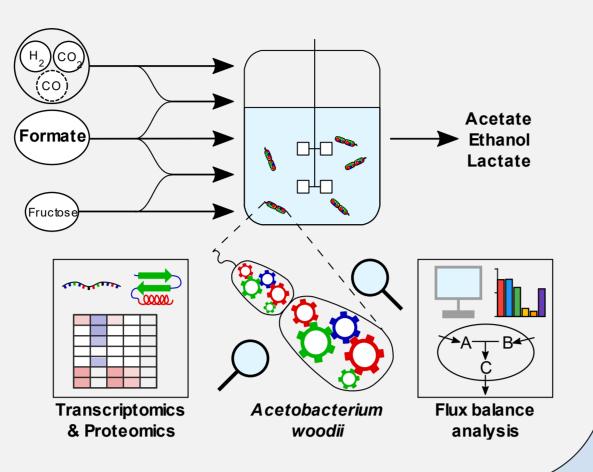


CEBE Acetobacterium woodii as a flexible and **IMAGINEERING** robust host for formate-based bioproduction

Stefan Pflügl^a, C. S. Neuendorf^a, G. Vignolle^a, K. Novak^a, C. Zimmermann (née Derntl)^a, T. Tomin^b, R. L. Mach^a, R. Birner-Grünberger^{b,c} **Email**: stefan.pfluegl@tuwien.ac.at

Objectives and approach

- Obtain a quantitative understanding of unitrophic and mixotrophic formate utilization by A. woodii
- Evaluate potential of *A. woodii* as host for formate-based bioproduction

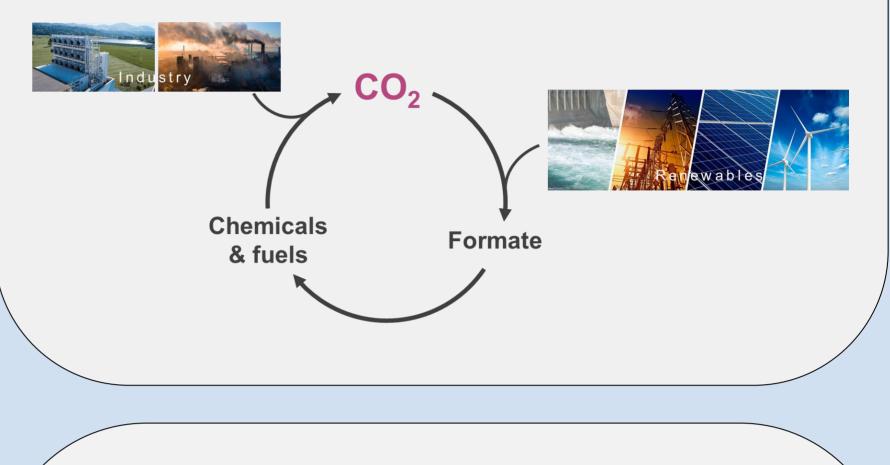


-omics analysis

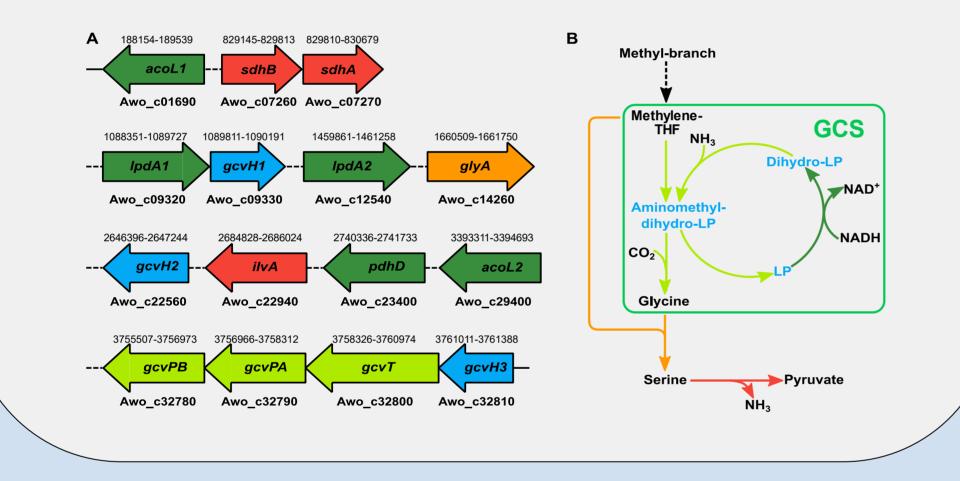
 RNAseq and shotgun proteomics (~1800 proteins detected) showed no significant difference between autotrophic (H₂/CO₂) or formatotrophic growth

Background

- Circular bioeconomy requires sustainable feedstocks
- Formate is a promising mediator between chemical feedstock production and microbial upgrading into value-added products
- Acetogens utilize formate with high energetic efficiency

