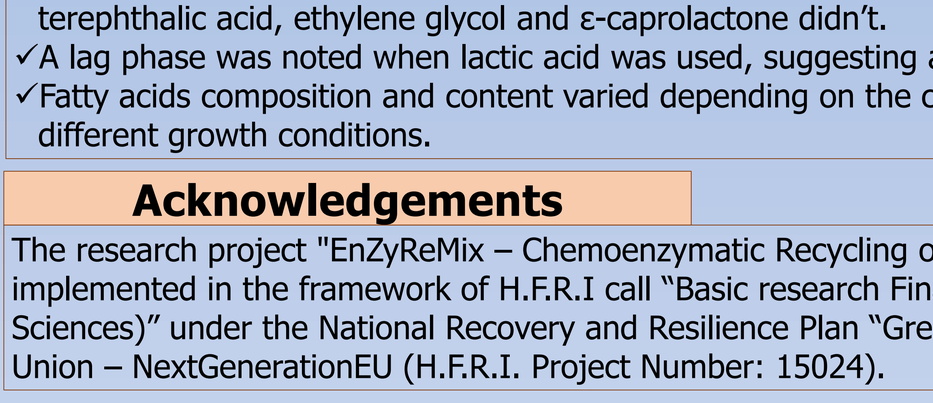






% Total fatty acids οφ δρυ βιομας

Glucose	Terephthalic acid	Lactic acid	Succinic acid	Adipic acid
22,9 ± 4,6	16,7 ± 3,0	19,1 ± 2,8	16,8 ± 3,4	22,6 ± 3,3



- Deviations varied from 1 to 8%.
- More C16 and less C22:6 when a different carbon source, other than glucose.
- More C18:1 when other carbon source than glucose.

Conclusions

- ✓C. Cohnii exhibited varied growth responses to the utilized monomers. Lactic, adipic and succinic acid were found to support growth and fatty acid accumulation while terephthalic acid, ethylene glycol and ε-caprolactone didn't.
- ✓A lag phase was noted when lactic acid was used, suggesting an adjustment period for the microorganism.
- ✓Fatty acids composition and content varied depending on the carbon source, reflecting the metabolic activity and substrate utilization efficiency of the microalgae under different growth conditions.

Acknowledgements

The research project "EnZyReMix – Chemoenzymatic Recycling of Mixed Plastic Waste" is implemented in the framework of H.F.R.I call "Basic research Financing (Horizontal support of all Sciences)" under the National Recovery and Resilience Plan "Greece 2.0" funded by the European Union – NextGenerationEU (H.F.R.I. Project Number: 15024).