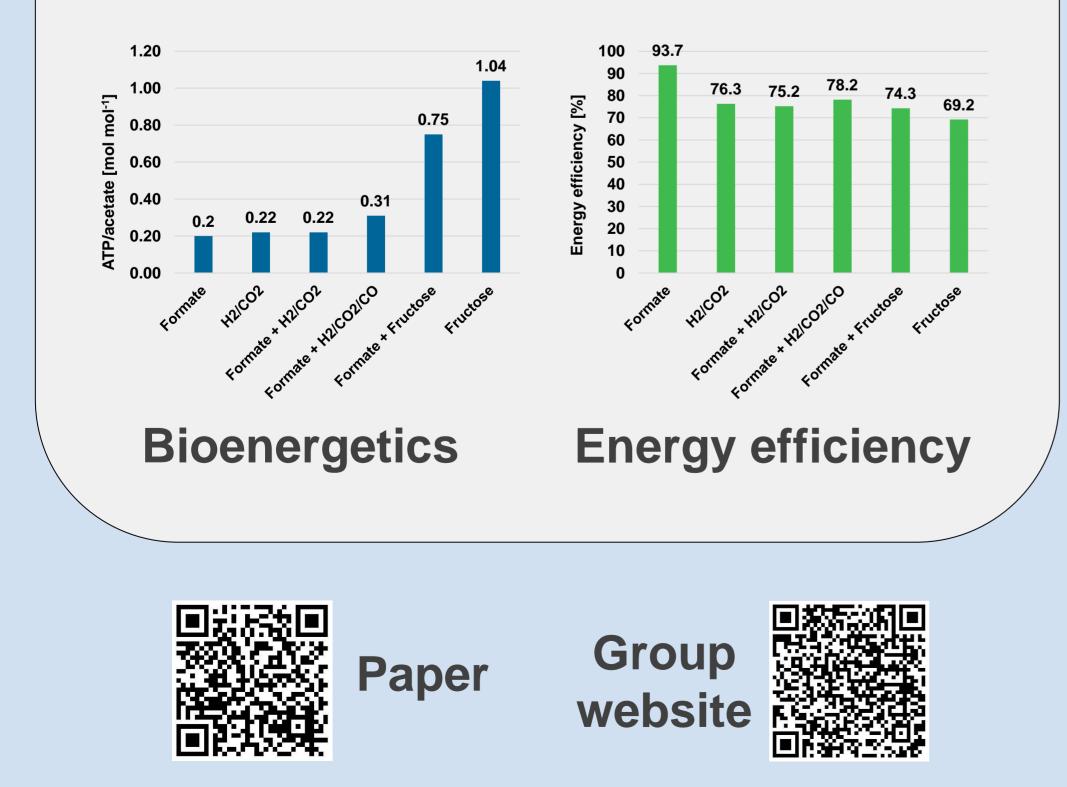


- Strong up-regulation of glycine cleavage system during growth on formate (gcvPB, gcvPA, gcvT, gcvH3)
- Likely due to increased uptake of glycine from medium



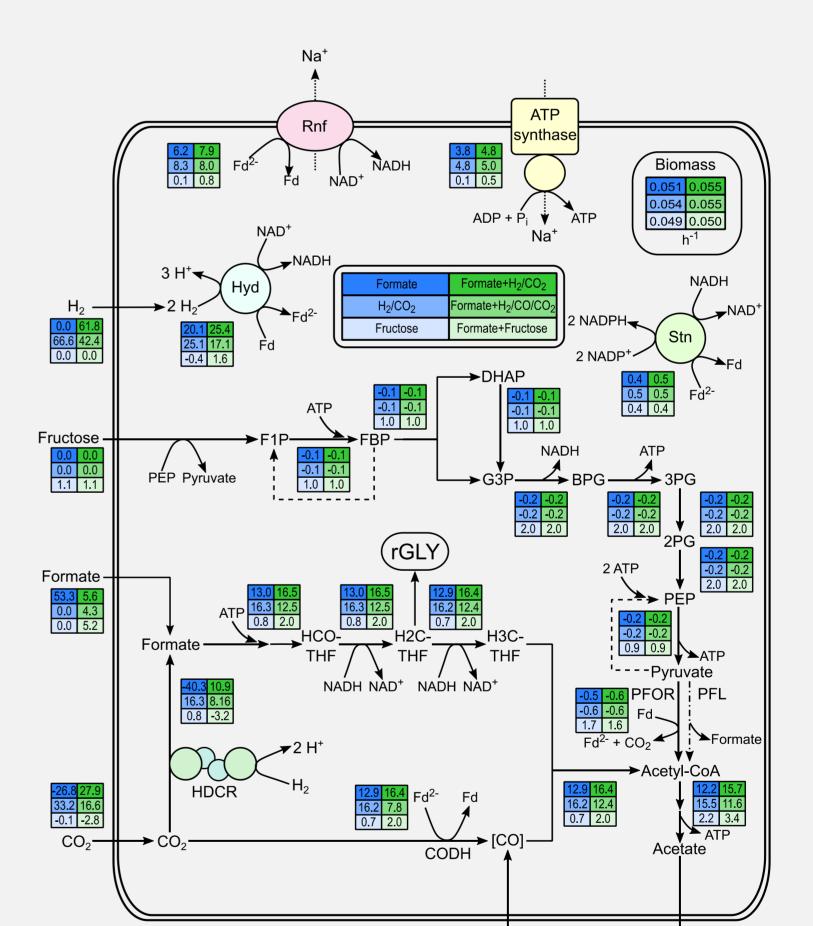
Bioenergetics and energy efficiency

 Physiological data and FBA results used to calculate energy availability and efficiency



Computational metabolic analysis

 Physiological data from chemostats used as input for flux balance analysis (FBA) (with A. woodii core model)



Conclusions

• A. woodii shows efficient and robust formate utilization

0.0 4.6 0.0 0.0 15.5 11.6 2.2 3.4

- High energetic efficiency of formate utilization
- Bioenergetics of formate utilization can be improved by substrate co-feeding

^a Technische Universität Wien, Institute for Chemical, Environmental and Bioscience Engineering, Research Area Biochemical Engineering, Gumpendorfer Straße 1a, 1060, Vienna, Austria ^b Technische Universität Wien, Institute for Chemical Technologies and Analytics, Research Group Bioanalytics, Getreidemarkt 9, 1060, Vienna, Austria ^c Medical University of Graz, Diagnostic and Research Institute of Pathology, Center for Medical Research, Stiftingtalstrasse 24, 8036, Graz, Austria